Experiencing and Envisioning Food:
Designing for Change

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Sonia Massari and Maria José Pires

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EXPERIENCING AND ENVISIONING FOOD: DESIGNING FOR CHANGE

Experiencing and Envisioning Food: Designing for Change contains papers on gastronomy, food design, sustainability, and social practices research as presented at the 3rd International Food Design and Food Studies Conference (EFOOD 2022, Lisbon, Portugal, 28-30 April 2022). The contributions explore potential solutions to current problems in the food system, and outline scenarios on the future of food and nutrition. The book aims at academics and professionals that interact with the food sector.


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PROCEEDINGS OF THE 3RD INTERNATIONAL FOOD DESIGN AND FOOD STUDIES CONFERENCE (EFOOD 2022), LISBON, PORTUGAL, 28-30 APRIL 2022

Experiencing and Envisioning Food: Designing for Change

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Experiencing and Envisioning Food: Designing for Change – Bonacho et al. (Eds)

Preface

Experiencing and Envisioning Food: Designing for Change.

The 3rd International Conference on Food Design and Food Studies, Experiencing and Envisioning Food: Designing for Change (EFOOD 2022) was held at the Lisbon School of Architecture, Universidade de Lisboa, 28-30 April 2022, Lisbon, Portugal.

The Conference theme was "Experiencing and Envisioning Food: Designing for Change".

The event was conceived as a forum for academics and experts to collaborate in an interdisciplinary and transdisciplinary way on the current food system and its food. Like the first and second conferences, it was intended to be a meeting between the world of design and food with other scientific fields. The 3rd International Food Design and Food Studies Conference, Experiencing and Envisioning Food: Designing for Change, sought to explore potential solutions to current food system problems and scenarios for the future of food and nutrition. The fundamental aim of the conference was to add value to our food and to design as a research and working methodology. This important goal could only be achieved if specific steps were taken to carry out essential tasks. In order to define this important goal, it was necessary to emphasise the benefits and the reasons. In order to achieve it, it was necessary to focus on various specific and positive processes. For this reason, the word "envisioning" was chosen for the title, as it is the ability to plan the present and activate change, taking a holistic and systemic approach, looking to the future.

The conference was organised by FORK, an international non-profit organisation whose acronym stands for "Food Design for Opportunities, Research and Knowledge", and aims to identify and demonstrate how collaboration between different actors in the food chain can make a difference. FORK was established as a global non-profit organisation of food and design experts who aim to (re)think and (re)design food systems and human diets towards healthier and more sustainable solutions. By applying a process of advocacy, promotion, and dissemination to the new field of Food Design, FORK aims to create opportunities in food systems based on research, knowledge and practice to generate new solutions for food in a transdisciplinary way.

The EFOOD 2022 conference and other concrete examples of FORK's work (World Food Design Days, Challenges for Food and Design Schools…) demonstrate that the collaboration that design can create is a game changer and supports economic, political, social, and environmental sustainability, both locally and globally.

The EFOOD 2022 conference was also designed to bring academia and industry together, and the proposed format during 3 days facilitated collaboration between diverse scientific domains.

From the 75 abstracts received, the Scientific Committee used a blind peer review process to select 54 to be presented as full papers at the conference, representing a wide range of high

quality contributions from academics, students, junior and senior designers, policy advisors and practitioners. The authors worked conscientiously and under time pressure, and thanks are due to all the reviewers on the Scientific Committee for their contributions and comments, sometimes provided at very short notice, which helped to improve the papers for presentation.

Following the conference, an open invitation was extended to all participants to contribute their insights and research by submitting papers for this proceedings volume. The aim of this initiative was to promote a diverse and inclusive platform for knowledge dissemination, allowing participants to deepen their conference contributions and share their findings with a wider audience. Following the guidelines provided by the editors, the call for papers sought to capture the richness and diversity of perspectives that characterised the discussions during the conference. This effort represents our commitment, as editors of del volume, to foster an ongoing dialogue and collaborative exchange of ideas to ensure that the intellectual momentum generated by the conference continues beyond its temporal boundaries.

Discussions and debates during the conference highlighted how several triggers are currently catalysing major changes in the food industry, driven by evolving consumer demands, technological advances and a growing awareness of sustainability and health. Speeches and projects presented at the conference showed that the key trigger is the shift in consumer preferences towards sustainable and healthier food options. As consumers become more aware of their dietary choices and the environmental impact of food production, there is a growing demand for innovative, environmentally friendly and nutritionally balanced products.

Technological advances are another key driver, long discussed by our speakers and participants, offering unprecedented opportunities for food innovation. From precision agriculture and vertical farming to blockchain technology for supply chain traceability, these tools enable the development of sustainable and efficient food systems. In addition, the use of data analytics and artificial intelligence is enabling personalised nutrition solutions that address individual health needs and preferences. Furthermore, collaborative initiatives between different stakeholders, including food producers, researchers, policy makers and consumers, are acting as catalysts for impactful change.

In conclusion, co-creating sustainable and healthy food systems means fostering partnerships that bridge different areas of expertise. The common vision that united speakers and audience during the conference was that the collaborative approach facilitates knowledge sharing, accelerates innovation and ensures that food design projects are holistic, addressing the complex interplay between health, sustainability and market dynamics.

At the EFOOD 2022 conference, FORK recognised excellence in innovation by awarding with the EFOOD Award three outstanding design projects. Selected by the project jury, these projects showcased innovative approaches in areas such as next-generation producers, next-generation consumers, next-generation food brands and next-generation restaurants.

In addition, at the end of the conference, an award was presented for the best scientific paper. The Scientific Committee selected the best scientific paper, which was awarded to the researchers and designers Wilde and Karyda , University of Southern Denmark, Esbjerg, and Umeå University, Sweden, for their paper “Co-creating Commensality”, presented on Day 1, 28 April.

After the opening speeches by Carlos Coelho; João Pedro Costa; Sonia Massari; Mariana Eidler; Raúl Filipe; Adelaide Meira Serras, the conference chair Ricardo Bonacho gave his opening remarks.

The keynote speeches of each session, all of high quality, were given by several experts in the field of food, creativity and design. The EFOOD 2022 Conference featured several high-profile keynote speeches, the texts of which are not included in these Proceedings, but a summary of which can be found in the EFOOD 2022 Catalogue-Monograph. Among them was Chef Cristina Bowerman, who spoke about the role of the chef in gastronomy and about being a role model for women in a professional world that is committed to improving and expanding the training offered in catering and management schools. Chef Yozef Youssef, a pioneer in gastrophysics - gastronomy + psychophysics - the understanding of how our senses alter our perception of flavour and taste, and one of the most established practitioners specialising in applying research in this fascinating emerging field to curate experimental dining as well as impact research projects exploring how science can be used to promote healthier or more enjoyable eating experiences for the most vulnerable - i.e. children, the blind, hospital patients. Martí Guixè, who has formulated a new way of understanding the culture of products. His work is characterised by the search for new product systems and the introduction of design into food environments. At EFOOD2022, he presented "The history, present and future of the food design movement". Mattia Busti, Agronomist, Chief Executive Officer of AWAF, Member of the Board of the Italian National Council of Agronomists and Foresters (CONAF), spoke about the role of agronomists in planning sustainable agri-food chains in Europe and the world. Rick Schifferstein, Associate Professor at the Faculty of Industrial Design Engineering, TU Delft, introduced and explained how (multi)sensory perception, food design and experience can drive innovation. Finally, Steven M. Finn, Vice President of Sustainability and Public Affairs at Leanpath, the world's leading provider of integrated food waste prevention hardware and software solutions, described how to help stakeholders take control of their food waste while engaging employees in creating a culture of food waste prevention.

The pioneering work of Studio Volpi was presented by designer and design director Patrizio Cionfoli, while Leonardo Mirone captivated the audience with his expertise in the food industry and food business, explaining how the value chain of the food we eat must be understood in all its components, in a systemic way, and then communicated to the consumer to make them more aware and responsible.

It is difficult to list all the high-level presentations that marked this edition of the EFOOD conference. The Latin American Food Design Network, as well as CUMULUS, INIAV and many others, were among the organisations that wished to support and send their greetings to all the participants.

In addition to all the parallel sessions of oral presentations, a design workshop by Jasper Udink ten Cate (on the emerging and disruptive use of algae in urban food systems) was developed and attended by around 30 participants.

Some sessions were dedicated to the presentation of design projects, which were first explained and involved young designers, students, PhD students and start-ups/innovators from the food sector.

These contributions represent a collective effort to bridge gaps between theory and practice, science and art, policy and implementation, and embody the essence of transdisciplinary collaboration in shaping a more sustainable and equitable future for food systems.

We would like to thank everyone who contributed to the EFOOD 2022 conference in April 2022 and made it such a success. See you at the next edition in Barcelona in 2024.

Editors
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Jozef Youssef, Kitchen Theory
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Experiencing and Envisioning Food: Designing for Change – Bonacho et al. (Eds)

Feeding change: Feeding minds and transforming food systems through design. A Guide to the Proceedings of the 3rd International Conference on Food Design and Food Studies

Sonia Massari, Mariana Eidler, Pedro Alvarez & Ricardo Bonacho

1 INTRODUCTION: NAVIGATING COMPLEXITY IN UNRAVELLING FOOD SYSTEMS

The intricate web of contemporary food systems is undergoing profound changes, driven by a convergence of complex factors that require urgent attention from the perspectives of scientific and technical disciplines, design and social sciences (Pereira et al 2020, Sonnino & Milbourne, 2022). At the intersection of ecological crises, socio-economic inequalities and technological advances, traditional paradigms governing the production, distribution and consumption of food are increasingly being challenged (van Berkum, & Ruben 2021). This article is an introduction that presents the themes raised by the papers in the proceedings and explores the complexity of these changes, highlighting the critical issues that define the collapsing state of food systems and the imperative for transformative action.

This introduction begins with a question about the unravelling fabric of food systems: are we at a point of no return? The confluence of climate change, resource depletion and socio-cultural change is pushing our global food systems to a tipping point, suggesting a potential point of no return (Hanlon and Carlisle 2008). The complexity of these challenges requires a nuanced understanding that goes beyond linear cause-and-effect relationships (Mazumder et al 2015). Through the lens of complexity and circularity theories (Sgroi 2022, Hamam et al 2022, Muscio & Sisto 2020), we can unravel the interconnected dynamics that contribute to the fragility of contemporary food systems and lay the groundwork for effective interventions.

In recent years, the role of design in addressing the complexities and challenges of modern food systems has received increasing attention. This paper explores how design can contribute to the transformation of food systems. Specifically, it explores the intersection of design and the food sector. Practitioners in the field aim to approach food design systematically, recognising that the holistic design approach inherent in the designer's practice has become increasingly integral to research across different thematic areas. Transdisciplinarity and plurality of thought are increasingly needed to provide a local and global framework for design-led change (Massari 2021). In addressing the multifaceted challenges of food system collapse, the importance of transdisciplinarity becomes paramount (Adefina et al 2021). This approach recognises that the issues at stake transcend the boundaries of traditional disciplines and require collaborative efforts that integrate insights from different fields. Furthermore, adopting a multiversal perspective acknowledges the plurality of knowledge systems and cultural contexts, thereby enhancing our ability to design empathetic and contextually relevant solutions (Massari 2023).

Digitalisation and ICTs are often highlighted as the catalyst or the real challenge in food system transformation, but the digitalisation of food systems presents both opportunities and risks (Ferrari et al 2023). While technological innovations offer opportunities for greater efficiency, traceability and communication, they also pose challenges related to privacy, unequal access and concentration of power (Metta et al 2022). The design community needs to address the ethical dimensions of digital interventions in food systems and ensure that technological advances are consistent with principles of inclusivity and sustainability (Vos et al 2021, Marti et al 2023, Marti & Recupero 2021).

Critiquing the status quo means designing with empathy and activating participatory design, mechanisms of co-creation that can make a difference (Massari et al 2023). When we challenge existing paradigms of food production and consumption, design emerges as a powerful agent of change. By fostering empathy with diverse stakeholders, from smallholder farmers to urban consumers, and engaging in co-creative processes, designers can generate solutions that resonate with the complexities of local contexts (Rosenzweig et al 2020). This empathetic and participatory approach is crucial to ensure the relevance and effectiveness of interventions in the changing landscape of food systems (Ciaccia et al 2019, Manzini & Rizzo 2011, Tassinari et al 2018).

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This proceedings volume aims to provide an additional tool for navigating the next decade as critical challenges and design imperatives converge in today's food design and food studies disciplines. Looking ahead, the field of design faces a number of critical challenges in navigating the evolving terrain of food systems (Bonacho 2021). Balancing technological innovation with ethical considerations, addressing socioeconomic inequalities, and developing adaptation strategies to mitigate climate impacts are among the critical tasks that require attention (Pires et al. 2018). This introductory article sets the stage for exploring these challenges and highlights the urgency of developing solutions that not only adapt to, but actively shape, the future trajectory of our global food systems.

2 3RD CONFERENCE INTERNATIONAL FOOD DESIGN AND FOOD STUDIES CONFERENCE, EXPERIENCING AND ENVISIONING FOOD: DESIGNING FOR CHANGE (EFOOD 2022)

The 3rd International Conference on Food Design and Food Studies, themed "Experiencing and Envisioning Food: Designing for Change', served as a collaborative platform for academics and experts from interdisciplinary and transdisciplinary fields to address contemporary challenges within the food system. With the primary aim of exploring potential solutions to existing food system problems and envisioning future scenarios for food and nutrition, the conference aimed to add value to both food and design as research and working methodologies. Organised by FORK, an international non-profit organisation dedicated to fostering collaboration between different stakeholders in the food industry, the conference emphasized the importance of holistic and systemic approaches in planning current actions and initiating transformative change. Through its title, 'Envisioning', the conference underlined the importance of forward-looking strategies in driving positive and specific processes towards achieving the overarching goal.

The EFOOD 2022 conference, along with other tangible examples of FORK's initiatives such as World Food Design Days and Challenges for Food and Design Schools, serve as evidence that the collaborative potential of design is transformative and contributes to economic, political, social, and environmental sustainability, both at local and global scales (Eidler et al., 2022).

The conference encompassed a range of key and complex themes, including but not limited to:

- Design for Sustainability and Agenda 2030
- Design for Social Innovation
- Design for Food Design Education
- Design for Policy and Communities
- Design for Nutrition and Health
- Design for Gastro and Wine Tourism
- Design for Gastronomy

Products, services and experiences; edible materials for food waste; food waste; solutions for food industry, producers, supply chain, retailers; technological solutions for food; new habits and diets for food consumption; local and seasonal food production; food narratives and storytelling; food experiences and multisensory experiences with food; cities and their foodscapes; landscapes and the cityscapes; food events; new practices at the table, food heritage and local foods; new models of education in food and design; new pedagogical practices with food and design are just some of the practices and areas that were touched upon during the various sessions of the EFOOD 2022 conference.

The final version of the proceedings includes 33 papers submitted under 3 main tracks:

1. Gastronomy
2. Research and education
3. Food design for sustainability

2.1 *Gastronomy: A design-centric paradigm shift through interdisciplinary collaboration*

The exploration of the reconceptualization of gastronomy emerges as an overarching lesson of the EFOOD 2022 conference, reflecting a deliberate initiative to stimulate collaborative inter- play between different sectors, including culinary arts, hospitality, sustainable tourism, and collective catering. This strategic pursuit aims to foster synergies and forge robust partnerships between gastronomy and design, recognizing the inherent alignment of values in both disciplines. At the heart of this collaborative framework is a shared commitment to fundamental principles, in particular the respect and responsibility owed to consumers, highlighting their pivotal role in shaping enlightened choices. The convergence of gastronomic and design principles acts as a catalyst, driving a paradigmatic shift that places design at the forefront of transformative innovation within the intricate fabric of gastronomic practices.

2.1.1 *Design for Gastronomy*

The conference underlined a profound lesson about sustainable gastronomy, highlighting it as a culinary approach that goes beyond simply considering the origin of ingredients. It encompasses a holistic understanding of how food is grown, transported to markets and ultimately reaches our plates, based on the fundamental principles of sustainable agriculture and respect for nature. The research prompted critical reflection on the notion of harmony within sustain- able gastronomy - is it a symbiosis between the planet and our food, or a harmonious coexistence between nature and humanity?

Contrary to common perceptions that often limit gastronomy to the aisles of supermarkets, or the realm of gourmet dishes created by renowned chefs, the conference reaffirmed the United Nations' perspective on gastronomy. It serves as a broad and complex cultural expression, closely linked to the natural and cultural diversity of the world. The valorization of this cultural expression is proving to be a powerful lever capable of contributing significantly to the realization of the goals outlined in the 2030 Agenda. This insightful exploration thus expands our understanding of sustainable gastronomy, highlighting its multifaceted dimensions and its potential to serve as a cultural force in achieving overarching sustainability goals.

2.1.2 *Design for Gastronomy, Nutrition and Health*

In the field of Design for Gastronomy, Nutrition and Health, the convergence of disciplines is becoming increasingly important to address the holistic well-being of people and the environment. The emphasis on One Health, which recognizes the interconnectedness of human health, animal health and the environment, plays a key role in this area. Designing interventions that consider the entire food system, from production to consumption, are essential to promote sustainable practices that positively impact human health while preserving ecosystems. This interdisciplinary approach recognizes the symbiotic relationship between food, gastronomy, and human and planetary health.

At the forefront of this transformative movement are chefs, food designers and consumers, who together are driving change and setting trends in food. Chefs, as culinary innovators, play a crucial role in shaping dietary choices by incorporating nutritious and sustainably sourced ingredients into their creations. Food designers, with their expertise in aesthetics and functionality, contribute to the development of appealing and health-conscious food products. Consumers, armed with increasing awareness and a desire for well-being, are actively influencing the market by seeking nutritious and ethically produced options. Nutrition trends are shifting towards personalized and preventative approaches, with an emphasis on whole, unprocessed foods. The collaborative efforts of chefs, food designers and informed consumers are not only driving health-conscious design, but also creating a positive feedback loop, that foster a culture of wellness, sustainability and culinary pleasure.

Within the field of gastronomy and design, the assembled papers offer a rich exploration of diverse facets in this intersection. "Secret Seasoning": exploring the playful potential of eating first-hand delves into the experiential dimensions of gastronomy, emphasizing the playful and immersive aspects of culinary encounters. In the paper titled "Human-nonhuman interactions for the complexity of gastronomy", the authors explore the interconnectedness between these two domains, offering illustrative examples to elucidate their symbiotic relationship. The intricate relationship between tradition and innovation is encapsulated in "Ceramics in Portuguese sweet pastry: a recipe for knowledge preservation and the reinvention of tradition," which illustrates how design elements can contribute to the reinterpretation of culinary traditions.

The exploration of gastronomic landscapes extends globally with "Proximity Index for Menus: the case of Culinária da Terra food service (Rio de Janeiro, Brazil)," which show the complex relationship between regional, local, and family food identity and menu design. The papers also address the urgent call for sustainability in gastronomy, as evident in "Strategies for promoting sustainable development goals in restaurants," which navigates the ways in which design can contribute to sustainable practices in culinary establishments.

The immersive qualities of gastronomy extend beyond taste in "Co-creating a meaningful food literary experience: A Taste of Cascais," which highlights the potential of design to elevate culinary experiences to narrative and cultural dimensions. "Ice cream therapy: Designing a food alternative to oral liquid nutrition supplements" explores the intersection of design and health, underlining the role of gastronomy in alternative nutrition solutions (older adult consumers).

In addition, the papers respond to the global health challenge in "Motivating NCDs patients with Better Dietary Experience," demonstrating the potential of design interventions to improve dietary experience of patients with non-communicable diseases. Finally, the need to address sugar intake is tackled in "Paths for reducing sugar intake in Portugal: Main findings from the SUGAR Project," underscoring the multidisciplinary approach required to address complex dietary challenges. Taken together, these papers collectively contribute to a nuanced understanding of the intricate relationship between gastronomy and design, reflecting the diverse and dynamic landscape of culinary exploration.

2.2 *Research and education: Bridging data and values for concrete action in transdisciplinary food practices*

The conference, through its diverse range of papers and keynote speakers, played a pivotal role in deepening the dialogue and fostering robust discussions on the intersection of data, values and actionable initiatives in the context of food studies and design. The imperative to move beyond data and values to tangible action, as highlighted in the conference discussions, underscores a strong commitment to cultivating a transdisciplinary and collaborative ethos in the field of food. The insights shared during the conference not only reinforced the importance of translating data and values into actionable initiatives, but also offered nuanced perspectives on the challenges and opportunities within the complex landscape of food systems.

The contributions presented at the conference served as a catalyst to empower researchers and practitioners, providing them with innovative knowledge

and design strategies. This collective knowledge, disseminated through papers and presentations, contributes significantly to the ongoing discourse in the field. The conference's specific focus on the intersection of research and education enhances its significance, as it actively works towards equipping future generations with the necessary tools to navigate the complexities inherent in food systems.

By adopting a transdisciplinary framework, the conference exemplifies a commitment to harnessing the collective expertise of different disciplines. This collaborative endeavor, as high- lighted in the conference discussions, forges an integrative path that not only advances sustainable practices, but also facilitates impactful advances in the field of food studies and design. In essence, the conference serves as a dynamic platform that not only advances the field, but also provides a forum for an enriched and evolving dialogue that shapes the trajectory of future food research, education and practice.

The papers included in these proceedings of the EFOOD 2022 conference contribute significantly to the global discourse on Research and Education by offering a rich array of insights, methodologies and case studies. These papers delve into the intricacies of urban challenges and provide nuanced perspectives on how design can effectively address social issues in different contexts. The papers present innovative approaches and transdisciplinary methodologies that highlight the importance of engaging communities, fostering inclusivity and reimagining urban spaces. By exploring real-world applications and successful interventions, these papers provide valuable lessons and best practices for practitioners, educators and policy makers working at the intersection of design and social innovation. Together, they elevate the global debate on the transformative potential of design for social innovation, highlighting its role as a dynamic force in shaping more equitable, resilient, and sustainable urban futures.

2.2.1 *Food design education*

In the field of design studies and pedagogy, the call to 'translate data and values into concrete actions' is in line with the principles of participatory design and action research. Participatory design theory emphasizes the active involvement of end-users in the design process, ensuring that their values, needs and experiences are integral to the final outcome (Eidler, 2022). This approach facilitates the translation of data into actionable solutions by fostering a collaborative environment in which stakeholders actively contribute to the decision-making process.

Similarly, action research, rooted in transformative learning theories, supports the idea of translating data and values into concrete actions. It involves a cyclical process of planning, acting, observing and reflecting, emphasizing the integration of theoretical knowledge with practical experience. This methodology is particularly effective in educational settings, where students and researchers can engage in real-world problem solving and translate insights derived from data into concrete actions.

The proposal to 'promote a transdisciplinary and collaborative approach to food' is in line with 'the concept of transdisciplinary design thinking and problem-based learning' (Massari, 2021). Transdisciplinary design thinking encourages collaboration between professionals from different fields and fosters an environment where researchers and practitioners can bring their unique perspectives to the table. Problem-based learning, a pedagogical approach rooted in constructivist theories, promotes collaborative problem solving and enables individuals to work across disciplines to address complex challenges. These approaches empower researchers and practitioners to co-create new knowledge and design innovative tools and policies, ensuring a holistic and forward-looking approach for the benefit of future generations.

Over the last decade, the development of food design education has undergone a transformative shift in line with the principles of transdisciplinarity and participatory methodologies (Massari 2021). Curricula have expanded beyond traditional boundaries to incorporate insights from fields such as nutrition, environmental studies and sociology. This interdisciplinary approach has enabled students to develop a more comprehensive understanding of the complexities inherent in the food system. Reflecting on this development, the shift towards experiential and collaborative learning has become a cornerstone. Students are not just recipients of knowledge but active contributors, engaged in hands-on projects that require the translation of data and values into tangible design solutions.

However, as the landscape of food design education continues to evolve, there are identifiable skills and competencies that require further emphasis. Beyond technical proficiency, there is an increasing need for students to hone their skills in cross-cultural communication, ethical considerations and systems thinking. The ability to navigate and understand diverse perspectives becomes paramount as food design is inherently linked to cultural, social and environ- mental contexts. In addition, cultivating a strong foundation in sustainability and circular design thinking is essential to addressing the pressing challenges in the global food system.

"Making sheep milk consumption more attractive through positive product interaction" introduces a design-driven approach to enhance the appeal of sheep milk, offering a case study that has educational implications in product development and marketing. "Chefs as change- makers: Updating a creativity model for sustainable Haute Cuisine" contributes to culinary education by revisiting the creativity model for haute cuisine in the context of sustainability, providing educators with innovative frameworks.

"Changing the world, one meal at a time: critical & fictional approaches in design education" represents an innovative fusion of critical and fictional approaches in design education, expanding the pedagogical boundaries in gastronomy and design

studies. “Cooking in health care – a new approach to a new profession” introduces a groundbreaking approach to culinary education by exploring the intersection of gastronomy and healthcare, offering insights into a novel profession.

“Food Design in China - A visual analysis based on VOSviewer” provides a visual analysis of food design in China, contributing to a global understanding of gastronomic education and design practices. Finally, “Food Design as a link between Design and Gastronomy in higher education” emphasizes the interdisciplinary nature of food design, elucidating its pivotal role in bridging design and gastronomy education at the tertiary level.

As we delve into the discussions and presentations at this conference, it is evident that the papers and speeches are not merely reflections of the past, but serve as beacons that illuminate new horizons in the field of food design education. The interdisciplinary nature of the dis-course fosters a rich exchange of ideas, pushing the field towards a more inclusive and forward-looking future. The emphasis on transdisciplinary collaboration, participatory approaches and the integration of emerging technologies opens exciting possibilities for the next generation of food designers and researchers. By collectively addressing identified skills gaps and embracing a holistic educational paradigm, these contributions pave the way for a more resilient, innovative and ethically conscious future in food design education.

2.2.2 *Design for social innovation*

Finally in the current landscape of urbanization and societal challenges, the emergence of Design for Social Innovation (DSI) represents a critical paradigm shift in design studies. Operating at the intersection of design, social sciences and community engagement, DSI represents a transformative approach to addressing the complexities of contemporary urban environments. The significance of DSI lies in its ability to act as a catalyst for re-imagining systems of relationships, models and assets within cities, fostering new alliances and transdisciplinary ways of working. This approach is particularly relevant as the complexities of today’s world require innovative solutions that transcend traditional disciplinary boundaries.

Cities, as dynamic and interconnected ecosystems, are grappling with multifaceted issues ranging from social inequalities to environmental sustainability. Design for Social Innovation becomes a strategic tool to address these challenges by engaging diverse stakeholders, including citizens, policy makers and businesses, in a collaborative and participatory design process. Through this approach, cities can become incubators for innovative solutions that address pressing societal issues by harnessing the collective intelligence of their inhabitants.

The contemporary world is characterized by unprecedented social and environmental change, requiring a collective design operation to navigate and reshape our social systems. Design for Social Innovation is emerging as a pivotal force in this operation, promoting a paradigm where design is not only aesthetically driven, but deeply embedded in social impact. The call to rethink relationships, models and assets is a response to the evolving needs of our cities and societies and requires us all to actively participate in this ongoing design endeavor. The inter- disciplinary and transdisciplinary nature of DSI positions it as a transformative force capable of generating meaningful and sustainable solutions, thus contributing to the creation of more inclusive, resilient, and adaptable urban environments.

In the field of research and education, the curated papers included in this proceedings Volume offer a diverse and comprehensive exploration of topics at the intersection of gastronomy and academic inquiry. “The contribution of gastronomy tourism to the branding strategy of a city” investigates the educational implications of local cultural heritage and gastronomy in the context of city branding, illustrating the multifaceted role that food plays in shaping a location’s identity. “Co-creating Commensality” emphasizes participatory design and approaches, highlighting the transformative potential of communal food experiences in learning and sup- porting participants to leverage commensality as a way of infrastructure their development as agents of change.

“Transformative Times – Rethinking Food” delves into the evolving landscape of food and its implications for education, signaling a dynamic and evolving approach to teaching and ongoing research on how systems thinking can address current food challenges to create new methods and innovative solutions to existing food chains.

Addressing societal paradoxes, “Hunger challenges in the land of plenty: how design can change the paradox of food waste” explores how design thinking can be instrumental in addressing critical issues such as food waste, thereby offering an educational lens to sustainability.

“Food and celebrations: the fanniid as a food heritage” is an extract from the author’s doctoral thesis which is about sugar and fanniid and explores the cultural dimensions of food, providing insights into how gastronomy (with its cultural values) can be intricately woven into heritage studies, showcasing the potential for interdisciplinary approaches and knowledge transmission. “The “Matchmaker”: From Food & Literary Studies to Reception & Memory Studies” bridges gastronomy with literary and memory studies, presenting an interdisciplinary experiment adopted in Master classes that enriches educational perspectives.

Together, these papers collectively contribute to the expansive and dynamic landscape of gastronomy research and education.

2.3 *Designing food and sustainability: Feeding our planet with a purpose*

2.3.1 *Food design for sustainability*

Within the dynamic field of design studies, recent trends in food sustainability design have shown a notable shift towards a more holistic and systems-oriented approach. Beyond the traditional focus on food and service products, contemporary scholarship emphasizes the critical importance of systems thinking. Scholars are increasingly recognizing the interconnectedness of different elements within the food system - from production and distribution to consumption and waste management. This systems perspective allows designers to address complex challenges at each stage, thereby promoting sustainability at a macro level.

Empathy has emerged as a central tenet of food sustainability design, recognizing the diverse needs, values and cultural contexts of individuals in urban, peri-urban and rural settings. Designers use empathetic methods to understand the intricacies of local communities, ensuring that sustainable solutions are culturally relevant and socially inclusive. This empathetic lens extends beyond the immediate needs of the user to include broader societal and environ- mental considerations, in line with the principles of regenerative design.

Creative thinking has become a pioneering and impactful approach to creating transformative change in food sustainability design. Academics and practitioners are exploring innovative and imaginative solutions that go beyond incremental improvements. From reimagining urban spaces for community gardens to designing regenerative agricultural practices in rural areas, creative thinking serves as a catalyst for novel interventions that address sustainability challenges. This approach seeks not only to solve immediate problems, but also to anticipate and adapt to future changes in the global food landscape.

The integration of design thinking into food sustainability initiatives promotes a paradigm shift in how challenges are approached and addressed. Design thinking encourages a human- centered and iterative approach, enabling designers to co-create solutions with end-users, stakeholders, and communities. The participatory methodology amplifies the impact of sustainability efforts by ensuring that solutions are not only effective, but also resonate with the people they serve. Recent trends collectively represent a paradigm shift towards more comprehensive, empathetic, and creative approaches to food sustainability design that go beyond product-centric perspectives to embrace the systemic, cultural, and societal dimensions of the food system.

In the rich tapestry of papers presented in these proceedings, there is a remarkable and comprehensive coverage of the field of food design for sustainability. The diversity of papers ranges from “Feeding the metropolis: Exploring ways to map food procurement in Barcelona”, which offers insights into urban food dynamics, to the multifaceted exploration of regional cuisines as seen in “Depicting the Setúbal Peninsula cuisine: Influences from the sea, mountains, and river in the regional food and restaurant models”. In “Making Data Digestible” article, the authors introduce the intricate theme of the connection between data, awareness, and sustainable lifestyles. The inclusion of “Ecolabel SOU Sustainability Origin UFRJ” delves into entrepreneurship and innovation in gastronomy, while “A semi-systematic literature review on Design in Open-Source Agriculture” offers a scientific perspective on the intersection of design and agriculture. In the article “Taxonomic System of Organoleptic Representation: A Case Study in the North of Portugal”, the case study plays a crucial role in highlighting the importance of the study area in the North of Portugal, while also serving to validate the methodology used.

The papers also take a forward-looking approach, with contributions such as “Envisioning sustainable futures through co-creation of cocoa food products” reflecting a commitment to shaping sustainable narratives in the food market and industry. The exploration of “Gastronomic culture and design education” adds an educational dimension to the discourse. The inclusion of “Development and acceptance of sourdough breads fermented by endogenous yeasts of Pyrus communis, Malus domestica and Pistacia lentiscus” underlines the importance of local and NUCs resources in sustainable food practices.

Some papers explicitly focus on transdisciplinary and ecological perspectives, such as “The sustainable food design hub: a transdisciplinary approach for ecological transition” and “Circular food waste biomaterials design for the food industry: exploring its potential”. Both are interesting examples that demonstrate the multi-dimensional scope of food design for sustainability and introduce the importance of a multi-actor approach in all parts of the food and supply chain. The paper “Fostering empathy and co-learning skills to drive companies towards sustainability 2030: design thinking as a metabolic approach” not only recognises the vital role of empathy in understanding different stakeholders, but also underlines the importance of co-learning and co-creativity as a dynamic process for knowledge sharing within companies and business environments.

3 FOOD SUPPLY CHAIN AND FOOD INDUSTRY: STAKEHOLDER INVOLVEMENT, CO-CREATION, AND INNOVATION FOR SUSTAINABLE IMPACT

The conference presented the need to reshape the landscape of the food industry and supply chain, underlining a commitment to stakeholder engagement, co-creation and innovation. The conference

aimed to create a collaborative ecosystem in which stakeholders actively contribute to the process of transforming the food industry. This approach was emphasized in several speeches and discussions, where food innovation and sustainable entrepreneurship were recognized as key drivers for the current and future state of the food industry.

It is noteworthy, however, that while these themes were central to the discussions during the conference, they were not extensively addressed in the papers published in these proceedings. However, their fundamental role in shaping the discourse was clearly evident in the food design and food projects presented in the conference's dedicated sessions. The collaborative and innovative endeavors discussed in these project presentations underscored the urgent need for deeper exploration and integration of these issues into the academic and research discourse, highlighting their real-world significance and potential for transformative impact. The synergy between stakeholder engagement, co-creation and innovation, as exemplified in the projects presented, formed the basis of a transformative ethos that is driving the food industry towards resilient and sustainable practices. By intertwining these principles, the conference sought not only to present the current state of the food industry, but also to cultivate an innovative and environmentally conscious narrative for its trajectory into the future.

The main findings of the discussions that took place during the conference, which we would like to highlight in this article, are as follows:

1) In the field of food innovation, the current landscape is characterized by dynamic triggers that are driving transformative change based on the complex interplay of consumer behavior, technological advances and the imperative for sustainable practices.
2) Key among these triggers is a discernible shift in consumer preferences, reflecting a growing awareness of the environmental and health impacts of food choices. This conscious evolution underlines the demand for novel, sustainable and nutritionally sound food products.
3) At the same time, technological breakthroughs ranging from precision agriculture to advanced analytics are reshaping the food industry, offering unprecedented opportunities for efficiency, traceability and personalized nutrition.

Our conclusion as FORK Food Design organizaton, (which included food innovators, scientists and pioneers), we advocated during the conference that creative design projects develop strategies that integrate these drivers. This includes understanding and adapting to consumer trends, using technological tools for efficiency and transparency, and fostering interdisciplinary collaboration to drive innovation. Successful food design projects should prioritise consumer education, emphasising the benefits of sustainable and healthy choices. They should also use technology to optimise production processes, reduce waste and improve nutritional quality. By aligning with current drivers and adopting a collaborative, multi-stakeholder approach, food innovation projects can play a key role in co-creating sustainable and healthy food systems that meet the evolving needs of consumers and the planet.

During the EFOOD 2022 conference, innovation was recognised with the presentation of the EFOOD Award by FORK to three pioneering design projects, carefully selected by the project jury. These projects focused specifically on the next generation of producers, consumers, food brands and restaurants. The selection of these categories was not arbitrary, but was the result of extensive consultation with the dedicated Innovation Committee. Throughout the jury's deliberations, many points of reflection and analysis emerged, which subsequently informed improvements and practices for future editions. Of particular focus was the discussion around project impact and what it means for a project to achieve transformative power, to outperform or stand out from others in terms of significance.

4 CONCLUSIONS

The papers included in the proceedings of this conference exemplify a remarkable transdisciplinary approach, bringing together experts, leaders, and visionaries from different fields for three days to share best practices and develop services that open up new models for implementation. These individuals, all pioneers in their respective fields, embody a collective commitment to advancing sustainable food systems through a multifaceted lens. The transdisciplinary nature of these contributions is evidenced by the convergence of concepts such as agriculture, biodiversity, and conservation, highlighting the intersectionality of environmental and agricultural practices within the broader context of food sustainability design. In addition, the papers delve into the complex realm of institutional food preparation and consumption, addressing critical spaces such as schools, hospitals, and prisons. The transdisciplinary lens here goes beyond culinary considerations to address issues of social and economic justice embedded in regional food systems. These papers transcend traditional disciplinary boundaries, recognizing that addressing such complex challenges requires collaboration between designers, policy makers and social justice advocates.

The conference proceedings further expand the transdisciplinary dialogue by exploring issues such as food literacy, culture, and education in the design field. Scholars and practitioners in these papers navigate the nuanced connections between gastrophysics, the science of culinary experience,

and the imperative to reduce food waste. Experiential innovation emerges as a key concept, highlighting the need to reimagine food systems through design thinking.

Conference participants came from every continent (except Antarctica) and 19 different countries. The range of topics, contributing disciplines, places of origin, and the timeliness and depth of the papers and research presented make these proceedings a very good representation of the current state of academic research (but not only) and applied projects in food design, creativity and sustainable food systems.

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Gastronomy: A design-centric paradigm shift through interdisciplinary collaboration

Design for gastronomy


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Experiencing and Envisioning Food: Designing for Change – Bonacho et al. (Eds)

"Secret Seasoning": Exploring the playful potential of eating first-hand

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ABSTRACT: In this paper, we present the outcomes of a design-led exploration into the playful potential of eating. Building on a body of first-person artistic experiments around eating, we articulate 8 forms of playful eating that transcend existing works in gastronomy by giving diners an active role. Our contribution is threefold: First, we present 8 provocative forms of playful eating so designers can embrace them in their work; Second, we provide examples of our artistic experiments that instantiate those playful eating forms and make them actionable; Third, we share our autobiographical accounts of engaging with those play-food experiences, as well as the responses from other stakeholders in a public exhibition we set up. Overall, our contribution will inspire chefs and other designers to embrace a more diverse palette of play-food experiences in their work.

1 INTRODUCTION

Food is a popular area of interest for design research (Zampollo, 2016). Recognizing the multifaceted importance of food practices and systems—for our bodies, culture, communities, and the environment at large—researchers explore how to enhance human-food interactions by design. A subset of that research focuses on the experiential texture of eating. Within that space, scholars explore how to craft or otherwise enable eating experiences that are socially, culturally, and/or emotionally rich. They embrace food as something far greater than a source of nutrients and investigate how to respond to such multifaceted significance by design.

Inspired by work on the socio-cultural dimension of eating (Douglas, 1972; Germov & Williams, 2017; Poulain, 2017), we turn to play and playfulness to explore how to enrich its experiential texture. By reclaiming the playful potential of food consumption, we hope to broaden the set of experiences available in gastronomy. We build on recent calls for increasingly playful approaches to food design (Altarriba Bertran & Wilde, 2018) and food-tech innovation (Altarriba Bertran & Wilde et al., 2019b; Grimes & Harper, 2008; Mueller et al., 2020), which suggest that the palette of play-food experiences available in today's gastronomic landscape is narrow. There is a need for transcending mainstream ideas of what it might mean to play with food.

Here we argue that, through play(ful) design, we may be able to entice people to engage more (and more consciously) with their food—and, in turn, help to reverse a trend of growing indifference towards food practices, and systems, which hinders our nutrition (Schmidhuber & Shetty, 2005), social cohesion (Euromonitor International, 2016), and the environment (Akotia et al., 2019; Clapp, 2015) alike. Thus, to support chefs and other designers to embrace a more diverse idea of what it may mean to play with food, we present a design-led exploration into the playful potential of eating. Through a combination of first-person (Marshall & Mead, 2005), artistic (Frayling, 1993), and design-led approaches (Gaver, 2012), we experimented with (and reflected on) ways of playfully reconfiguring our meals. As a result of that process, we identified 8 exciting forms of play-food that might currently be underrepresented in gastronomy, as well as several ways in which they could be creatively designed for. We thus present a three-fold contribution: (1) a collection of inspirational exemplars of playful eating; (2) a synthesis of those exemplars' underlying mechanisms; and (3) our reflections from inviting people to experiment with and make creative use of the above inspirational material. Overall, our work provides food designers with *generative* (Gaver, 2012) knowledge: inspirational ingredients that can guide the design of eating experiences that are increasingly fun.

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2 BACKGROUND

2.1 *Food and eating as a societal concern*

Eating is a fundamental part of human life. It nourishes our bodies, brings sensorial pleasure, creates opportunities for socio-cultural flourishing, and connects us with the environment. It is far more than an act of biological survival: it is an inherently hedonic, cultural, and social phenomenon (Douglas 1972; Ochs and Shohet 2006; Warde and Martens 2000).

Research shows a decrease in the time people invest in eating (Zeballos & Restrepo, 2018). More and more, people lead irregular diets and skip meals (Akotia et al., 2019); though meals have long been important for socialization (Douglas, 1972), people increasingly eat alone (Akotia et al., 2019) while engaging in mindless tasks (Euromonitor International, 2016). Such multifaceted detachment from eating—and other food practices—has serious implications: for our bodies, e.g. leading to growing obesity rates (Schmidhuber & Shetty, 2005); for society, hindering socio-cultural development (Euromonitor International, 2016); and for the planet, e.g. de-sensitizing people from their environment (Akotia et al., 2019; Clapp, 2015). Recent studies suggest that promoting more mindful ways of eating might help to reverse those trends (Hurst & Fukuda, 2018).

2.2 *Why playing with food?*

We argue that play and playfulness can help to reclaim the social, emotional, and cultural function of our food practices, and in turn to foreground the importance of leading more active, engaged, and conscious food lives. Just like eating, play is a key part of human life (Brown, 2009; Brown & Juhlin, 2015; Caillois, 2001; Huizinga, 1950; Sicart, 2014). Even if it does not yield materially productive results, it can be socio-emotionally productive (Sharp & Thomas, 2019). Here we discuss 3 qualities of play that are highly relevant in the context of eating:

First, *play brings joy* to unstimulating situations as it is intensely pleasurable (Brown, 2009). Playful experiences can help us to approach the table as an ephemeral playground where we can explore and detach from boredom and isolation—feelings we increasingly experience at mealtime and that have negative nutritional (Chae et al., 2018) and psychological (Kimura et al., 2012) effects. Second, *play provides us with a feeling of agency*: it allows us to choose, act, and express ourselves in ways that feel meaningful (Huizinga, 1950; Sicart, 2014). By food design, we can help to cultivate those qualities in our meals, empowering people to play a more active, conscious, and creative role in them. Finally, *play can bring people together* (Isbister, Márquez Segura & Melcer, 2018), which is highly relevant as social interaction is key to our wellbeing (Isbister, 2016) and a key reason why people eat (Douglas, 1972).

These experiential qualities of play—joy, agency, and social connection—are desirable social goods that can have positive effects on our wellbeing. We argue that food designers should cultivate them. We hope our work inspires a move towards increasingly rich and diverse play-food experiences.

2.3 *Related works in play-food design and research*

Play-food design has received attention lately. In fine dining, chefs have long tried to imbue their creations with an element of play—the so-called "play-food" (Regol, 2009). In a study of contemporary fine dining, Altarriba Bertran & Wilde (2018) noted that "play-food" experiences often center on a very particular understanding of play in which diners take the rather passive role of "sitting and contemplating" (Regol, 2009), while chefs amuse them through captivating, mysterious, surprising experiences. While there are exceptions, it is uncommon to find gastronomic creations that provide diners with a more active role. That is at odds with many forms of playful engagement that have interactivity as a core component. There is an opportunity for broadening ideas of what it means to play with food and thus enrich the palette of play-food experiences available to diners.

In the arts, the intersection of food and play has been explored from a more interactive and experimental perspective. An example is *Mealing*, an artistic cup designed by Martí Guixé (2010) that has a set of tasks written on it (e.g. "communicate", "listen", "eat at end") as well as a series of food items (seeds, mini snacks…) people can eat after completing the tasks. The cup is meant to provoke different ways of engaging and socializing in public events. These kinds of artistic play-food interventions often extend the work of gastronomic chefs through more radical, experimental, and subversive forms of play—giving diners a more active and empowered role in the experience. Their aim is not necessarily to enrich the experiential texture of meals that take place outside the domain of art and artistic practice, but rather to use artistic meals as a form of creative provocation.

Play-food has also been explored in technology and experience design. A recent review of playful technology design revealed that works in this space often embrace a narrow idea of what it might mean to play (Altarriba Bertran & Wilde et al., 2019b)—a limitation that resembles that of gastronomic restaurants, as seen above. In response, design researchers have begun to explore how to incorporate more interactivity in food designs—technological and non—and thus enrich the palette of play experiences available in gastronomy. For example, Grimes and Harper (2008) proposed to think about future mealtime tech as a tools for celebrating the joy of eating in community; Wilde & Altarriba Bertran (2019) proposed designing play-food meals by involving diners in the ideation process; Altarriba Bertran et al. (2020)

explored food traditions and rituals to distill play-forms that might inspire culturally grounded playful food design; or Gupta et al. (2021) explored how narrative-based food experiences (such as the ones we sometimes see in gastronomic restaurants) could be made more interactive through technology.

Our work aligns with those efforts towards exploring increasingly rich forms of playful eating. To continue to broaden possibilities in this space, we present an exploration of the playful potential of eating from a first-person perspective; we highlight exciting opportunities derived from our hands-on experiments with playing with our food. Below we describe our research process and outcomes.

3 METHOD

The aim of our study was to broaden perspectives on what it may mean to play with food, to support the design of increasingly playful eating experiences. To that end, we used a combination of first-person research (Marshall & Mead, 2005) and research through design (Gaver, 2012), which are suitable for conducting *generative* research like ours (Gaver, 2012). Importantly, we did not aim to provide a comprehensive account of all the ways in which one may play with food, nor to unpack the behavioral and sociological implications of playful eating. Rather, we explored, foregrounded, and made accessible to designers a range of relevant experiences that might currently be underexplored in food design. Our process included three phases: (1) first-person artistic exploration, (2) design-oriented analysis, and (3) community consultation. We unpack them here:

3.1 *Phase 1: First-person artistic exploration*

The study began with a first-person artistic exploration. Over the course of 17 months, the first author imagined, prototyped, experimented with, and reflected on a plethora of ways of playfully reconfiguring the act of eating. Her artistic exploration involved 100+ experiments where she created and consumed dishes involving uncommon ways of eating. An example is "Arm Plate", which involved placing food on the inside of the forearm and using it as a vessel to lick and eat from (Figure 1D).

At that stage, the experiments were not yet conceived as academic research; the first author conducted them as part of her artistic practice, with no other intent. They were motivated by a pressing need to connect more with her body and with the food during meals: noticing that she often ate alone, in front of a screen, she hoped to enable herself to eat more mindfully. While a systematic protocol for data collection was not formally envisioned from the onset, the artist autobiographically documented her work using Instagram[1]. For each experiment, she made a post including: one or more photos/videos of the play-food experiment; an artistic name; a description of the experiment; and a brief account of her own experience of engaging with it.

3.2 *Phase 2: From artistic practice to analysis*

The first author's artwork gained visibility on Instagram over time. Through a series of informal, collegial conversations, the two authors discussed the experiments as a potential source of insight into playful eating, an analysis of which might inspire chefs and other food designers. We decided to collaborate to do such analysis.

The second phase of the study involved a qualitative analysis of the play-food experiments. Using a combination of visual content analysis (Bell, 2001) and reflexive thematic analysis (Braun & Clarke, 2021), we examined the Instagram posts with the aim of uncovering interesting forms of playful eating that might inspire the design of increasingly playful eating experiences. We built on the Situated Play Design (SPD) methodology (Altarriba Bertran et al., 2019), which proposes to explore forms of play and playfulness in people's existing lived experiences (i.e. *play potentials*) and distill them into generative knowledge other designers can use to create.

To do that analysis, we collected the first 100 experiments on a shared document. We decided to limit analysis to the first 100, even though the list continued (and still continues, as of 2022) to grow. Once collected, we did a first round of inductive coding, independently, followed by a meeting where we contrasted our early lists of codes and negotiated one that generated consensus. Our focus was to surface commonalities in the forms of playful eating expressed in the pool of play-food experiments.

Our first round of analysis yielded a list of 10 codes—i.e. 10 different forms of playful eating. In a second round of analysis, we clustered all the play-food experiments thematically using these codes as a starting point. In a subsequent meeting, we collated our independent analyses and consolidated the thematic clustering of the play-food experiments based on their underlying playful eating forms. That helped to sharpen the final list of codes (i.e. playful eating forms) from 10 down to a list of 8.

Through those two rounds of thematic analysis, we thus surfaced 8 forms of playful eating that, we argue, transcend mainstream approaches to playful eating found in the gastronomic industry and in commercial food design. We suggest that they have inspirational value: they foreground exciting, fun ways of eating that are as experientially rich as commonly underexplored. Building on the SPD methodology (Altarriba Bertran et al., 2019), we frame those playful eating forms as

1 See Instagram account: https://bit.ly/3TOY90L

play-food potentials: forms of playful eating that are grounded in real, situated lived experiences and that can inspire increasingly playful eating experiences and designs.

3.3 *Phase 3: A catalog and exhibition of play-food experiments*

The last phase of our study involved dissemination of our play-food potentials (i.e. the findings from our analysis) and underlying play-food ingredients (i.e. the artistic, first-person experiments that motivated them). Importantly, the previous phases of the study reflected our voices and perspectives—the first author's, through self-experimentation and later reflection; the second's, through second-person reflection. However rich and valuable those perspectives were—first-person methods are recognized as a valuable form of qualitative inquiry within design research (Marshall & Mead, 2005)—we set out to broaden them by exploring other people's.

Hoping to learn about other stakeholder's thoughts about the play-food forms uncovered by our research, we created an inspirational catalog that presents the 8 play-food potentials and illustrates them with a selection of play-food experiments from Phase 1 of the research. We framed those experiments as actionable ingredients for implementing the play-food potentials, as they provide tangible and nuanced ideas of how these play-food potentials can materialize. We called the catalog "Secret Seasoning", after the name the first author gave to her artistic work, and presented it as an inspirational guide for playful eating. We printed and distributed it through our personal and professional networks.

We also set up an exhibition featuring a representative selection of the catalog's content. We used it as an opportunity to gauge people's reactions to our work, to invite them to discuss it with us, and to engage them in voluntary, playful, and lightweight creative exercises using our work as inspiration. We deployed the exhibition twice, in Spain and Belgium; ~40 people visited it, 21 of which actively engaged us to discuss the work. We consider the latter our research participants; they consented to participate in our research either verbally during the workshop or via WhatsApp. A reflexive thematic analysis (Braun & Clarke, 2021) of the notes, photos, and videos produced during the exhibitions allowed us to broaden our perspectives from the analysis done in previous phases of the study with the views and lived experiences of others. We report on the combination of those findings below.

4 RESULTS: AN INSPIRATIONAL LIST OF PLAY-FOOD POTENTIALS & INGREDIENTS

The aim of the process described above was to unpack and make actionable to designers a set of play-food experiences that might be currently overlooked in food design. In this section, we present the findings from our study as 8 *play-food potentials*, i.e. 8 forms of playful eating that we found interesting and potentially inspirational. For each of those play-food potentials, we: (1) unpack their underlying form of playful experience; (2) provide "ingredients" to empower designers to design for it, in the form of examples of play-food experiments included in our catalog; and (3) give an account of both the first author's and our research participants' lived experiences with and thoughts about those playful eating experiences. Overall, we this section will provide designers with actionable inspirational starting points for incorporating elements of playfulness and interactivity into their food designs and experiences.

#1 Edible story worlds, our first play-food potential, has to do with the idea of enriching eating experiences with a narrative overlay. It uses storytelling as a tool to add an element of playfulness into a meal. Importantly, as opposed to the rather passive forms of storytelling and narrative we often see in gastronomic restaurants (see Section 2.3), this play potential builds on the idea that the diner should be able to actively participate in the story, either as a principal actor or even as a creator. It stimulates the eater's imagination to help them to become conscious of a story while eating. An example of "Edible story worlds" is "Avion" (Figure 1A), where the artist pasted figurative elements on her fork to make it look like a plane. During that meal, she found herself imagining taking off, landing, and flying her fork from and to various destinations while managing to land the plane-fork into her mouth with a heap of spaghetti.

According to the first author's autobiographical accounts of eating "Edible story worlds"—"Avion" and beyond—adding a narrative layer to eating can make meals more meaningful. As food becomes part of a larger story, eating is reframed into a richer, more joyful experience that often has a humorous touch. In our conversations with exhibition attendees, we explored how to enable narrative-based eating experiences: When provided with small food items (cheese cubes, cherry tomatoes, crackers…) as well as toothpicks with different kinds of drawings pasted on them (swords, unicorns, a lightning…), people were generally able to let their imagination flow. For example, two attendees started making little scenes on paper, letting toothpicks with cheese cubes fly over a scenery of cucumber trees representing a park. Differently, when provided only with a plate of spaghetti Bolognese (no props involved), attendees struggled to make up stories and shifted attention towards pragmatic ways of eating. We thus suggest that, to afford "Edible story worlds", using pre-prepared props such as our thematic toothpicks might be necessary; else, it may be too much for diners to have to invent a story taking as a point of departure a commonplace dish of ordinary food.

#2 The estrangement of things, our second play-food potential, messes with the tools that are

used for eating. It disrupts commonplace ways of eating in two ways: First, by preventing the eater to handle cutlery as one normally would do. For example, in the experiment "Nose Fork" (Figure 1B), the artist used a fork as an extension to her nose. While she thought it might be easier to eat with the fork closer to her mouth, the experiment turned out to be challenging. Since her hands became useless for eating, she concentrated on her face as a point of attention, and she felt like she was learning a new skill.

Suddenly, she was moving an unusual part of her body (mainly, the neck) to put food into her mouth; a challenge that added great fun to the experience as the artist kept trying to defy the food and the laws of physics with her nose-fork. A remarkable moment in the experiment was when the artist eventually gave up and dived into the plate with her full face to get a bit of food into her mouth—a cheating moment that brought about a great deal of joy.

A second way of experiencing "The estrangement of things" inserts playfulness into the meal is by using tools that are hardly associated with eating. For example, in "Toothbrush" (Figure 1B) the first author replaced her usual cutlery with a toothbrush. As she had a strong mental idea of the brush's usual flavor of toothpaste, she found it weird to taste yogurt instead. It was also strange for her to scoop food with the toothbrush instead of squeezing toothpaste on top of it. Using such an uncommon utensil also implied new movements she had never done before while eating her food. It thus added an extra sensorial layer to the meal as well: the texture of the brush stimulated the artist's tongue.

According to the artist's first-person experience of experiments involving "The estrangement of things", by incorporating new objects into the meal the diner can discover how different textures and properties change the perception of food. These new tools invite disrupting old associations and building new connections. Likewise, being playful with the tools one uses for eating invites rethinking one's commonplace practices. As the first author experimented with her eating tools, she repeatedly challenged her brain and muscles to adapt to the new eating situation. She also broke many conventions and pre-set ideas about certain objects as she used them to handle food with. Keeping an open mind while being aware of those prejudices brought intense joy during those experiments.

That joy resonated with many attendees of our exhibitions. For example, when invited to explore how to use a clothespin as an eating utensil, people surprisingly discovered that a clothespin might in fact be a useful grabbing tool provided the food at focus is not too thick or fragile. As they experimented with that unusual utensil, they enjoyed the process of learning how to not squeeze cherry tomatoes too much (to avoid them splashing open), or turning the clothespin in spaghetti as if it was a normal fork. These carefree explorations, all with their own share of playful failure, were both fun and learningful. Seeing people's enthusiasm to explore how to eat with those unusual tools and in those unusual ways, we thought that "The estrangement of things" might be an interesting entry-level form of getting people to eat more playfully, as it still respects their comfort zone by giving them the control of handling the objects and tools however they please.

#3 Displaced food entails placing foods in unusual settings, i.e. beyond the table or picnic blanket. Consuming food in an atypical environment, whether indoors or outdoors, disrupts old associations and challenges the eater to get rid of certain ideas and standards. An indoors example of "Displaced food" is "Chocolate Window" (Figure 1C): the artist placed melted chocolate on a (clean) window in her house and then licked the chocolate straight from it. Exploring a new food surface and eating posture—she was licking the chocolate while standing in front of the window—led to the discovery of new human-food interactions, e.g. using the tongue to draw and write on the chocolate. According to her autobiographic account of the experiment, such displacement of food came with a feeling of creative agency.

At the exhibition, many attendees expressed disgust when seeing some of the artist's "Displaced food" experiments; however, they did burst out in laughter when they found examples of this play potential that did not pose hygienic risks. For example, people seemed to find the experiment called "Hanging pizza" (Figure 1C) amusing, where the artist hung up pizza slices on a drying rack with clothespins—to a point that one of the visitor's children got so excited about this experiment that she convinced her parents to try it out at home. Thus, we suggest that "Displaced food" experiences that are hygienically comforting might be a good entryway for people to begin to experiment with their own food.

#4 The bodily plate involves placing food on different parts of one's body, thereby turning oneself into a vessel. According to the artist's autobiographical experience of experiments based on this play potential, the key affordance of eating from "The bodily plate" is that it adds an extra sensorial layer to consuming food. "Shaving" (Figure 1D) is an illustrative example of this play-food potential: the first author placed yogurt on her shins and scraped it with a spoon pretending to be shaving her legs. As she was creating this narrative around shave-eating food, she noticed the calming properties yogurt has for the skin. That sensorial discovery, together with the fun of performatively "eating the shaving cream", added fun to the experience through imaginative pretend play. Further, it brought about discovery: the yogurt took over the artist's body temperature, becoming lukewarm (and in consequence less tasty) for her.

As food could be placed on arms, hands, legs, face, shoulders, feet, and beyond, this play potential led to mixed reactions at the exhibition. Some

Figure 1. Summary of the *play-food potentials* [1] we derived from our analysis of the first author's artistic practice, illustrated with relevant play-food experiments from her work. The full collection of play-food experiments can be found at: https://bit.ly/3TOY90L and in the catalog available through: https://bit.ly/3DFCWj9.

attendees were very hesitant to touching food with any other body parts than their hands; they avoided getting dirty and preferred to use plastic bags as a protective layer between their body and the food. However, those attendees who dared to place food directly on their skin reported an experience that resonated with the artist's: they found it very sensual. To implement this play-potential, we suggest that the environment should lend itself to it: anyone engaging in a bodily plate should feel at ease and safe, and that might require a more private atmosphere.

#5 Challenge the meal, our fifth play potential, adds a provocative twist to the meal to make it more interactive and challenging. That can manifest in different ways: setting rules (e.g. not using the hands), creating physical constraints (e.g. tying both hands together), or presenting food in a way that is intrinsically challenging (e.g. placing it in containers that make it difficult for the eater to reach). An example of this play potential is "Handcuffed" (Figure 1E), where the artist tied her hands before eating a sandwich. Such restriction made her conscious of how much she takes her hands for granted when not tied together. She had to adapt her eating style to be able to coordinate her hands towards simultaneous action. The challenge was much greater than anticipated.

Making a meal challenging requires very minimal setup and preparation. It is a rather simple way to add a playful element to a meal and turn it into a more mindful experience—exhibition attendees noted that. Especially in the Belgian setup, attendees often resorted to this play potential when invited to creatively explore their eating: they challenged themselves by tying their hands, by attaching them to their neighbor's, by pinning their lips with a clothespin, by taping their face… Interestingly, they noted that seeing other people's experiments inspired them to try out new things; we suggest these kinds of "Challenge the meal" experiments, if performed in a social context, might lead to incremental collective creativity as diners will be inspired by each other's occurrences.

#6 Eating: it's a game! encompasses eating experiences enhanced through challenging gameful elements. In different ways, they dare diners to "earn" their food. For example, in "Catch me if you can" (Figure 1F), the artist made holes on a set of cookies to fish them up with a fishing line and a hook. As she performatively adopted the role of a fisherwoman, she found that fishing up cookies was not easy. The rope dangled from one side to another, and the wind added an extra challenge to that. Nevertheless, she enjoyed the experience, as she saw the laws of physics put into practice and ate each cookie catch as a well-deserved reward.

Generally, experiences around "Eating: it's a game!" impose a great challenge to eating. Eating becomes a competition as scoring points is translated by a food item that manages to reach the eater's mouth. The unpredictability and the thrill of flying, moving, and falling food items are what make these experiences so joyful. Exhibition attendees generally liked this play potential, and some pointed out that it lends itself better for snack-based eating scenarios. When being too hungry, having such a challenge for eating could be too much to deal with. This remark resonated with the artist's own experiences: in her experiments, she noticed her patience was inversely proportional to how much she was starving.

#7 Altered senses involves experiences that aim to trick the senses. This can manifest as playing with lighting, darkness, or other ways of modifying the visual perception of food; it can imply playing with different sensorial cues that alter the touch and feel of eating; or it can involve acts and installations that affect sound perception, smell, or taste.

The first author experimented with "Altered senses" in various ways. An example is "Blindfolded" (Figure 1G), where she eliminated any visual distraction by putting on a blindfold. Interestingly, she was not as surprised by the taste of her food as she had expected—possibly, because she knew what was on her plate beforehand. Yet, what she found surprising was her way of engaging with the food: once she removed the blindfold, she noticed she had been holding her knife wrongly all around. In another experiment, "Plastified" (Figure 1G), the artist experimented with her sense of touch and ate a sandwich with plastic gloves. She found that, by putting on plastic gloves to eat, she irrationally started perceiving her sandwich as something that was possibly contaminated—the experiment happened right during the first wave of the COVID-19 pandemic—and raised many questions about the hygienic qualities of the food. Also, since the tactile feel of the plastic was unusual, her attention was exceptionally drawn towards its auditory qualities. Another element that added playfulness to this meal was the fact that the artist took away the limitation of getting something dirty as with the gloves on she was less careful about making spills or making a mess of her hands.

For many exhibition attendees, eating blindfolded was something new; they were generally eager to experience it and to explore and discover its sensorial implications. Many realized that they take many of their senses for granted while eating, and (like the artist) found joy in re-connecting with them through an experience of "Altered senses".

#8 Digital eaters, our last play-food potential, involves experiences that challenge the idea of eating in front of a screen. While on the one hand the idea and concept of a "screen" is confronted, on the other hand this play potential involves experiences that combine screens and eating in playful ways. Mainly, this is done by making the act of eating more interactive. An example is "Cabled" (Figure 1H): the artist attached cables to her cutlery and plugged them into her laptop. It gave her eating a 'computer mouse' experience as she had to deal with cables and their cluttering while trying to eat. The installation made her question and re-imagine

food tools in screen settings. Could these tools evolve as well to make screen-meals more conscious? Conducting the experiment enabled the artist to think more creatively and envision solutions to distractive meal settings.

Exhibition attendees identified eating in front of the screen as a relevant issue that interferes with conscious eating. Many noted they wanted to change their scrolling and watching habits but found it very hard to do so. This shows that speculating on how to be more (consciously) playful during meals is relevant considering current societal trends, as also noted in Section 2. We suggest that playfully reambiguating our eating experiences around screens might be first step in that direction.

5 CONCLUSION

Our study explores, foregrounds, and makes accessible a set of inspirational materials that can inspire the design of eating experiences that are more (and more diversely) playful. Those generative materials take the form of 8 play-food potentials—i.e. 8 forms of playful eating that transcend existing works in food design—and a set of inspirational play-food ingredients, i.e. 100+ playful eating experiments that instantiate these play-food potentials. Our contribution aims to broaden perspectives on what it may mean to play with food and to support the design of increasingly playful eating experiences. Importantly, it does not present a comprehensive or universally generalizable list of ways in which one can play with food, nor does it unpack the behavioral and sociological implications of playful eating. This work rather reflects on and illustrates the underlying mechanisms found within an artistic exploration and a subsequent reflection on why those playful eating insights are interesting and relevant through the light of both the authors' and other stakeholders' perspectives. Our work thus has inspirational, generative rather than validative value (Gaver, 2012): it is meant to be used in practice to inspire design.

As described in Section 2, play-food experiences often center on a very particular understanding of playfulness, both in food design and contemporary fine dining. They seldom incorporate active participation and interactivity as core properties (Altarriba Bertran & Wilde, 2018). Our contribution makes a richer and broader palette of play experiences accessible and actionable to food designers, as it focuses heavily on play forms that give diners an active role.

We suggest that empowering chefs and other food designers to enhance and diversify the playfulness of their creations can have societal benefits. As people increasingly engage in mindless tasks while eating (Euromonitor International, 2016), inspiring them to playfully re-configure their meals might bring joy to their eating, and in consequence lead to more mindful eating. For example, what would happen if a pizza delivery service inserted a playful game element based on the play potential "Eating: it's a game!", to make the consumption of their pizzas more joyful? Being inspired by our work, the delivery service could have the idea to modify their pizza boxes by adding a spinning wheel to the base of the box. Diners could then opt to spin the wheel of their "Pizza Roulette" to decide who is getting a slice of pizza first. As opposed to just opening the box to eat the pizza straight from it, diners would discover a multilayered experience that potentially sparks joy and paces the meal and the underlying social dynamics.

A major limitation that our first-person design led approach brings to the table is that most of our reflections stem from the first author's first-person lived experiences with the body of play-food experiments. Though these perspectives were enhanced through the second author's views during analysis, and through 21 research participants' experiences during the exhibitions, the core of the work reflects the first author's views. This implies that our contribution cannot be considered a universal representation of how people enjoy playing with their food; we rather present it as an inspirational starting point designers can use and map out with the contexts and populations they design for (or with). By sharing our work at exhibitions, we were able to explore that inspirational potential. We learned that people seemed to lean more towards playful experiences they could engage with and see the results of in a straightforward manner. Those co-design engagements allowed us to better understand how our experimental forms of playful eating might be perceived by others and, more broadly, how they could inspire design. To further explore and enrich the inspirational materials we provide, in future work we will engage more perspectives by collaborating with chefs and other gastronomic designers. Learning how they use our catalog and set of play potentials to ideate playful food experiences will enrich our current understanding of how playfulness can enrich food design.

To close, in this paper we presented a design-led exploration into the playful potential of eating. We shared a body of first-person artistic experiments around playful eating to find actionable insights for food designers to incorporate playfulness into their work. Our contribution surfaces 8 provocative forms of playful eating, illustrated by a body of examples of play-food experiments that transcend existing works in playful gastronomy. Sharing those materials in public exhibitions broadened our understanding of those play-food experiences. We hope our work inspires chefs and other designers to embrace a more diverse palette of play-food experiences in their work, encouraging them to give diners an active role in eating experiences. In future work, we will further explore the inspirational value of our work from professionals within gastronomy.

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Experiencing and Envisioning Food: Designing for Change – Bonacho et al. (Eds)

Human-nonhuman interactions for the complexity of gastronomy

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ABSTRACT: Gastronomic congresses have played a key role in opening a share reflection around the concept of gastronomy. Venues such as Diálogos de Cocina have included agents and disciplines that did not have a space in the traditional format of gastronomic congresses. Since the first editions, the proposal of this event has evolved and changed the focus from the public construction and the social notoriety of a specific profile (the chef) to the understanding of an ecosystem (gastronomy). The following research proposes a revision of three editions of Diálogos the Cocina (2011, 2019, and 2021). The analysis would be on how the addition and the interaction of human-nonhuman agencies have created new and complex definitions for gastronomy.

1 INTRODUCTION

The beginning of gastronomic congresses took gastronomy out of the kitchens and beyond the restaurants. The evolution of these events has allowed chefs to enrich their perspectives through collaboration with other professionals. Taking gastronomy to a public venue opened the subject to be understood beyond its culinary proposal. It allowed reflection and analysis of what used to happen exclusively behind the kitchen door. During the last twenty years, gastronomy has become the meeting point for different interests, views, practices, and professionals to work together on a subject that joins them all (del Moral, 2020; Pérez-Lloréns, 2019). As a result, gastronomy is now open to be defined by the encounter of multiple perspectives and disciplines.

El Bulli: Historia de un sueño (Pujol, 2009) evidence two milestones that gave space for cooks to conquer public attention and generate new interactions. On one hand in 1999 the appearance of Adrià on the cover of El País Semanal, The New York Times Magazine, Le Monde, and Time magazine (el Bulli, n.d.). In the latter the chef is mentioned as one of the 100 most outstanding personalities of the world, granting it a media visibility that completely overflowed the kitchen and the restaurant. This exposure changed the perspective of the eaters, from diner to audience. The cook is not only a figure for the one who eats, but also for the one who reads and assists the media. On the other hand, the focus of this research, the notion of sharing was transformed (Pujol, 2009). The knowledge that was previously developed and kept in secrecy for the restaurants was now brought to the stage. Audiences of cooks listened to the processes and new developments of their colleagues in a public environment. The chef is no longer just the one who cooks, he is the one who develops the process and creates new culinary proposals.

In Spain at the beginning of the 21st century, chefs started exploring a scientific approach to cooking. However, gastronomy congresses were only attended by chefs, whereas science congresses were, mainly, attended by scientists (García-Segovia et al., 2014). Events such as Madrid Fusión or San Sebastián Gastronómika generated those spaces through which advances in techniques, trends, and perspectives were shown. The result of these encounters is described by Pilar Salas, on the 20th anniversary of Madrid Fusión, as "gastronomy in its purest form" (Salas, 2020). These gastronomic congresses gave value to the work of the chef. The contents and narratives generated, set a definition of gastronomy from the perspective of the chefs, focusing on what takes place in the kitchen and results in a dish and the experience of it. Although this event contributed to the visibility of science and cooking interactions (Pérez-Lloréns, 2019), at this point, the collaboration between chefs and professionals from other disciplines belonged mainly to a private context. Even though the collaboration was the result of shared processes, publicly, in the gastronomic context chefs were the voice for the outcome.

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In 2007, Andoni Luis Aduriz, as a member of the Euro-Toques[1] association, along with other members of this institution, created Diálogos de Cocina, "a small great gastronomic observatory, an incubator of ideas, a space for reflection and creative dialogues" (Luis Aduriz, 2007). Rather than bringing together chefs to talk about cuisine, Diálogos de Cocina set a space for a multidisciplinary debate around gastronomy. For the first time, chefs attend a public meeting with scientists and professionals from other disciplines. Every other year chefs meet in a space for reflection in which synergies are established between scientific and artistic disciplines that generally do not see each other (Mondragon Unibertsitatea, 2015). There was no one cooking on the stage, chefs assisted in a discussion of multiple perspectives with gastronomy as a common ground. The proposal settled an intellectual perspective for gastronomy, a cultural and human perspective different than the culinary view of other venues.

With conferences such as Diálogos de Cocina, not just cooking, but gastronomy was opened to other fields of knowledge, as well as to other social, political, cultural, and economic realities (Martínez de Albeniz, n.d.). Chefs looked at the complexity of their work and found new ways of understanding and nurturing their gastronomic proposals. After 16 years of its first edition, the congress has evolved internally, in terms of the proposals of its topics, agenda, and communication formats. During this time, Diálogos de Cocina has permeated the gastronomic ecosystem and synergies between chefs and professionals from other disciplines are becoming more frequent. Moreover, nowadays there are more events for chefs to meet with scientists to share knowledge (Spence & Youssef, 2018). One of the best-known proposals that seem to be born as an echo of Diálogos de Cocina is the MAD Symposium organized by the Noma restaurant. This event makes its first edition in 2011, intending to move away from conferences in which most of the speakers are chefs, and the activities seek to glorify cooking demonstrations (Tan, 2020). For these events, kitchens are no longer on the main stage and chefs are not the only ones giving shape to what gastronomy is, and questioning which might be the new horizons.

Even though gastronomic congresses have followed this path to a more open understanding of the discipline, it is just the beginning. The visitors of these events are mainly if not only chefs, and new perspectives are given just by the speakers. Now it is evident that gastronomy has been looking for other perspectives to understand its complexity. Although these venues started focusing on the culinary aspect, proposals such as Diálogos de Cocina created new interactions. This shift brought light to other aspects of gastronomy and the opportunity to listen to and integrate other perspectives. In consequence, gastronomy has unfolded a wide range of dimensions and opportunities for development. The evolution and creation of new dynamics might reveal and propitiate more inclusive reflection according to the complexity of the subject. Finally, these events could be the perfect platform for proposing an open concept of gastronomy that needs to be addressed not just from the culinary view.

1.1 *Making things public in gastronomic congresses*

Diálogos de Cocina proposes with its dynamics the interaction and meeting of different generations, disciplines, cultures. For this, it builds its contents on gastronomy's current affairs, and based on this, there is a framed construction of themes through questions centered on specific problematics. Additionally, it proposes a material layer (communications, technologies, illustrations, scenery, etc.) that has evolved with each edition. Like gastronomy itself, non-human agents serve as *boundary objects*, at the same time consistent and flexible enough to be re-defined without losing their essence (Leigh Star & Griesemer, 1989), allowing the meeting of a diversity of profiles. Different agencies reveal in Diálogos de Cocina the multiple dimensions of the main topic of the conference.

Since its first edition, there has been a transformation in the way its discourse is currently constructed. A search to model spaces and situations that trigger singular conversations around gastronomy. In this constant iteration around objects, it would be worth differentiating between the *fetiche* and *factiche* functions proposed by Bruno Latour. A *fetiche* is defined by the author as something that is nothing, but rather the screen on which ideas, fantasies, and passions are projected, something that is on behalf of another thing (the red high hell shoe instead of a certain female sexuality) (Latour, 1999). Euro-Toques, for example, uses the Toque Blanche as a community identification resource. An object that no longer has its function as a kitchen uniform, yet it becomes the identity of the community. On the other hand, the *factiche* is that object that will be open to being redefined to promote reflections (Latour, 1999). Two examples of *factiche* presented in the 8th edition of Diálogos de Cocina, the dildo, and the tangerine, will be developed in detail.

These concepts can be seen in the stage design. In contrast to what happens in gastronomic congresses that place kitchen is the center of the stage, Diálogos de Cocina began with a scientific congress scenario format, and this decision took chefs out of their familiar workplace to introduce diverse profiles of speakers and topics to the conversation. This setup evolved in recent editions to set a dining table on the stage, inviting the assistant to take part in the shared construction of ideas. The former is a public kitchen

1 EURO-TOQUES is an international organization of cooks that integrates more than 3,500 cooks from 18 countries. It was founded by Pierre Romeyer, Paul Bocuse, Juan Mari Arzak and Pedro Subijana among other illustrious chefs on November 18, 1986, in Brussels, at the request of the then President of the European Commission, Jacques Delors.

that has become a *fetiche* for chefs, the latter a table to be redefined by the conversations held around it. The utilitarian and fetishist use of the kitchen in gastronomic congresses that lately have become decorative is transformed by Dialogos de Cocina into a set of objects that are meant to be used and trigger the conversation on the questions proposed. Unlike other congresses, the decisions are taken with a discursive or provocative purpose. Each object, illustration, or scenographic decision will have a function beyond the aesthetic. These material decisions facilitate the generation of responses beyond the obvious.

2 THE EVOLUTION OF THE DISCOURSE CREATED THROUGH THE ANALYSIS OF HUMAN-NONHUMAN INTERACTIONS

Diálogos de Cocina, in its approach, deliberately distances itself from the commonplace of other congresses. It defies the dynamics of doing gastronomy from the kitchen and proposes a meeting where people from different fields share knowledge to enrich gastronomy. In the first editions of the event, the chefs took the place of the audience. They were invited to the event to attend other speeches. The focus was on offering them new inputs and visions to nourish their culinary practice and their project proposals. The intention was to set a space for chefs to be trained both personally and intellectually, and to generate a new space for chefs to meet outside the kitchen. It was a group of people who sought to shape their field among other disciplines (de Certeau, 2000). More than gastronomy or the topic proposed the attention was focused on people, both attendees, and speakers.

This focus changed progressively. In the last three editions (2017-2019-2021), the congress went on to develop a proposal that combines languages, agencies, narratives, generations, profiles, spaces, and perspectives, that could provide answers to the questions raised for the edition. The interaction of this multiplicity of agencies has resulted in different gastronomic associations. This resulted because of the attention given to relationships not only between people but also including new agents that went unnoticed because they were not human. It proposes moving from reference to subjects and the construction of them to the creation of a network of assemblies, mediations, or associations that coexist in duality (Larrión, 2019). The transition from being to doing. From giving shape to specific profiles, to understanding through the interaction of specific agencies that meet in the venue. The discussion at this point started including chefs, who became part of the interaction (not just as an audience but as speakers). Chefs became one of the multiple agents responsible for the resulting Discourse.

The topics presented for each edition of the congress are the baseline for choosing the agents - human and nonhuman - that will take place in the event. This selection accounts for the visibility of a particular perspective of the gastronomic ecosystem. Each time, the main topic will reveal its field of action, one that is specifically chosen for responding to current gastronomic affairs (Haraway, 1995), and enlighten the voices and situations that need to be addressed for the construction. This meeting results in the creation of harmonies and tensions between agents (Marres, 2009). Diálogos de Cocina becomes a space that seeks to propose alternative ways of seeing gastronomy and redefining what gastronomic congresses could be. The way of proposing the dynamics in each edition will be the opportunity to propose a new set of agencies and allow themselves to be questioned by gastronomy. Lastly, the discussion around gastronomy accounts for what happens in the event. Every time a new set of inputs, connected to a complex always changing ecosystem will redefine the possibilities of gastronomy and the agents that have a word on it. Gastronomy is always something on the go. Not a previously packaged item.

The aim of the present research is to analyze three editions of the congress, focusing on how the introduction of nonhuman agencies has evolved. First *2011 - Liderazgo, motivación y crecimiento personal* for being the first time a speaker introduced multiple devices that did not belong to the gastronomic universe. Since 2011 there was no reflection on materiality made by the core team of Diálogos de Cocina until 2017 when a table was introduced as part of the main stage. The introduction of this first element made it possible to understand the possibilities of generating new discourses through the introduction of non-human agents. The same happened in an even more self-conscious manner in the *2019 - ¿Qué como cuando como?* In this case, an effort was made to propose dynamics that bring together the various agents at the service of the claim of the event. Finally, in the *2021 – Jornada virtual de vacunación* due to covid restrictions the congress faced the need to adapt to virtuality. This exercise also resulted in restructuring contents and interactions, and a greater exploration of nonhuman agencies. Virtuality changed the relationship between agents as well as the outcome of the encounter.

2.1 *Case 1: 2011 - Liderazgo, motivación y crecimiento personal*

For this edition, an agenda of two days of activities were proposed. It included conferences and round tables around the main theme and a set of speakers belonging to different areas (business coaching, philosophers, psychologists, advertisers, etc.) (Diálogos de cocina, 2011). On the other hand, the audience was made up of chefs belonging to the organizing institution. Two elements stand out in this edition: The graphic image of the congress and the few elements that are introduced by the organization in the meeting. The latter fulfills, for the most part,

the function of reinforcing the attendees who are at a gastronomic event. The illustration of chef Pedro Subijana with his chef's hat(his Toque Blanche), and chef Andoni Luis Aduriz as representatives of the community of organizers recognized for his careers and members of Euro-Toques (Figure 1). This will serve as an invitation to other members of the community, reinforcing the idea that it is a congress for chefs. In the same way, as part of the activity *Corte de jamón* a ham appears in the event room (Diálogos de Cocina, 2011). The function of this element, more than demonstrative, will be to ensure, as if it were an anchor of a boat that sways slightly, that, within a diversity of disciplines and theories, chefs remember that they are in a gastronomic congress.

Figure 1. Main illustration for Diálogos de Cocina 2011. Illustration by Guillermo Ganuza.

Although the psychologist Fidel Delgado introduces a broader repertoire of objects into his participation, he intends to materialize his narrative and generate remembrance. He uses some chairs and a suitcase that contains several elements, which will serve as accessories for the creation of multiple characters. The objects serve here as tools to give life to various characters that inhabit them, as well as the transformation in each of these according to the situation in which they find themselves. In this case, the agents are not willing to reflect or build joint narratives. The material resources proposed in this edition do not invite to expand the frontiers or limits of gastronomy or to reflect on them. On the contrary, they will be a means to support the community, making chefs feel "at home" in a shared conception of gastronomy.

2.2 *Case 2: 2019 - ¿Qué como cuando como?*

The seventh edition of Diálogos de Cocina, as stated above, consolidates some elements that came to modify the approach of the congress since its previous edition. For the first time, the theme of the congress raises from a series of questions based on the current situation of gastronomy (Does the truth matter? What do we understand by food today? A cook who cooks? What is a restaurant? What does a diner want? What feeds hunger? Can technology open the code of gastronomy?). These questions show the intention to put aside the search for an individual specialization (Epstein, 2020) and move on to unite voices to create shared answers. Gastronomy goes from being the public construction of chefs from a multidisciplinary meeting to a space for an open source reflection on gastronomic issues.

The graphic image is also transformed. Despite mixing graphic imagery, this edition will mark a line that will be reinforced in subsequent editions. In 2019 Diálogos de Cocina goes from chefs as the main image of the congress, to the illustration of a monkey. The chef hat (Toque Blanche) that Pedro Subijana used before in sketched black and white illustrations (Figure 1), would take on the status of a *fetish* for the Euro-Toques community. With the monkey (Figure 2), we move on to a fantasy imaginary. A chef monkey a blasphemous Toque Blanche, who questions topics that seem naive but that will reveal their complexity during the days of the event. The closeness of the proposed tone, translated into a communication strategy, gave Diálogos de Cocina an opening in terms of visibility beyond the Euro-Toques community. The notion of Dialogos's public and how to make the event public was here at stake.

Figure 2. Main illustration for Diálogos de Cocina 2019. Illustration by Pedro Perles.

The discourse is also accompanied by new interactions and evolution in materiality. For the second time on the stage of the Basque Culinary Center, a table was placed to create a real space for dialogue. It was the provocation to interact in an after-meal conversation (sobremesa), it evidenced the passage of time, the result of eating, drinking, talking, and sharing. At this messy table, each human and non-human agency met in their discrepancies and agreements and resignified themselves in their interactions. At the end of the congress, those speeches left their material

mark, their public materiality (Marres, 2009) on the table. At this point, the layout of the auditorium and the regulations of an educational institution, continue to generate, a hierarchical distinction between those who speak and those who listen.

In the seventh edition of Diálogos de Cocina, gastronomy takes on a greater dimension. It becomes the result of the encounter of journalism, music, art, gender roles, the countryside, culture, new generations, the food industry, the joy of cooking, the table, food, a monkey chef, some hanging knives, the Basque Culinary Center and everything that has allowed reflection during the congress. These realities brought together result in the creation of tensions and agreements. Gastronomy was at last treated as a very promising controversy (Latour, 2005) not a comfort-zone for the convinced. In this way, a definition of gastronomy is implicitly generated by a community of chefs and agents from outside this community who temporarily meet in the venue. Gastronomy in this edition opened the gaze and made visible its conception from the perspective of the field, the industry, a glass of wine, a way of telling stories, illustrations, and multiple particular perspectives that were found to answer the question: what do I eat when I eat?

2.3 *Case 3: 2021 – Jornada virtual de vacunación*

The Covid-19 restrictions will be, for this edition, the trigger for a new paradigm of the event. The impossibility of maintaining the face-to-face format leads Diálogos de Cocina to go from a two-day face-to-face congress, that depended on the capacity of the auditorium to two weeks of virtual activities in different formats: workshops, round tables, interviews, and conferences. In the search to shorten the distances given by the interaction through screens, the event proposed a concept that everyone could relate to. A virtual vaccination week. The main stage, occupied in 2019 by a table, in 2021, became a laboratory. A virtual place served as a mediator between interactions. The center where questions were asked was to decode the complexity of gastronomy. The framework from where questions were raised was to decode the complexity of gastronomy.

In 2021, illustrations developed in the seventh edition evolved to meet the vaccination concept. The monkey became one of the characters waiting for the vaccine. The graphic image intends to show the diversity of visions that would meet in this virtual venue, and a grandmother that would deliver spoonsful of the vaccine (Figure 3). Characters introduced the activities in the program: A baby wondering *How to feed the future?* a devil presenting the *Workshop of Indiscipline*, a couple of homosexual chefs asking themselves, *Cooks to their Kitchen?* In addition to the illustrations, the concept was translated into a material universe. Objects on the main hub and in the set for the activities. Faced with the impossibility of sharing a physical space, relatable objects generated a shared space among participants. Each object, discursive resource, guest, and question became part of a reflection that took place in the intangible space of virtuality.

The main hub was designed as a hybrid between between a kitchen, an altar and a laboratory (Figure 4). It contained everything necessary for the vaccination. Potions, flowers, herbs, alcoholic beverages, food, botanical illustrations, candles, a heart, sweets, among other objects were arranged in such a way that, evidenced the transformation of the space in time. Different objects from diverse worlds generate a logic of association. Diálogos de Cocina proposes this imaginary as a provocation, so the audience establishes connections between this collage of objects. These materialities, together with each speech and previous information of each participant, propose a version of the complexity of gastronomy.

Figure 3. Main illustration for Diálogos de Cocina 2021 – Jornada virtual de vacunación. Illustration by Pedro Perles.

Among these objects, there are two that account for the *factiche* function of materiality in the debate proposed by the organization. A tangerine and a dildo. The former brought by Marije Vogelzang to her participation *To Eat you Better.* Vogelzang invited participants to have a tangerine during the activity for a shared experience. The latter is an object used by Andoni Luis Aduriz and Francisco Contreras in their practices as chef and musician.

Figure 4. Opening ceremony Diálogos de Cocina 2021 - Jornada virtual de vacunación. Picture by Diálogos de Cocina.

Marije Vogelzang, under the premise "food is not only food", created a story centered on a tangerine. The designer, followed by the audience, led a tour that started with the personification of the fruit and ended with the act of eating it and the phrase "as a designer, I create things that become shit". Between these two statements, Vogelzang unfolded the tangerine in physical dimensions, rituals and cultural beliefs, the multiplicity of possibilities in relation to the body, its origin, growth process, the needs of the crop, the organisms that interact with it, fertilizers, meteorological circumstances that enable its growth, molecules that give it a characteristic smell, the functionality of its essential oils and their impact on the body, sensory aspects such as sound and texture. The tangerine showed how various agents coexist in tension within the food. And how all of them intervene and participate in the act of eating. The fruit made public its complexity by gathering every attendant in relation to their own tangerine. A material agent to which everyone could relate highlighted other agencies (humans and non-humans) (Kaljonen et al., 2019; Marres, 2009). From a micro to a macro level, gastronomy was built through a tangerine that temporarily brought the speaker together with farmers, scientists, cooks, microorganisms, insects, and those attending the talk, among many others. The selection of the materiality, a tangerine to which most of the audience could have access, and an interpretive repertoire (Marres, 2015) allowed attendants to be part of the story and to create their own.

The second object, the dildo was used to create controversy. On one hand, due to the fact of being considered part of the intimacy imaginary. And on the other, for the function assigned to it, through a sort of surrealistic *détournement* exercise, in cooking, playing music, or any other practice by the audience. Attendants were invited by Andoni Luis Aduris to get uncomfortable and to be part of the resignification process. The dildo opened the space for a fractal temporality made up of multiple presents that go beyond what is considered the truth of sexual identity or of a symbolic order (Preciado, 2002). The dildo is understood as the feet of a dancer, the guitar that accompanies a singer or a kitchen utensil. It breaks with the common understanding in a similar way to what they did in the artistic avant-gardes such as surrealism or pop art. The object was exposed and distorted in its use. It opened to criticism, reflection, and tension with the audience to establish new connections and expand the concepts (Marres, 2009). It serves as an argument for the meeting of two disciplines that dialogue around an object, a boundary-object, apparently foreign to their universes (cooking and music) and allow these to be transformed into the use of the dildo. Guests turned this object into a familiar device giving new meanings to it. The role of this object in a gastronomic event is something that each agent answers by creating their own narratives. The dildo modifies the dialogue around gastronomic topics. The dildo and the tangerine are *factiches* that make up the Diálogos de Cocina audience in the same way that this audience resignifies the dildo and the tangerine and thus each of the attendees.

The interaction of human-nonhuman agents makes the approach to gastronomy become complex, rich, and diverse, with greater scope. Diálogos de Cocina proposed some questions that, mediated by the event, will generate reflections in different parts of the world. Gastronomy is no longer seen through the eyes of the chefs and opens in a virtual space (sharing space with countless simultaneous interactions) in which the place and the people participating are unknown. Based on the content proposed by the virtual vaccination week. Gastronomy will be the argument of the dialogue and will remain in constant construction as information continues to circulate and intersect with other contents.

3 CONCLUSIONS

Diálogos de Cocian describes in its trajectory a displacement from an individual construction centered on people, eager to have a public dimension, to making connections between humans and non-humans that propose heterogeneous and complex visions of gastronomy (Haraway, 1995). These new dynamics proposed for the event glimpse the possibility of understanding gastronomy not from a center that proposes a single version, but as scattered detonations (and connotations) that reveal its complexity.

In terms of gastronomic congress format, it proposes a route by which it leaves behind the ritual logic of congresses to give way to gastronomic experiences as the backbone of the event. It proposes the creation of proposals that allow, through experience, the unraveling of things related to "eating" (Mol, 2021). From this change in dynamics, these performative acts generate tensions and questioning. Because of the act of doing, there is a revelation of deep levels of understanding (Vogelzang, 2021), making evident dimensions that had been previously overlooked. As a result, there is a constant redefinition of gastronomy and everything that takes place as part of the experience. The interactions will serve as an awareness device, will reveal new possibilities, and a place where new paths can be opened jointly (Kaljonen et al., 2019). From now on, gastronomy is in the making of an ever-open prototype.

In the interaction of human and non-human agents around specific approaches, gastronomy shows its potential as a boundary-object. The resultant construction between these agents will keep in transformation by their actions while modifying each of them. The creation of new forms of gastronomy and an open definition in constant construction results in the modification of the previously established. It triggers reflections and, through the deciphering of complexity, it generates more complexity (Tirado Serrano & Domènech i Argemí, 2005). In the case of Diálogos

de Cocina, for this to happen, gastronomy would have to be placed in the uncertain place of allowing itself to be redone. Release concepts on which have been established (restaurant, kitchen, diner, chef, the truth, the countryside), so that they are questioned, enriched, experimented with, and reformulated under logics permeated by multiple and diverse agents. It would be to open to the constant act of iterating, of rethinking itself, removing the paradigms that continue to frame what gastronomy is and is not.

Given the difficulty of defining gastronomy, Diálogos de Cocina can explore new possibilities for doing it. Continue in the search for new combinations of agents that lead the audience to propose new perspectives and to ask more questions. In these circumstances, gastronomy will be understood in this analysis as cause and effect. A never-stopping transformation and nourishment from the interactions between humans and non-humans. A kind of entity that will change its form and will remain in constant transformation, responding to the actions promoted by the congress. Gastronomy will have scope and openness depending on the relationships triggered by the discursive approach proposed by the organization.

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Experiencing and Envisioning Food: Designing for Change – Bonacho et al. (Eds)

Ceramics in Portuguese sweet pastry: A recipe for knowledge preservation and the reinvention of tradition

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ABSTRACT: Recognizing that sweet pastry and ceramics are referential elements of Portuguese culture, this study aims to identify the ceramic objects still in use in sweet pastry. Observing them from the point of view of preparation, baking, and presentation, these objects will be identified based on research conducted by Cristina Castro on sweet pastry across the Portuguese territory. Once the objects are recognized, they will be observed for their characteristics which will then be shared with three specialists: a pastry chef, a gastronome, and an anthropologist, to gain a deeper understanding of them. Once this study is concluded, from a design perspective, space will be given to reflect on the possibilities of finding ways to both reinvent and preserve Portuguese tradition, integrating ceramics and sweet pastry.

1 INTRODUCTION

Sweet pastry and ceramics are two defining areas of Portuguese cultural identity that can curiously be defined in a very similar way. Both confectionery and ceramics have at their genesis masses in which ingredients and recipes, as well as forming and baking processes are integrated so as to physically and chemically alter their respective materials.

The trajectories of confectionery and ceramics in Portugal have crossed paths multiple times throughout the history of the two practices, in many recipes developed and repeated throughout the country. Many of these practices and recipes have, however, been lost over time. This study presents a survey of ceramic objects still in use in Portuguese confectionery, recognizing the formal typologies identified in its preparation, confection, and presentation. It also identifies the respective culinary preparations that make use of these artifacts and elaborates on how and why certain recipes still preserve certain uses.

This data collection will be shared with three specialists in these areas to deepen the understanding of the objects identified and the reason for their uses. After the survey and discussion of the results, we seek to observe, from a design perspective, the instances of today's confectionery recipes that integrate ceramics, with the goal of valorizing these connections and identifying how design can be a way to rescue a shared national heritage between these two practices and disciplines, thus preserving knowledge, promoting history, and reimagining their respective traditions.

2 CONTEXTUALIZATION

2.1 *Culture and design*

Culture lies at the intersection of tradition and innovation; tradition is everything that has been passed down to us (techniques, knowledge, and values) and innovation is the ability to try new things from traditions, which offer us a look at the world and the context in which we live (Montanari, 2004: 15). To define culture is to talk about movement, as it is not static and is always under construction. Culture integrates this idea of cultural heritage which "is an expression of the culture of human groups that retrieves memories, ritualizes sociabilities, selects cultural assets and transmits legacies for the future" (Pereiro, 2006: 25). The anthropological understanding of social memory, which is transmitted by productions, reproductions, and materializations of knowledge (Rodrigues, 2014: 4), allows us today to think about the past and observe what is still preserved in the present. It is the materiality that makes memory available, namely in archive documentation that tells us the history of things and the ways of life of a given society. This archival dimension is also, but not only, an institution of memory. The archive

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is the way through which the memory of the complex that we understand as culture is organized" (Morais, 2021: 20). Without this documentation it would be impossible for us to recognize the history and inevitably the culture of a society or territory. The integration of symbols is particularly relevant for this process, as culture is "a system of inherited conceptions expressed in symbolic forms through which men communicate, perpetuate and develop their knowledge and their activities in relation to life" (Geertz, 1989: 133). This symbolic dimension is inevitably linked to design insofar as it seeks to "make explicit the contents and symbolic forms that constitute the human universe" (Moura, 2011: 7). In this sense, design plays an active role in the way we shape culture over time, how we preserve it and how we can recover it. It is an active tool in current and future expressions of a culture. Preserving often simple, past cultural expressions attenuates threats to this culture from artificial and digital dimensions that disconnect us from the place we live and from what surrounds us. As designer Ingegerd Raman affirms, in the future "a designer's cultural and geographical origins will become increasingly relevant. Heritage and tradition will be important stimuli in the creation and interpretation of concrete objects" (Fiell & Fiell, 2003: 146). This is the direction in which design could be an active tool, in the sense of looking at the objects around us with care and empathy for our history and culture.

Recognizing the Portuguese cultural territory as a research field and highlighting Portuguese confectionery and ceramics as the central focus of this research, we identify basic concepts and approximations between these two practices (confectionery and ceramics), highlighting what they share in common. In Portugal sugar is identified as a central ingredient of a food culture inseparable from three contexts: convents, religion and feasting (Bernardino et al., 2012: 139,151).

Mapping this territory from a design perspective aims to both highlight expressions of a visual and material culture and to recognize a field of action that intends to add value by rescuing a central dimension of Portugal's gastronomic and cultural heritage.

2.2 *Ceramics and pastry*

The relationship between clay artifacts and food is inextricably linked as both cooking and pottery have maintained a close proximity from prehistoric times to the present day. The plasticity of clay makes it a material with endless shaping possibilities, allowing for the creation of a range of objects adapted to culinary needs, which have broadened the spectrum of cooked and manufactured foods (Wilson, 2013: 37-38).

In early human history, clay was an accessible material that nature offered in abundant form. Clay has also become appreciated over time for the way it influences culinary preparations. Indeed, "cultures that cooked with porous clay appreciated the flavor it imparts to food, a result of the free soluble salts that leach out of the clay." (Wilson, 2013: 40). Another factor that brings clay and food closer together is that cooking transforms both materials by changing them chemically. This process has taken place since the creation of the first cylinder-shaped clay bread ovens, which are still found in much of rural Africa today (Wilson, 2013: 19). The invention of clay ovens motivated the Egyptians (from 2600 BC) to explore several cereals in the making of flour for their bread (Barroqueiro, 2020). This intimacy between both materials is reinforced when we know that diverse cultures used the same kiln for both baking bread and firing pottery (Canotilho, 1999: 15). These examples are noteworthy because they introduce the idea of masses, which both embody the edible (bread) and the non-edible (pottery) artifact. This perspective is the starting point for approaching the theme under study: ceramics and sweet pastry.

2.3 *The doughs*

In attempting to clarify the understanding of the basic concepts of this paper, ceramics are understood as a ceramic powder that becomes moldable when added to a liquid (Carter & Norton, 2013) and which acquires the designation of ceramic when it is fired (Boch & Niepce, 2007: 3,4). Pastry (including sweet pastry) can be understood as a dough made from ground grain (flour) and water, which after cooking originates an interesting solid (Green, 2006: 517). We can say that the disciplines of ceramics and pastry work on the potentialities of modeling, shaping, and conforming with the hands. Both open new for the building of objects: "Dough comes from an Indo-European root that meant "to form, to build" and that also gave us the words figure, fiction and paradise (a walled garden). This derivation suggests the importance to early people's of dough's malleability, its clay-like capacity to be shaped by the human hand. Cooks have long used both clay and dough to make containers for cooking other foods, especially birds, meat and fish" (Green, 2006: 516). Human creations made from these natural materials – namely through pottery – in its endless possible forms (Wilson, 2013: 37-38), but also from edible doughs, reveal the power to shape both natural materials and human desires (Mcgee, 2004: 516).

Pottery is only very exceptionally made from a single clay extracted from nature (Fagundes, 2000: 20). A ceramic paste is most often the combination of several elements (Gómez, n.d.: 12), namely by plastic materials (clay), fluxes and degreasers (Alves, 2015) which, when added to water, are able to be shaped into desired forms. Pastry combines several components in the preparation of its doughs/pastes (both sweet and savory):

proteins, carbohydrates and lipids, acids and refined minerals, as well as leavening agents and mixed emulsifiers (Mcgee, 2004: 39).

3 PORTUGUESE SWEET PASTRY

To discuss sweet pastry in Portugal we must understand its origin, recognizing the emergence of sugar as a commodity and its relationship with convents, religion, and celebration (Various, 2003: 139,151). We must also approach ceramic objects used in its preparation, cooking and presentation that are part of the purpose of this study.

3.1 *Encounters between sugar, pastry, and ceramics*

The Arabs were responsible for the spread of sugar in Europe and the Mediterranean, having introduced it to southern Portugal in the Middle Ages (Saramago & Fialho, 1997). In this period, sugar was predominantly used as a medicinal product and as fruit and vegetables preservative (Barroqueiro, 2020). It was however in the 15th century, with the start of Portugal's maritime expansion, that the exploitation and production of this ingredient flourished in the Portuguese kingdom. Most of its production first took place on the island of Madeira (Morgado, 2002). One particular foodstuff that arose as seafarers expanded the Portuguese kingdom by exploring new maritime routes and conquering territories was the biscoito, "biscouto" or biscuit- a bread, made from wheat flour with a flat shape was baked more than once – the words biscouto and biscuit are both etymologically derived from the conjunction of the Latin terms bis (twice) and coctus (past participle of coquere, or to cook – so to make it resistant and durable (Barroqueiro, 2020). It was integrated in the list of crew supplies (Fonseca, 1997) for the ships sailing from Portuguese ports. Yet according to Barroqueiro (2020) when describing a sweet pastry "served at the table of the Infanta D. Maria", what was described above as bread could also incorporate sugar and other ingredients in its recipe, which made it; "much more delicate and tastier than that of the caravels" (2020: 91). In this example, it is understood that sweetened aromas were a privilege of certain social classes (Freitas, 1999: 92).

Curiously associated with the biscuit, a ceramic object called "forma de biscoito" (biscuit mold), which had a discoid shape and was manufactured with variable dimensions at the Mata da Machada pottery in the area of Barreiro (south of Lisbon), is believed to have been used by ship crews in its confection (Carmona & Santos, 2005). But the ceramic productions did not only give shape to this food dough; they also shaped the sugar itself through the use of sugar molds,conical-shaped ceramic objects with a hole at the end through which the molasses were drained. This process allowed the purging of sugar from impurities and its shaping into units that could be easily transported and commercialized. Sugar molds were also produced at Mata da Machada and exported to other parts of the kingdom – namely Brazil – to be used in sugar mills.

This encounter between foodstuffs and ceramics indicates some traces of Portuguese sweet pastry, showing how ceramics give shape to pastry doughs and even to the most important ingredient of this culinary territory: sugar.

3.2 *The origin of the sweet pastry places: Convent, religion, and celebration*

Festive pastries, regional pastries and conventual pastries are part of what we can describe as Portugal's traditional sweet pastry production (Bernardino et al., 2012: 139,151). Most of this production originated in female religious order convents and monasteries around the 16th and 17th centuries, as both novices and older women, many from noble or wealthy bourgeois families, entered these convents and monasteries with their maids who often cooked or prepared food destined for internal consumption or external sale (Correia, 2003: 4). Many of their recipes and innovations included confections predominantly made from sugar and egg yolks; the latter were often used as a byproduct of egg whites use, either in the clarification of wine, the making of hosts – a kind of bread used for Holy Communion in Catholic Eucharisty – or as a starching agent used in the ironing of habits (Bernardino et al., 2012).

Conventual sweets can be understood in two distinct ways. One of them is more oriented toward confection, in which the sweets are either fried or oven-baked (Saramago & Fialho, 1997); the other groups them by rich (spoon cakes, slice cakes, etc.) and poor cakes (dry or assorted cakes). Poor cakes would be consumed on abstinence days, while outside this period rich cakes would be preferred (Correia, 2003: 4). These dynamics allow us to understand the religious influence on the eating habits of the time. Religion is essentially an expression of the symbology of a people's culture and cannot be dissociated from food practices that define Portuguese cultural dimensions; indeed"[a] religion is the organization of life around the deep dimensions of experience - varied in form, integrity, and clarity according to the surrounding culture" (Jones et al., 2005: 23).

We cannot leave aside from this discussion the festive value, as "[the] sweet pastry has always occupied an important place in celebration and in moments that, for one reason or another, everyone commemorates" (Bernardino et al., 2012: 139). Such celebrations are normally periodical and usually repeated on an annual basis, resulting in a day agreed upon by the community that may have its origins in pagan customs and traditions that have been incorporated by religion (Amaral, 1998).

4 METHODOLOGY

The research is exploratory in nature and both involves literature review and source selection for the study of the role played by ceramics in Portuguese confectionery. This qualitative research is organized in two stages: the first foresees a documental analysis, selecting the bibliographical reference (as a source to identify the ceramic objects still in use in present-day Portuguese sweet pastry). The second integrates semi-structured interviews with experts to obtain a reflection on the collected objects.

The "No Ponto" research project, carried out since 2015 by Cristina Castro, is used as the main source of information on Portuguese sweet pastry recipes that can still be enjoyed today throughout the country. It is from this project that we identify the presence of ceramic artifacts in their manufacture and consumption.

This selection of ceramic artifacts includes three distinct phases: preparation (involving all the actions before the oven), baking (describing the moment of transformation), and presentation (recognizing the ceramic objects used to serve a specific sweet). The results are then presented to a pastry chef, a gastronome and an anthropologist, in order to deepen the understanding of the objects identified.

5 RESULTS

5.1 *Bibliographical reference*

The "No Ponto" research project was conducted by Cristina Castro since 2015 mainly by accessing primary sources, such as confectioners and pastry chefs. These direct contacts with professionals led to several videos, which result from a visit to various municipalities in Portugal, interviewing the makers of the sweets in order to understand in greater depth all these delicacies. (Castro, 2016) and three books, which address contemporary sweet pastries respectively in Portugal. The author addresses the history of these sweets and their places of manufacture and consumption, with an emphasis on the people who produce them. As such they consist in a survey of what is still consumed today in the context of national sweets. Castro's three books are respectively aimed at a geographical area of Continental Portugal:the north (Castro, 2016a), the south (Castro, 2017), and the center (Castro, 2019). In the photos made purposefully to illustrate the reference in the books to each sweet pastry, the author included ceramic objects that are part of its preparation, cooking and presentation, thus hinting at the artifacts associated with its making, culture and history.

5.2 *Identification of the ceramic objects*

The data collected from these sources was organized into three categories: preparation, cooking and presentation. This categorization makes it possible to recognize distinct uses for the identified objects, enabling a clear and organized understanding of them. Preparation integrates the objects used in creating the dough and mixing the ingredients. Cooking describes the objects used in the moment of transformation of the dough by the action of fire, originating the final shape – and taste. Finally, presentation includes the ceramic containers where each sweet pastry is served at the moment of tasting.

Preparation:

- Large bowl: Object of variable size, where the ingredients are placed, and the dough is mixed according to the recipe. This piece was identified in the preparation of some sweets from north to south of Portugal. In the north it is used to make "bola doce" (São João da Pesqueira); in the center it is used to make "trianas" (Alenquer), "caspiadas" (Cartaxo), "pão de ló de Miragaia" (Lourinhã); in the south it is used to make "londrino" (Montemor-o-Novo) and "bolo do tacho" (Monchique).

Cooking:

- Slab: identified as an unglazed red clay plate, used for the final cooking of "Manjar Branco" (Coimbra). This sweet is originally made with white ingredients (Castro, 2019: 54), cooked on the fire until a consistent dough is obtained; finally, this preparation is placed in the oven on the red clay plate to toast slightly.
- Glazed Pot: in Portugal, this artifact is also known as "caçoilo". A piece with a wide shape used to bake "tigeladas", typical of Proença-a-Nova and Oliveira do Hospital, (Castro, 2019: 236, 237). This utensil is previously heated in the oven, and only after this stage will the liquid dough be poured inside the pieces.
- Bowl: small unglazed ceramic bowl, with a rounded base, where its width is greater than its height. It is used for the confection of "tigeladas", namely in Ferreira do Zêzere and Abrantes (Castro, 2019: 236,237). Its use integrates a pre-heating of the object before it is filled with the mixture.
- Glazed tray: the rectangular-shaped tray is used for the confection of "palitos do marquês" in Oeiras (Castro, 2019: 166,167). Cooking paper is placed on the container and the creamy dough is poured over it so that it can go into the oven and subsequently be unmoulded from the ceramic piece.
- Mold: unglazed red clay ceramic container, similar to the shape of a vase, with its width approximately equal to its height. The recipe is poured inside the piece, on which a baking paper is placed to prevent the dough from sticking to the mold. This shape is characteristic of the "Pão de ló de Ovar", or Ovar sponge cake (Castro, 2019: 341-344).
- 3-piece Mold: a set composed of three pieces, also used in the confection of "pão de ló" or

sponge cake; in this case, a traditional production of "pão de ló de Mondim de Basto" (Castro, 2016: 144) and of "pão de ló de Margaride", which is originally from Felgueiras (Castro, 2016: 126,127). The way of making the sweet is a little different from the "pão de ló de Ovar", as the three pieces allow baking the dough inside the ceramic. Asto create a cake with a hole in its interior, the smaller, cup-like piece is placed in the inverted form and in the middle of one of the larger pieces. A baking paper is placed on it and the powdered bread dough is poured over it. Finally, the last piece is placed on top of the other similar one.

- Glazed plate: a shallow, wide-brimmed glazed plate, on which the creamy composition of "sericaia" – a sweet pastry mainly associated with the city of Elvas in the Alentejo region of Portugal (Castro, 2017: 50) – is poured and later baked.

Presentation:

- Slab: Used to serve "manjar branco" (Coimbra). This delicacy is sold as a large drop of white, sweet paste placed on a circular slab of unglazed clay. This confection reveals great intimacy with its vessel, as its flavor and texture bond with the clay slab.
- Glazed Plate/Pot: the "Prato" (Plate) or "caçoilo" (Glazed Pot) are two options for serving the "doce de pão", a specialty of Vila Nova da Barquinha (Castro, 2019: 222). This sweet can be served in individual portions (small clay containers) or in a larger container, so it can be shared.
- Glazed Pot: presented to serve the "tigelada", in a shared or individual serving, depending on the size of the ceramic piece. This object is used in Oliveira do Hospital (Castro, 2019: 236) to serve the "tigelada" that is eaten with a spoon, as opposed to the one made in Abrantes, which uses the ceramic object only for cooking; the pastry is subsequently unmolded and sold/consumed without the ceramic piece.
- Glazed Plate: This object contains two small wings and presents decorative details in white. It is mainly used to serve sweet "sarrabulho," a delicacy originating in Portugal's north, more specifically in Lousada (Castro, 2016: 154). The slightly viscous dessert is poured into the ceramic container where it is served.
- Glazed plate: Wide-rimmed dish, often with decorative details in white, where "Sericaia" is served and cut in slices for individual servings.

6 DISCUSSION

6.1 *The objects*

The carried-out survey identifies, formally simple objects that share a basic design. The pieces are all made in red clay and produced by the pottery technique, which expresses a manual involvement in their production and the preservation of an ancestral technique of ceramic shaping. This technique was highly valued in medieval and modern eras (Rocha, 2019: 35), historical periods that coincide with the foundational period of Portugal's sweet pastry production associated with monasteries and convents. In the same way, we can see the action of the hands in the production of the sweets, showing the handiness of their confection. Both ceramics and sweets imply a direct contact between body and matter in the production processes. Understanding this proximity and intimacy between body and materials as significant factors in the design process entails approaching these ceramic forms and how they communicate their functional and emotional purpose.

Three types of relationships established between container and content characterize this relationship between ceramic forms and sweet doughs: inside, on, and contained:

- Inside: ceramic objects that contain sweet dough inside. Concave shapes that have the capacity to contain the preparations (e.g. bowl and- "tigelada").
- On: flat objects where sweet dough is placed on the piece (e.g. slab and "manjar branco").
- Contained: ceramic objects that surround and contain the sweet dough in its preparation, (e.g. 3-piece M and "pão de Ló de Margaride").

The descriptions allow us to observe different ways of exploring the relationship between ceramics and sweet doughs.

6.2 *Presentation of results to experts*

Seeking a specialized understanding, three authors of recognized merit for their professional careers were interviewed, to clarify the theme and contribute to the understanding of the identified objects and the respective sweets associated with them. For a transversal analysis of the data collected, we selected a pastry chef, a gastronome, and an anthropologist.

The pastry chef, Carlos Fernandes, has vast experience in various Michelin-star restaurant kitchens; he provides a more technical and creative understanding of this relationship. Making little use of traditional ceramic objects in his pastry creations, Fernandes recognizes that the fragility of clay may be a factor that prevents its use in pastry. Nevertheless, he identifies positive factors in its use, both for its thermal conductive properties and its inflexibility to heat. He believes that what is traditional should be preserved and not changed, because when we talk about history "we must respect it".

Fátima Moura, a writer in the field of gastronomy and a researcher of Portuguese products, provides a gastronomic approach. Having published books where she shares a vision of cooking and an approach to food and cultural aspects, Moura describes the use of red clay in confectionery as a simple, cheap and accessible material. She understands that this material

has a history and a tradition, which relates these artifacts to craft and gives them an emotional value. The gastronome identifies two relevant points in clay: taste and porosity. Although she acknowledges the taste of clay in sweet pastries may be difficult to identify, she mentions the porosity can be important especially when used in a closed environment, as it allows for exchanges of oxygenation and condensation. "The great wealth of clay is when it is cooked in a closed environment", (F.Moura, personal communication, [april] [19], [2022]), as is the case of "pão-de-Ló de Margaride". She considers that in this context, the taste of clay deserves to be tested so that its influence on the taste of sweet pastries can be verified.

The anthropologist Teresa Perdigão, author of the *Doçaria Açoriana - da História que os Gestos Contam* monograph and researcher of popular regional cults and of popular habits linked to Portuguese celebrations, provides a cultural approach to popular know-how. Perdigão justifies the use of red clay in the identified artifacts because this material goes into the oven, retains heat, and cools down slowly. She nevertheless considers that by being a material associated with tradition, clay artifacts give their respective sweet pastries a "birthplace". Many of these artifacts thus bear the name of the sweet pastry and their place of manufacture, a designation preserved to both certify the origin of the sweet pastry and the object in which it is made. According to the anthropologist, "Affective taste is a very important and fundamental thing" (T.Perdigão, personal communication, [april] [21], [2022]); memory and affectivity are thus linked to the clay objects used in sweet pastries and therefore influence our appreciation and pleasure in their consumption.

7 CONCLUSION AND FUTURE RESEARCH

This study aimed to recognize the value of ceramic objects still in use in the preparation, cooking and presentation of Portuguese sweet pastry by verifying their formal typologies, identifying key examples and understanding the relationships they establish with their respective delicacies.

The ceramic artifacts currently in use in Portuguese confectionery integrate stories, places and flavors of a culture. Their material carries yet sensorially experienced in the gastronomic moment that involves the use of these objects.

Ceramic artifacts and sweet doughs have been closely linked since the beginning of time. As the relationship between container and content has always existed, thinking of this relationship from a formal and aesthetic point of view allows for reflecting on what contains and is contained, so to later design both elements and the relationships created between them on the stages of preparation, cooking and presentation.

Understanding that "design is a field dedicated to the objectification, the construction, the materialization of ideas" (Cardoso, 2013:118), it is expected that this reflection can integrate the study of materials (ceramics and confectionery), as well as their composition, conformation, and contamination. Having identified clay paste as central to Portuguese sweet pastries, one can analyze Portuguese red clays and try to identify their places of origin, so as to enquire if it would be possible to create local sweets with local pastes. Such enquiry aims to strengthen an idea of Portuguese cultural identity by adding value to artifacts in a new approach that preserves history and tradition.

Recognizing that the dimensions of flavor may be related to the confection contained in the ceramics, it is worth analyzing the confection of certain Portuguese sweet pastry recipes in different ceramic pastes, to attest if these can influence new flavors.

As a "project area that acts in the shaping of materiality" (Cardoso, 2013) design seeks to bring a new look at ceramics and Portuguese traditional confectionery, but also recovering the use of ceramics in Portuguese confectionery and awakening a new way of experiencing these objects.

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Experiencing and Envisioning Food: Designing for Change – Bonacho et al. (Eds)

Proximity Index for Menus: The case of Culinária da Terra food service (Rio de Janeiro, Brazil)

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ABSTRACT: One of the great challenges to ensure more sustainable gastronomic services is the implementation of short food supply chain, which can provide access to healthy products, disseminate principles related to agroecology, strengthen local cultures and economies, social movements relevant to family farming, among others (Soares et al., 2020; IPES-Food, 2021). Information generated by indicators allows to support decision making, provide follow-up, monitoring and evaluation of actions (BRASIL, 2018). That's why we propose the Proximity Index for Menus (PIM) which aims to allow an analysis, based on numerical data, of how much the offered menu uses short food supply chain inputs. This paper aims at presenting the PIM and its application in the Culinária da Terra food service (Rio de Janeiro, Brazil), linked to the Landless Rural Workers Movement (MST).

1 INTRODUCTION

A challenge for gastronomic services of the great challenges is the implementation of a short food supply chain (SFSC) (Soares et al. IPES-Food, 2021). Today, the opposite of short chains is what is found, produced by a global production system of traditional foods with large scale and still based on the product (Sequinel de Queiroz, Maria Grandi, Plein2022). In chains, such as longer companies and almost non-existent consumers (Schneider, Gazol, 2017). Although this and mass food production are still the standard, both in standard products, it has a similar circuit under development, two decades ago, there is a worldwide trend of promoting short standardized products, which indicates a search for more methods and methods . resulting from a new demand from consumers (Amaral et al., 2020; Schneider, Ferrari, 2015)

The adoption of SFSC meets this demand and incorporates collective social and cultural values, changing the way food is conceived as a whole (Sequinel de Queiroz, Maria de Grandi, Plein, 2022). In addition, benefits are observed when those involved in the process insist on the institution of SFSC, such as access to products related to agricultural dissemination and the strengthening of local cultures and economies.

The definition of chains reduces the central dimension of economies of proximity and scope, which refers to the role of geography and the interaction between space and economic activity (Schneider, Gazolla, 2017). This study is understood by proximity to the one proposed by Levidow, Sansolo and Schiavinatto (2021), which describes how:

- Proximate purposes | democratic self management, mutual aid, socioeconomic inclusion, respect for the environment, among others;
- Organizational proximity | establish relationships of confidence, reciprocity and solidarity among producers;
- Cultural proximity | common cultural characteristics;
- Geographical proximity | can be used to establish social cohesion, solidary relationships and equitable relations that provide financial and learning gains for all members of the productive chain; and,
- Institutional proximity | interactions with professional staff in public authorities which can provide support measures for solidarity economy activities)

In Brazil, a food market place that meets some proximity precepts is Armazém do Campo, the official store of the Landless Rural Workers Movement (MST) located in Rio de Janeiro. It is currently the main point of sale for agrarian reform products, specializing in agroecological and organic foods, health products and handicrafts produced in rural settlements across the country. Its supplier network includes small family farmers, cooperatives and workers' associations. All fresh food sold locally comes from settlements located in the state of Rio de Janeiro, respecting seasonality and valuing regional biodiversity (Figure 1). In November 2021, with the need to generate additional income to support the business in the face of the economic crisis resulting from, among other factors, the Covid-19 pandemic, the partnership between Armazém do Campo and Culinária da Terra emerged.

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Figure 1. Overview from the store Armazém do Campo.

Culinária da Terra is a food service located inside Armazém do Campo (Figure 2), which sells preparations from menus created based on the definition of proximity by Levidow, Sansolo and Schiavinatto (2021). The intention of the service is to make the most of the products of agrarian reform. The service operates every Saturday from 12pm to 3pm and is planned and operated by students of the Gastronomy Course at the Federal University of Rio de Janeiro (UFRJ). We can say that Culinária da Terra is an entrepreneurial practice of these students. Entrepreneurial strategies focused on sustainability in food services can and should be based on attempts to capture a greater share of the value generated in the main food chains, as well as assist in the recovery and revaluation of artisanal processes, of a "know-how" linked to to historical and cultural heritage (Schneider, Ferrari, 2015).

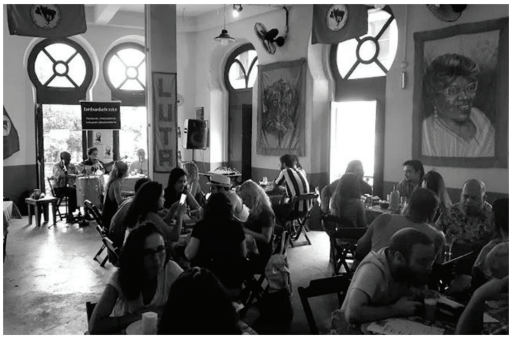

Figure 2. Overview of the restaurant hall.

Information generated by indicators allows to support decision-making, provide follow-up, monitoring and evaluation of operations (BRASIL, 2018) and can be important instruments to recognize the scope of actions focused on sustainability also in services. The creation of the Proximity Index for Menu (PIM) was necessary since no indexes were found in the literature that address the quality of the menu from the point of view of sustainability, especially from the perspective of proximity. The PIM aims to allow an analysis, based on numerical data, of how much the offered menu uses inputs from the short food chain.

2 METHODOLOGY

This work is divided into two stages: a) elaboration of a proximity indicator to evaluate food service menus based on the definition of proximity by Levidow, Sansolo and Schiavinatto (2021); b) a case study of Culinária da Terra based on an exploratory investigation, using qualitative and quantitative data obtained through field research.

The Culinária da Terra food service is located at Armazém do Campo, at Avenida Mem de Sá, number 135, in the city of Rio de Janeiro, Brazil.

Therefore, based on the concepts adopted, an indicator will be proposed to analyze the case of the food service described above in the light of the short-chain agri-food system. The data collection period took place between November 2021 and March 2022.

3 RESULTS

The PIM was created so that the acquisition of inputs for the production of food service menu preparations that take place in markets that meet the characteristics of proximity are valued. The percentage in value of the purchased inputs is taken into account over the total value of the preparation inputs. The developed PIM was built based on the local currency (Real) as a numerical method and can vary from 0% (there is no amount spent on a food input item in proximity markets) to 100% (the total amount spent on food input items is from proximity markets). In this way, the proposed index intends to provide summarized and synthetic information about the sustainability of a menu based on the premise of adopting SFSC.

$$\text{PIM}\,\% = \frac{\text{R\$ in inputs purchased in proximity markets} \times 100}{\text{R\$ in inputs purchased in total}}$$

Culinária da Terra, as a food service that works under the precepts of sustainability, values the construction of a menu that communicates this to the consumer. The menu consists of a starter, main course (vegan and non-vegan option) and a dessert (Figure 3).

The construction of the menu follows a weekly flow of operations as described below: a) acquisition of the list of inputs made available by rural settlements and the Armazém do Campo store; b) creation of a menu by the students based on the list of inputs; c) technical preparation sheets; d) preparation of two input purchase lists (products to be purchased in proximity markets and in the conventional market); e) Purchase of inputs (proximity and conventional

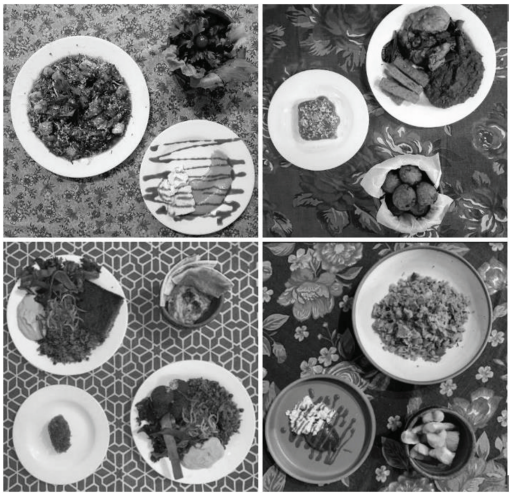

Figure 3. Examples of Menus served at Culinária da Terra.

market); f) Service operation; g) consolidation of the PIM and management control sheets (Figure 4).

Figure 4. Weekly operating flow of Culinária da Terra.

The PIM was tested using the two pourchase lists created in the elaboration of a menu - proximity market and conventional market (Figure 5).

item	Quant.	Unid.	Valor unitário	Valor total
Cheiro verde - 3 maços (3,50)	3	maços	R$ 3,50	R$ 10,50
Limão galego - 0,8 kg (6,50)	0,8	Quilo	R$ 8,50	R$ 6,80
Taioba - 4 maços (3,50)	4	maços	R$ 3,50	R$ 14,00
Couve - 1 maço (3,50)	1	maço	R$ 3,50	R$ 3,50
Abóbora - 8 kg (8,48)	8	quilo	R$ 8,48	R$ 67,84
Berinjela - 1,3 kg (8,40)	1,3	quilo	R$ 8,40	R$ 10,92
Bolo de Aipim - 4 unidades (17,0	4	unid	R$ 17,00	R$ 68,00
Polpa de maracujá - 2 unidades	2	unid	R$ 8,49	R$ 16,98
Feijão fava - 1,5 kg (26,98)	1,5	unid	R$ 26,98	R$ 40,47
Vinagre de maçã 500ml Cooperr	1	unid	R$ 27,49	R$ 27,49
Vinho Branco - 1 garrafa	1	unid	R$ 10,49	R$ 10,49
Fubá de milho torrado (500g) - 1	1	unid	R$ 7,98	R$ 7,98
Fubá de milho ecobio (400g) - 3	3	unid	R$ 7,98	R$ 23,94
Goiabada cascão - 1 unidade (20	1	unid	R$ 20,49	R$ 20,49
Geléia de goiaba Cooperrnatural	1	unid	R$ 21,49	R$ 21,49
Cogumelos - 1 kg (90,00)	1	quilo	R$ 90,00	R$ 90,00
Coentro - 2 maços (2,50)	2	maços	R$ 2,50	R$ 5,00
Salsa - 2 maços (2,50)	2	maços	R$ 2,50	R$ 5,00
TOTAL				R$ 450,89

Proximity Market

item	Quant.	Unid.	Valor unitário	Valor total
Barriga de porco - 8,635 (1	8,6	unid	R$ 19,98	R$ 171,83
Tomate - 1,5 kg (5,00)	1,5	Quilo	R$ 5,00	R$ 7,50
Cebola roxa - 1 kg (8,00)	1	Quilo	R$ 8,00	R$ 8,00
Pimentão amarelo - 1kg (1	1	Quilo	R$ 14,00	R$ 14,00
Alecrim fresco - 1 maço (3	1	maço	R$ 3,00	R$ 3,00
Manjericão fresco - 1 maç	1	maço	R$ 2,00	R$ 2,00
Alho - 1kg (21,00)	1	quilo	R$ 21,00	R$ 21,00
Azeite (500ml) - 2 unidade	2	unid	R$ 20,00	R$ 40,00
Óleo de soja - 4 unidades	4	unid	R$ 9,00	R$ 36,00
TOTAL				R$ 227,33

Conventional Market

Figure 5. Example of purchase lists - proximity and conventional market - from the Culinária da Terra.

Based on the lists above, the generated PIM calculation was as follows:

The result shows that in the menu in question, 67% of the money spent on purchasing supplies was spent on proximity markets. The same was done with data from the 16 editions of Culinária da Terra that occurred at the time of data collection. The average PIM obtained was 51%. The lowest PIM found (31%) occurred in the edition whose main dish was feijoada and the highest (67%) in the menu that offered Tutu with fried polenta and chicken with okra (Figure 6).

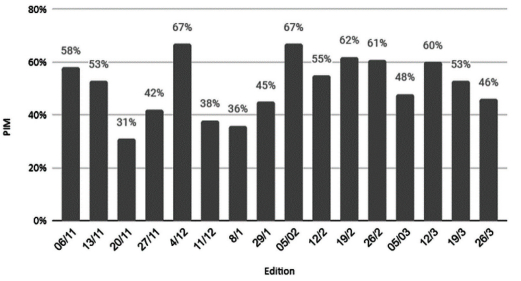

Figure 6. PIM for each menu of Culinária da Terra editions.

4 DISCUSSION

The use of the PIM proved to be easy to apply and made it possible to visualize in a simplified way how much the created menu was able to use inputs from short marketing circuits and, consequently, contribute to a more sustainable food service. The choice of an indicator that uses the Real value is in line with that described by Balestro (2017), the need to determine empirically verifiable indicators or elements that correspond to the conceptual model, such as the monetary or physical quantity of products that are marketed face to face at fairs or direct sales from the producer.

Monetizing through an indicator will allow the evaluation of actions so that corrections can be taken since the direct purchase of food from local producers results in cost reduction, consumption of organic food, reduction of rural exodus, in addition to stimulating commerce in the region, generating income for families of small farmers (Mota, Bezerra, Seabra, Silva, Rolim, 2017).

The information necessary for the elaboration of the PIM of a menu are basic to control a food service: cost control and place of purchase of inputs. We understand, therefore, that any service can obtain the PIM as a way of monitoring, based on the proximity aspect, the sustainability of the menu offered. The elaboration of healthy menus from the perspective of sustainable production is a global trend essential to the promotion of health and environmental care, and must adopt sustainable practices that can be applied from the planning to the distribution of meals in food services (Mota, Bezerra, Seabra, Silva, Rolim, 2017).

Despite the current hegemonic model being the target of much criticism and certainly not being in

crisis, it shows enough signs of difficulties, allowing us to assume that the concentration cycle is giving way to a transition cycle, with the reconquest of space by small and medium enterprises and importance of location factors and proximity economies (Belletti, Marescotti, 2017). More than ever, it is up to food services to analyze their menus. Enabling consumers to reconnect with the food source.

The PIM can be a way to control, but also to communicate to customers how much a service in question, from the perspective of proximity, is based on sustainability. Making the result of the index of a menu public will serve the process of changing the relationship between producers and consumer markets, which begin to demand products with quality and identification of origin (Schneider, Ferrari, 2015).

At Culinária da Terra, all menus are prepared considering the food habits and cultures of the producing regions and the seasonality of the inputs. Most of the desserts are produced by the residents of the agrarian reform settlements who supply inputs to Armazém do Campo and are available for sale directly at the store. Even with all the attention given to the design of the menus, we observed that the PIM remained low. This is due to the cost of beef and chicken used in non-vegan preparations, since the proximity market does not produce any type of meat, negatively impacting the index.

In the study by Mota, Bezerra, Seabra, Silva and Rolim (2017), the food services evaluated met most of the aspects necessary for the execution of sustainable menus, however, it was highlighted that responsible managers must implement requirements such as the direct purchase of food from local producers, probably evidencing a difficulty in this aspect.

Based on the analysis of data generated by the PIM, it was possible to measure the inputs that most negatively impact the index, a relevant fact for service managers. Measuring actions, identifying deficiencies, approaching opportunities and monitoring changes and impacts from the point of view of sustainability can be possible with continuous monitoring. As described by Correia-Oliveira et al (2007), studies of sustainability indicators can contribute to the search for solutions that lead to the reversal of important social and economic problems currently faced by societies.

Encouraging and supporting the purchase of locally produced food are relevant for the planning and implementation of actions within an organizational process in a food service, strengthening the financial and purchasing sector, since they will have articulation initiatives for the development of sustainable management (Mota, Bezerra, Seabra, Silva and Rolim, 2017). The present work intends to be another source of collaboration and information in the description of Miranda and Maynard (2021) who report that given the insufficiency of work in the field of food services related to sustainability, it is essential that work be developed with the aim of promoting changes in the lifestyle of today's society in order to have a dignified life in the near future.

5 CONCLUSION

The PIM proved to be an easy-to-apply index and can be used as a tool for decision making and to promote discussions about the impact and feasibility of short food supply chain in gastronomic services. More studies should be carried out to allow us to understand other influences on the PIM in different situations in addition to those evaluated in the present paper. The future use of this indicator has transformative potential as it will allow consumers and managers of gastronomic services to show the impacts generated by their consumption choices. Because, as the slogan of Culinária da Terra reinforces, "Eating is a political act!".

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Experiencing and Envisioning Food: Designing for Change – Bonacho et al. (Eds)

Strategies for promoting sustainable development goals in restaurants

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ABSTRACT: Restaurants are involved in a food chain of production, distribution and consumption which impacts the planet and should be considered in the discussion for achieving the Sustainable Development Goals (SDGs). The aim of this work is to discuss the aspects that involve restaurants as promoters of sustainable development and to present practical solutions to be implemented in these places to contribute to achieving SDGs. An investigation in bibliography, social media and direct observation was conducted. The data collected was categorized and organized focusing on four areas: menu design, supply and suppliers, restaurant management and customer relations. The SDGs most related to the proposals were 2, 3 and 12, while goals 9, 11, 16 and 17 weren't related to any of them. The work concludes that for restaurants to be more actively involved in achieving SDGs, it is necessary to change some logics in which they are based.

1 INTRODUCTION

Gastronomy[1], as an area of study, covers different aspects related to food and eating and is one of the fields that may promote sustainable development depending on the ways in which its processes are carried out. For a culinary preparation to be made, different sectors of society are mobilized, through a chain of production, distribution, and consumption that involves not only culinary techniques but different aspects of human life such as culture, politics, nutrition, environment, among others (Beriss & Sutton, 2007). Restaurants, in their different sizes and service modalities, are businesses present all over the world, impacting the planet in different ways depending on the local culture and the way they are structured.

The concern with sustainable development dates to the 1980s, when the Brundtland Report (1987) was prepared by the World Commission on Environment and Development created in the United Nations (UN) Assembly. In this report, the concept of sustainable development was established, and three pillars were defined for this to occur, which are: environmental sustainability, economic sustainability, and social sustainability (Brundtland, 1987). The intersection between them is shown in the image below.

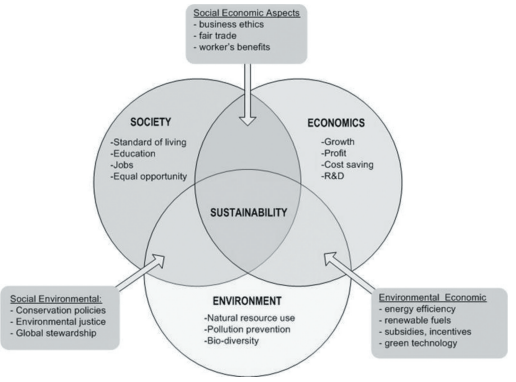

Figure 1. Intersection of the three pillars of sustainable development goals.

(Source: Irsan & Utama, 2019).

The environmental sphere will focus mainly on the proper use of natural resources and their management; the economic sphere will think about profit relationships, cost reduction, and economic growth linked to research and development; and the social sphere focuses on a social balance, seeking equity and fairer human relationships. Thus, at the center of these three pillars would be sustainability.

1 The term was primarily defined by Brillat-Savarin in 1825 as "the knowledge and understanding of all that relates to man as he eats", showing its complex and multidimensional character (Brillat-Savarin, 1995).

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Based on these concepts and the various agreements on this topic developed over the last few decades, in 2012, during Rio+20, the UN and its member states created the Sustainable Development Goals (SDGs) (Assembly, 2015). The SDGs comprise 17 global goals, presented in Table 1, to be met by the year 2030, so that all countries grow and cooperate in this sustainability agenda.

Table 1. Sustainable Development Goals (SDGs) of the United Nations (UN) 2030 Agenda for Sustainable Development.

Goal 1.	End poverty in all its forms everywhere.
Goal 2.	End hunger, achieve food security and improved nutrition, and promote sustainable agriculture.
Goal 3.	Ensure healthy lives and promote wellbeing for all at all ages.
Goal 4.	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.
Goal 5.	Achieve gender equality and empower all women and girls.
Goal 6.	Ensure availability and sustainable management of water and sanitation for all.
Goal 7.	Ensure access to affordable, reliable, sustainable, and modern energy for all.
Goal 8.	Promote sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for all.
Goal 9.	Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation.
Goal 10.	Reduce inequality within and among countries.
Goal 11.	Make cities and human settlements inclusive, safe, resilient, and sustainable.
Goal 12.	Ensure sustainable consumption and production patterns.
Goal 13.	Take urgent action to combat climate change and its impacts.
Goal 14.	Conserve and sustainably use the oceans, seas, and marine resources for sustainable development.
Goal 15.	Protect, restore, and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.
Goal 16.	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all, and build effective, accountable, and inclusive institutions at all levels.
Goal 17	Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development.

*Source: Desa, 2016.

The goals are broad, interdependent and cover social and economic development issues, including poverty, hunger, health, education, climate change, gender equality, water, sanitation, energy, urbanization, among others (Desa, 2016).

Acknowledging gastronomy as a cultural expression related to the natural and cultural diversity of the world, the UN General Assembly designated 18 June as an international observance, Sustainable Gastronomy Day (UN, 2022). Sustainable Gastronomy was defined by the Food and Agriculture Organization (FAO) as "cuisine that takes into account where the ingredients are from, how the food is grown and how it gets to our markets and eventually to our plates" (FAO, 2020).

Within this context, we must think critically about the role of restaurants in achieving the SDGs. In the literature, there are mainly discussions regarding SDGs and sustainability from the point of view of hospitality and tourism, but little has been said from the point of view of Gastronomy and restaurants specifically in this context.

Therefore, this work aims to discuss the aspects that involve restaurants as promoters of sustainable development and present practical solutions to be implemented in these places to contribute to the fulfillment of the 2030 agenda SDGs.

In order to do so, we conducted an investigation on the theme in scientific bibliography, social media, websites, and *in loco* direct observations in restaurants. The scientific literature search was conducted on Scopus and Web of Science databases for publications within the last 10 years with the following keywords: sustainable development; sustainability; restaurant; food chain; gastronomy. The same keywords were used for general searches on the internet and social media. All the materials which presented practical proposals for the sustainable development on restaurants were selected for analysis (Baloglu et al, 2022; Băltescu et al, 2022; Freeman, 2011; Higgins-Desbiolles & Wijesinghe, 2018; Iaquinto, 2014; Jang & Zheng, 2020; Kasim & Ismail, 2012; Maynard et al, 2021; Perramon et al, 2014; Pulkkinen et al, 2016; Wang et al, 2013; Zanella, 2020). The direct observation was made by the authors for a period of 6 months in two cities in Brazil when the proposals observed *in loco* were documented in field journals.

After the selection of the material to be analyzed, the data recollection consisted of extracting just the practical proposals presented in general and academic publications and directly observed. Then, the proposals were categorized and organized focusing on four main areas and subcategorized. When already categorized, the proposals were connected by two independent researchers to the SDGs they are directly related to.

2 RESULTS

The analysis of the material found in the research resulted in the compilation of several practical proposals for promoting sustainable development goals in restaurants, which were categorized into four groups named as (1) menu design, (2) supply and

suppliers, (3) restaurant management and (4) customer relations.

The restaurant management category, in which most of the proposals are inserted, was subcategorized into five areas regarding (1) food waste reduction, (2) energy efficiency, (3) solid waste management, (4) efficient water use and (5) people management.

After the proposal's compilation, each one of them was analyzed according to its relationship with the goals of the 2030 Agenda for Sustainable Development. All these results are presented in Tables 2, 3, 4 and 5 below.

2.1 *Menu design*

One of the first and main things we should consider is the creation and design of the menu. The proposals found in the literature, presented in Table 2, indicate that it would be necessary first to change the idea of fixed menus and design a reduced and changeable menu according to food season, with fresh, local, and seasonal ingredients. It is also important to plan culinary preparations for the integral use of food, prefer a menu based on vegetable products, with limited animal products and industrialized culinary ingredients.

The choice for culinary recipes that are connected to local cultures is a potential way to preserve them and may strengthen the community around and local products since traditional recipes are generally linked to products that grow in the region.

Table 2. Compilation of practical proposals for promoting SDGs in restaurants and their relationship with the goals of the 2030 Agenda in the Menu Design Category.

Practical Proposal	SDG
1. Design a reduced menu	2, 3, 12
2. Design a changeable menu by week, month or season according to food season.	2, 3, 12, 15
3. Use fresh, local and seasonal ingredients	2, 3, 12, 15
4. Plan culinary preparations that combined may enable the use of food integrally	2, 3, 12, 15
5. Limit the supply of meat and animal products and preference for a menu based on vegetable products	2, 3, 14, 15
6. Respect the fishing season and avoid the use of endangered fish on the menu	2, 3, 12, 15
7. Reduce industrialized culinary ingredients and prefer preparations made out raw and whole ingredients	2, 3, 12, 15
8. Choose culinary recipes that respect and are connected to local cultures	2, 3, 12, 15

*Source: The authors.

Those proposals are mainly related to goal number 2, to end hunger, achieve food security and promote sustainable agriculture, goal number 3, to ensure healthy lives and promote wellbeing, and goal number 12, to ensure sustainable consumption and production patterns.

Punctually, also goal number 14, is related to the conservation of marine resources, and goal 15, is related to the sustainable use of terrestrial ecosystems.

2.2 *Supply and suppliers*

During and after creating the menu, there is the dimension of supply and the supplier's choice where the proposal presented in Table 3 suggests it would be recommended to prioritize small-scale local suppliers, family farmers, with a sustainable certification, among other socio-environmental quality certifications.

Buying politics such as paying a fair price, buying directly from the producer, buying in bulk with reusable containers, and having a rigid purchasing planning and control are also recommended.

As well as being connected to already mentioned goals number 2, to end hunger, 3, to ensure healthy lives, 12 to ensure sustainable consumption and production, and 15, to sustainable use of terrestrial ecosystems, they are also related to goal number one, to end poverty.

Table 3. Compilation of practical proposals for promoting SDGs in restaurants and their relationship with the goals of the 2030 Agenda in the Supply and Suppliers Category.

Practical Proposal	SDG
1. Prioritize small-scale local suppliers and farmer markets	1, 2, 3, 12
2. Prioritize suppliers with organic, agroecological, sustainable certification, among other socio-environmental quality certifications	1, 2, 3, 12
3. Prioritize family farming products	1, 2, 3, 12
4. Pay a fair price for producers and suppliers	1, 2, 3, 12
5. Buy directly from the supplier, without middle person	1, 2, 3, 12
6. Rigid purchasing planning and control to avoid food waste	3, 12
7. Cultivate part of what is used on the menu at the restaurant	3, 12, 15
8. Buy in bulk with reusable containers	3, 12

*Source: The authors.

2.3 *Restaurant management*

The first subcategory out of five on restaurant management is food waste reduction and the proposals, presented in Table 4, pass through auditing waste to act in a targeted manner on portion adjustment, techniques used on culinary preparation, integral use of food, training staff and controlling production processes for greater efficiency. They are all related to goals 2, ending hunger, 3, ensuring healthy lives, and 12, ensuring sustainable consumption and production.

Table 4. Compilation of practical proposals for promoting SDGs in restaurants and their relationship with the goals of the 2030 Agenda in the Restaurant Management Category.

Practical Proposal	SDG
Waste Management	
1. Food waste reduction	2, 3, 12
2. Auditing waste by weighing and analyzing to act in a targeted manner	2, 3, 12
3. Portion adjustment for fewer leftovers: reduce and offer two or more portion sizes	2, 3, 12
4. Integral use of food following logic such as 'nose to tail' or use of leftovers in culinary preparations such as soups, broths, croquettes, among others	2, 3, 12
5. Donate leftovers or participate in apps that sell ready-made culinary preparations at reduced prices	2, 3, 12
6. Control of production processes for greater efficiency	2, 3,12
Energy Efficiency	
1. Food waste reduction	7
2. Increased use of natural light and ventilation	7
3. Analyze the thermal behavior of materials to choose them more efficiently	7
4. Use of bioconstruction	7
5. Installation of photovoltaic solar panels	7
6. Use of biodigesters to produce biogas for use in food preparation	7
7. Use of energy-saving light bulbs	7
8. Use of equipment with a high energy efficiency certification	7
9. Presence sensor for lighting	7
10. Green roof installation	7
Solid Waste Management	
1. Use of non-disposable durable goods	12, 13
2. Use of biodegradable packaging and utensils such as cassava, sugarcane bagasse, grass seed and wood	12, 13
3. Correctly separate and dispose of solid waste	12, 13
4. Separate and properly dispose of edible oil	12, 13
5. Use of detergent and biodegradable cleaning products and natural sponges	12, 13
6. Include in the processes the logic of reducing, reusing and recycling	12, 13
7. Composting in the restaurant	12, 13
Efficient water use	
1. Installing water pressure reducers and faucet aerators	6
2. Foot or movement faucet actuation	6
3. Install double-volume discharge valves	6
4. Have a water capture and reuse system	6
People Management	
1. Ensure team diversity in terms of income, race, gender, age, disability, among others	5, 8, 10
2. Promote gender and racial equality on career opportunities	5, 8, 10
3. Provide technical training to employees and facilitate access to educational opportunities	4, 8, 10
4. Promote physical and mental health in the workplace	3, 8, 10
5. Pay a fair wage for the staff	1, 2, 3, 8, 10
6. Provide quality food and adequate space for employees to eat	2, 3, 8, 10
7. Follow labor legal rules	8, 10
8. Provide adequate space for employees to rest	3, 8, 10
9. Promote reasonable working hours	3, 8,10
10. Not tolerate or promote a culture of moral or sexual harassment	3, 5, 8, 10
11. Consider the cook's experience as an asset during the execution of culinary preparations	4,8, 10

(*Continued*)

Table 4. (*Continued*)

*Source: The authors.

The second subcategory on restaurant management is energy efficiency with proposals regarding reducing energy use or using alternative sources of energy. These proposals are connected to goal number 7 on ensuring access to affordable, reliable, sustainable, and modern energy.

The third subcategory of restaurant management is solid waste management, and the proposals follow the logic of reducing, reusing, and recycling, with the preferred use of non-disposable or biodegradable goods and correct separation and disposal of waste. These proposals are connected to goals number 12, on sustainable consumption and production, and 13 on combating climate change.

The fourth subcategory on restaurant management is efficient water use with proposals for reducing or reusing water, mainly related to infrastructure. The proposals are connected to goal number 6, to ensure availability and sustainable management of water and sanitation for all.

The fifth and last subcategory of restaurant management is people management. Proposals are around staff's career and opportunities and others around staff's health. On career opportunities, there are proposals on diversity, gender, and racial equality, fair wages, learning opportunities, and training and following labor legal rules.

On health, the proposals are around adequate food and rest, as well as reasonable working hours. This is the category directly related to most goals, which are 1, end poverty, 2, end hunger, 3, good health and well-being, 4, quality education, 5, gender equality, 8, decent work, and 10, reduce inequalities.

2.4 *Customer relations*

Finally, the proposals connected to customer relations are presented in Table 5, such as offering biodegradable packaging and water on glass or having a collection point for recyclables.

Also, actions to promote local cultures such as partnerships with local producers and gastronomic events with the community around are proposed.

These proposals are connected to goals number 6, sustainable management of water, 8, decent work, 10, reducing inequalities, 12, sustainable consumption and production, and 13, combat climate change.

Table 5. Compilation of practical proposals for promoting SDGs in restaurants and their relationship with the goals of the 2030 Agenda in the Customer Relations Category.

Practical Proposal	SDG
1. Offer biodegradable packaging and encourage customers to take leftovers	12, 13
2. Have a collection point for recyclables, batteries, light bulbs, and other items	12, 13
3. Offer water in a pitcher or glass to reduce plastic packaging	6, 12, 13
4. Promote partnerships with local producers	8, 10
5. Promote gastronomic events with local entrepreneurs and the community around	8, 10

*Source: The authors.

3 DISCUSSION

The most frequently found proposals were those related to the environmental dimension, demonstrating that the social dimension of sustainable development is one of the most neglected when it comes to the theme about restaurants.

One of the hypotheses for this finding is that the proposals around the environment are mostly related to financial savings for the business, such as reducing the consumption of energy, water, and inputs such as packaging.

As for the social dimension, the proposals may involve higher financial costs such as higher payments for suppliers, producers, and employees, in addition to investments in structure for greater comfort and health of employees, such as rest areas and adequate food.

Making changes that lead to more sustainable restaurants requires thinking about the restaurant's organizational culture, how the employees are treated, and how the business is managed. Horizontal relationships between everyone involved in the business could be a way to implement more sustainable practices in the establishment. However, this demand's a change in the way of management from those in charge, which can be difficult to achieve.

Menu design is the foundation of any restaurant. It is also the activity in which gastronomic skills are most used. The use of seasonal foods, menus that change weekly or daily, requires both a creative chef and a competent team that will need to master strong cooking techniques to be able to work with a regularly changing menu. Exactly because of this characteristic, perhaps this is the aspect in which the gastronomy area may contribute the most to the sustainability of a restaurant.

The people management category was one of the most neglected when it comes to proposals for sustainable development in restaurants, although it is the dimension directly related to the most SDGs, seven of them.

Additionally, in this category, we think about gender and equity policies within the restaurant. Promoting gender equality of opportunity is more than promoting equal pay for the same jobs in the kitchen or dining area, but also allowing universal access to any job position or promotion independent of gender. It is very common to assign the meat sector in the restaurant to male cooks, while the salad and dessert are overseen by women (Harris & Giuffre, 2015). Also, the glass ceiling phenomenon affects more strikingly women, making it more difficult (when not impossible) for them to reach the highest positions in their careers (Albors-Garrigos et al., 2021).

It is also important to point out the working relation culture that naturalizes moral and sexual harassment inside restaurant kitchens (Poulston, 2008). Bullying is frequent and very accepted in the gastronomy sector, frequently attributed to the scoffian militarized kitchen culture. Auguste Scoffier (1846-1935) was a French late 19th-century chef who developed the concept of the kitchen brigade as a way of organizing work within that space, inspired by the military organization. This type of organization is perpetuated to this day in most Western fine restaurants. This is a culture that promotes "putting up with" bullying as a proof of resilience on part of the employees. Being the one who can't stand the mistreatment is being treated as weak for the team. Unlike sexual harassment, which generally occurs from men against women (ROC United, 2014), moral harassment usually happens regardless of gender, being frequent harassment between men, for example. It is important to note that promoting a culture of respect in the kitchen does not cost financial resources, unlike other proposals. However, it takes a change in the mindset of the sector actors, which may take time and confrontation to establish a new cultural parameter.

Regarding sexual harassment, it can occur both between team members and between clients and employees. For the first case, the establishment needs to have: a low tolerance organizational culture for this type of behavior, a safe complaint channel for the victims, and serious conduction of the post-complaint process. In the case where the client harasses employees of the establishment, prior contingency plans can be drawn up for cases like this, with the removal of the aggressor carried out quickly and

efficiently and with the appropriate reception of the victim.

Something to be considered is the implementation viability of some proposals, as they vary from simple and cheap solutions that doesn't demand much investment or structure, to more complex ones that may not be feasible for all realities.

Although one of the practical proposals suggested is the use of sustainably certified suppliers, it is important to verify who are the producers of these foods or if it belongs to major food international brands. That's because many of these certifications are paid and have high costs. Therefore, the certification requirement may act as an exclusion mechanism for the small food suppliers who do not have the financial conditions to acquire it. At the same time, it can become an asset for large food-producing companies, which have the financial capital to pay for certification, when only a part of their production is "clean" while the rest of the company may have non sustainable practices.

In 2020 the Michelin Guide launched its new Sustainability Emblem focusing on the Nordic Countries (Denmark, Finland, Iceland, Norway and Sweden). They claim to highlight by their new symbol the restaurants at the "forefront with their sustainable gastronomy practices" and to add short descriptions of the initiatives of restaurants that are taking smaller steps to work in a greener way. Although it may be understood as a sign that the restaurant industry is going towards a greater commitment to sustainable issues, the guide's evaluation is related just to environmental aspects, once again indicating a negligence of the social dimension of sustainable development (Guide Michelin, 2020).

The goals most related to these proposals were 2, 3 and 12, which are, respectively: (2) End hunger, achieve food security and improved nutrition and promote sustainable agriculture; (3) Ensure healthy lives and promote wellbeing, and (12) Ensure sustainable consumption and production patterns.

This suggests that these three goals may be the most important for restaurants to invest their actions in and for the strategies developers of the 2030 agenda to consider involving restaurants to a greater extent.

Goals 9, to build resilient infrastructure, industrialization, and foster innovation, 11, to make cities inclusive, safe, resilient, and sustainable, 16, to promote peaceful and inclusive societies, and goal 17 around a Global Partnership for Sustainable Development, weren't related to any of the proposals.

4 CONCLUSIONS

Although there are plenty of proposals on academic literature or even some real examples of actions being implemented in restaurants, it is fundamental to look at these proposals as possibilities and not as norms to be followed, as each reality should be thought of specifically. The alternative solutions or possibilities for global problems should be constructed locally in a dialogic manner that respects local cultures and knowledge. Top-down "solutions" may not be the most adequate or accepted by local realities.

Despite the focus of this article being on possible actions to be taken by restaurant businesses individually, it is important to point out that collective solutions should be taken, such as public policies, workers' unionization, or cooperative political organization. Local initiatives may be largely limited; thus it is useful to consider policies that are the most likely to have broader impacts.

For restaurants to be more actively involved in achieving sustainable development goals, it is necessary to change some logic in which they are based. This goes from the customers' expectations of eating always the same food made the same way, until the organizational culture on restaurants that still maintains outdated and inappropriate working practices.

Furthermore, sustainability must be thought of for everyone, not being restricted to social economically privileged social groups. After all, excluding policies are precisely contrary to the very logic of sustainable development.

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Experiencing and Envisioning Food: Designing for Change – Bonacho et al. (Eds)

Co-creating a meaningful food literary experience. A Taste of Cascais

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ABSTRACT: Our research, a collaboration between Cascais Food Lab and the MSc in Innovation in Culinary Arts and Sciences (ESHTE, Portugal), attempted to combine areas such as literature, tourism, gastronomy, and design to explore the co-creation of a meaningful food literary experience through Cascais. Such a collaborative development of new value (concepts, products and services) entailing experts and stakeholders intended to share knowledge and improve it jointly. The project included questionnaires to understand the sequential interactions (people, place and objects) and their analyses (thoughts, emotions, attitudes, behaviours). This led to a product or service design process in which such an input from consumers now plays a central role from the Cascais tour to planning the food experience, as a form of collaborative innovation.

1 INTRODUCTION

The partnership between Cascais Food Lab and the Master's program in Innovation in Culinary Arts and Sciences at Estoril Higher Institute for Hotel and Tourism Studies (ESHTE) in Portugal has brought together different fields like food, literature, tourism, and design. The goal was to explore the idea of co-creation in crafting a unique gastronomic and literary experience that highlights Cascais as a hub for collaborative development of new concepts, products, and services.

Taking inspiration from the literary route in Cascais, which features eight writers, a culinary journey was crafted to reflect literary movements ranging from Romanticism to Surrealism. This journey aimed to capture different perspectives across time, bridging historical moments with new meanings.

In this context, we delved into the essence of Cascais and the stories shared by its people. The aim was to create a special dining experience at Casa de Santa Maria, a historic site designed by Raul Lino in 1902. The idea was to blend the diversity of ingredients and the art of both cooking and storytelling present in the location. A menu was carefully designed to bring back the unique writing style of each author, reviving their literary genres, social concerns, and personal experiences.

The challenge was not just to incorporate the themes from each writer's work but also to integrate ingredients that reflected those themes. This approach ensured that the culinary experience resonated with the writers' concerns and experiences while also showcasing local ingredients. For instance, ingredients like the bitterness of loquat and elderberry, native to the Sintra Natural Park in Cascais, were used to evoke the spirit of Ramalho Ortigão's work. Similarly, the almond from Sintra was used to infuse Branquinho da Fonseca's magical realism.

The literary route was initially conceived as part of António Ribeiros's master project in the Cascais Municipality in October 2019. However, the first gastronomic experience linked to this route took place on July 15, 2021. Since then, it has been recreated with different approaches annually (on June 7, 2022, and March 31, 2023), following a co-creation framework within a schedule of Cultural Gastronomic Experiences.

2 FROM A LITERARY ROUTE TO A GASTRONOMIC EXPERIENCE

Cascais rose to prominence as a distinguished summer retreat during the mid-19th century and earned international acclaim in the 1930s for its inviting coastal expanse. Nevertheless, Cascais's identity is not solely bound to its coastal allure; it boasts a rich literary legacy that spans over a century. The

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query emerges: how does Cascais emerge as a literary haven? Prevalent portrayals of Cascais in literature invariably intertwine with the notion of transient pleasure associated with the locale:

The mere reference to Estoril or Cascais carries connotations of blissful mobility: locales where individuals converge to partake in dining, revelry, amorous engagements, and leisurely pursuits. […] The myth of the frivolous 'Linha' resonates, in a universal sense, within the literature of those who elect it as the backdrop for their characters' endeavors, frequently comprising members of the invading cohort that augments its narrative with a puerile legend. (Conrado, 1995, 9).

Embarking upon an academic internship undertaken in 2019 within the ambit of the Municipality of Cascais, as part of Ribeiro's Master's program in Tourism and Communication, proffered an avenue to delve into this literary expanse. Intensive archival scrutiny and comprehensive research undertaken within libraries culminated in the identification of Cascais-related references and literary figures, precipitating the inception of a novel literary itinerary titled the "Cascais Literary Route." This trail traverses the town and designates eight locales of literary import, each associated with prominent authors: Ramalho Ortigão, Almeida Garrett, Maria Amália Vaz de Carvalho, Alberto Pimentel, Ruben A., Branquinho da Fonseca, Eça de Queiroz, and Fernando Pessoa (Ribeiro, 2020).

The itinerary can be undertaken autonomously, facilitated by now available online pamphlets, guidance from trained local guides, or enhanced through supplementary embellishments to augment the immersive experience (Cascais.pt, 2019). During the inaugural journey in October 2019, Ribeiro himself served as the guide. Notably, the collaboration with the Municipality of Cascais, particularly the contributions of Cláudia Mataloto and João Miguel Henriques, facilitated the inclusion of differentiating elements.

Within the excursion, local theatre students from the Teatro Experimental de Cascais (Experimental Theatre School) adeptly assumed the roles of characters featured in the Route, attendees were treated to emblematic pastries of Cascais, and glimpsed the Cascais Mobile Library. Additionally, they were granted access to the exterior of Casa São Bernardo, an area typically off-limits to the public (Figure 1). If the gauge of the literary significance of a locale is contingent upon the prominence afforded to the vivid interpretation of its literary heritage, it can be posited that this principle was upheld, thereby affirming the imperative to transcend textual bounds and imbue the literary experience with performative elements.

Accordingly, the context of Cascais underscores a tourist destination that extends beyond national frontiers, largely due to its famed shorelines. Against this backdrop, a commitment to literary tourism could potentially serve as a pivotal factor in diversifying the town's focal allure and broadening the array of available offerings. Given the substantial corpus of literary references associated with the town and the noteworthy roster of authors who have traversed its

Figure 1. A. Ribeiro's inauguration Literary Route. Photograph by Cascais Municipality.

landscape, the prospects are manifold, with the "Cascais Literary Route" being merely one manifestation thereof.

Borrowing López-Guzmán and Maria Margarida Jesus' (2011) expound that gastronomy serves as a conduit for travelers in pursuit of indigenous components and the cultural fabric of the locales they traverse, we considered adding the culinary arts into the project, reckoning it would offer another unique perspective of Cascais. In fact, when contemplating the convergence of literature and gastronomy within the tourism framework, we are delving into manifestations of intangible heritage that align closely with the predilections and anticipations characterizing the profiles of contemporary tourists and travelers. These manifestations resonate with their quest for authentic moments, immersive encounters, and a sense of communion with the visited communities.

Within this concise section, a coherent illustration emerges, vividly depicting the interplay and intersection of these allusions. This narrative immediately introduces us to the multifaceted nature of the term "heritage," particularly in the context of intangible heritage, tangibly manifested here through endogenous gastronomic representations encompassing staples such as bread, wine, and cheese, each bearing a distinct identity DNA, resonating with the essence of heritage representation – whether in the manner of bread's preparation, or even the manner in which it is sliced and engaged with. The spotlight remains on this gastronomic heritage, skillfully interwoven with another intangible and ever-evolving heritage, transmitted orally through expressions, legends, narratives, and other embodiments of what is commonly recognized as popular, oral, and traditional literature. The nexus culminates with the traveler – a figure endowed with keen observation, who intimately acquaints themselves with the community, immersing in the local and culturally intrinsic aspects that invariably allure the contemporary wayfarer; an explorer adept at discerning the nuances and distinctive potentials embedded within each visited domain. We aspired to engage a diverse array of participants within the scope of this project, not solely as collaborative partners, but also as participants in both the tour and the gastronomic experience. This strategic

approach enabled us to effectively demonstrate and subsequently apprehend the shared sense of affiliation among all involved stakeholders. Such an approach was taken in light of the contemporary context wherein gastronomic occurrences have emerged as inventive and communicative activities, yielding diverse receptions and interpretations of literary compositions.

In a deliberate departure from the confines set by established academic domains, particularly concerning the intricate process of meaning reconstruction undertaken by visitors, "Cascais Literário | A Gastronomic Journey" examines the manner by which the culinary lexicon, akin to a repository of historical insights, underscores a deep appreciation for epoch-specific practices. This endeavor transcends being merely a reclamation of culinary heritage; it serves as a recognition of the impetus arising from present-day demands and anticipations. Indeed, can we not liken the process of formulating a recipe to a transformative and illusionary methodology analogous to that undertaken by writers during their literary inception, as contemplated by Ronald Tobin, a gastrocriticism scholar?Top of FormBottom of Form

3 THE GASTRONOMIC EXPERIENCES

Condensed iterations of the António's Literary Tour, initially introduced in 2019, were subsequently conducted on July 15, 2021; June 7, 2022; and March 31, 2023, commencing at 7:00 pm. These events were organized within a co-creative framework as part of a Cultural Gastronomic Experiences initiative, which was sequentially succeeded by the "A Taste of Cascais" gastro-literary tour. Starting at Cascais Bay, this tour encompassed significant sites such as the former residence of Mª Amália Vaz de Carvalho, the establishment referenced by Alberto Pimentel in his chronicles, Ruben A's Chalet Leitão, the Museum Castro Guimarães, and the House S. Bernardo, alluding to Eça de Queiroz's connection.

3.1 *First gastronomic experience | July 15, 2021*

Of noteworthy significance was the primary gastronomic encounter, designed to pay homage to the writers featured along the complete itinerary. This culinary experience constituted an integral part of the challenge posed to students enrolled in the MSc in Innovation in Culinary Arts and Sciences program at ESHTE, Portugal, for the 2020-2021 edition. This challenge was integrated into the syllabi of the courses "Menus and Wines" and "Food Design". However, the chronological arrangement of authors encompassed diverse literary epochs, spanning from Romanticism to Modernism, engendering an extensive spectrum of genres and perspectives pertaining to Cascais. This ordering accentuated the conceptual intricacy of the overall experience, de-emphasizing the geographical junctures en route.

The formulation of this approach emanated from a collaborative alliance between the aforementioned academic units and literary researchers M. J. Pires and M. M. Almeida. Collaboratively with the students, M. J. Pires fashioned a narrative strategy that adeptly harnessed the distinctive literary attributes characteristic of each writer, adeptly appropriating idiosyncratic expressions and stylistic nuances. This endeavor ingeniously intertwined literary aspects with culinary elements, incorporating references to select ingredients associated with each temporal period, predominantly accentuating those that underscored indigenous products or cultural allusions.

Accordingly, the narrative for the guests followed the 8 writers chosen for the tour, 8 readings from the students, and 8 gastronomic moments. There was a printed version placed on top the guests' plates, but only with created narrative (for the description of the gastronomic moments, the guests would have to access the QRCode at the bottom (Figure 2).


8

O GOSTO DE LER CASCAIS

Tenho para mim que este gosto por correr terras e o empenho em viajar por mera curiosidade, me trouxe a Cascais, até à vossa companhia. Quanto às farpas que lanço muitas vezes e às questões por que luto, não creio que tenham tido o prazer de apreciar um amargo de nêspera e ruibarbo [1].

Também há quem meia-desfeita e convalescente aviste da sua janela o grande mar azul e mantenha a sensação de atravessar o oceano, colaborando versatilmente na educação e no papel da mulher, enquanto vos oferece o essencial de um tártaro de sames, de certo [2]!

É nesta agreste natureza de morangos selvagens, capuchinhos e abrunhos de Sintra que inda ali acabo e já temos as vieiras - recordemos aqueles dias, como vivemos! Ai ai! Estes pêssegos rosa de Colares, um fermento [3]!

Já quem se der a observar elegantes indústrias locais destinadas a lisonjear o paladar de pessoas finas, também assistirá a cenas que envolvem ingleses impassíveis, damas incomodadas e quem sabe robalos escondidos entre fumaradas tranquilas. Sem esquecer a nacional broa de milho [4].

Mas que bela cavaqueira esta e a saudade com que penso nas preguiçosas estadias aqui por Cascais. Imagino-vos já a pasmar com o lombo de borrego, mas queridos amigos não se resignem e deixem vencer, façam bom uso deste óculo de obulato e cardomomo [5].

Certo é que nesta espécie de central humana de camionagem, o mundo vinha à procura da minha irrequieta alma de viajante e se encontrava aqui. Que fenómeno esta massa amorfa e misturada numa combinação improvável, onde o aipo e o roquefort se tornam difíceis de distinguir [6].

Completando umas coisas, agrupando outras, a minha multiplicidade espelha e estilhaça-se nestas torcidas reflexões com espuma de romã e hortelã da ribeira [7].

Um dia hei-de contar-vos tudo; mas hoje estou ébrio e só vos digo que esta pêra, bêbeda ou não, muito guarda... [8]

O GOSTO DE LER CASCAIS

Figure 2. Printed menu with the 8 created narratives. Photograph by Gabriell Vieira.

Here are the authors, description of the dishes, and the prineted menu narratives:

i. for Ramalho Ortigão (1836-1915) – a defender of national heritage who liked to criticize to better evolve (Aperol of loquat and rhubarb with bergamot foam, lime and elderberry, Figure 3): "I think this love for roaming the land and the commitment to travel out of mere curiosity brought me to Cascais, even to your company. [§] As for my honest critique and the questions I fight for, I don't believe they offset the pleasure of enjoying a bitter of loquat and rhubarb" (the menu narrative considering his journalistic and acute chronicles' style; our emphasis).
ii. for Maria Amália Vaz de Carvalho (1847-1921) – a polygraph writer and poet, female activist, author of short stories and poetry, but also of essays and biographies, while

collaborating in several newspapers and magazines in Brazil (Fresh cod tart, sames, green apple and lobster pil-pil, Figure 4): “There are also those who, half undone (*meia-desfeita*) and convalescent, see from their window the great blue sea and keep the feeling of crossing the ocean, and resourcefully collaborate on the education and the role of women, while offering you the essential of a tartar of cod sames, of course” (the Menu narrative highlights the writer’s state of mind and her house in Cascais Bay from where she wrote on her longings, along with the bitter-sweetness, freshness and choice of not so noble but equally tasty parts of codfish; our emphasis).

Figures 3-10. Eight dishes served. Photograph by Gabriell Vieira.

iii. for Almeida Garrett (1899-1954) a romantic writer and playwright, orator, politician peer of the kingdom, minister, and honorary Portuguese secretary of state (Scallops with pink peaches, sloes and wild strawberry kvass, Figure 5): “It is in this rough nature of wild strawberries, capuchin cress and sloes from Sintra that just ends there, and we already have the scallops - let us remember those days, how we lived! Oh there! These pink peaches from Colares, a yeast!”. (the Menu narrative stressed the choice of ingredients made according to seasonality and location and the language mirrored his writing style in the poem *Cascais*, with the wild strawberries representing his prohibited love, the Sintra-Cascais sloes reflecting a bittersweet feeling, the scallops as a reference to the sea, and the capuchins as elements of nature, and finally the ‘yeast’ referring to the need to thrive and the preparation process; our emphasis).

iv. for the late romantic Alberto Pimentel (1849-1925) and his Travel Chronicles, the fish course (Low temperature sea bass with corn tile, dashi macarons, mousseline cigar and shrimp coral with white chocolate, Figure 6): “Anyone who takes the time to observe elegant local industries designed to flatter the palates of fine people will also watch scenes involving impassive Englishmen, troubled ladies and maybe hidden bass between quiet smokes. Not forgetting the national cornbread…” (the Menu narrative was a reference to one of his travel chronicles in which the author describes an episode from the Cascais train with an Englishman smoking his cigar, the ladies and the forgotten seabass wrapped in newspaper; our emphasis).

v. for Eça de Queirós (1845-1900) and his Realism, the meat course (Sealed lamb loin and tuber puree, orange flavors, mint and cardamom with vegetable jus, Figure 7): “But what a beautiful chatterbox this is and the longing with which I think about the lazy stays here in Cascais. I can foresee you are amazed with the lamb loin by now; but dear friends don’t resign and feel defeat, make good use of this oblaat and cardamom monocle” (the menu narrative conveyed his extensive descriptions and the selection of ingredients bore the influence of French (cuisine) in his work, as well social criticism (eg use of astringent flavors such as saffron) and his trademark monocle used here to present a different yet acute perspective on all the details of the plating; our emphasis).

vi. for the palate cleanser the Surrealist Ruben A. (1920-1975) – essayist, historian, literary critic, and author (Roquefort and celery textures, Figure 8): “It’s true that in this kind of human bus station, the world came looking for my restless traveler’s soul and it was here. What a phenomenon this amorphous and mixed mass in an unlikely combination, where celery and Roquefort become difficult to distinguish” (the Menu narrative intended to reflect the way the author lived and his connection to the village, looking at all the most diverse newcomers running away from the war, with a dish coloured with the blue ocean and sky view from his Chalet Leitão and inspired by an iconic dish by chef Gaggan Anand where you have to lick it, representing superrealism; our emphasis).

vii. for the pre-dessert the most well-known Portuguese Modernist, Fernando Pessoa (1888-1935), a poet, philosopher, essayist, translator, astrologist, and literary critic (Isomaltose blown with

a froth of pomegranate and mint from the river, Figure 9): "Completing some things, grouping others, my multiplicity mirrors and shatters in these entwined reflections with pomegranate foam and mint from the river" (the Menu narrative inspired by the involvement and collaboration in the case of the forged suicide of Aleister Crawley in Boca do Inferno, Cascais, astrologer and journalist friend of the author, to also convey some of the characteristics of modernism, such as contempt for society, the desire to shock, the vertigo for the sensations of life – "I don't know who I am, what soul I have… I feel multiple. I'm like a room with countless fantastic mirrors that turn to false reflections a single previous reality that is not in any and is in all", *Private and Self-Interpretation Pages*,1966; our emphasis).

viii. for dessert, Branquinho da Fonseca (1905-1974) with his neorealism (Pear stuffed with cherry and almond mousse, chicken skin ice cream toasted with smoked cherries and white chocolate distillated, Figure 10): "One day I will tell you everything; but today I'm drunk and I will only tell you that this pear, drunk or not, preserves a lot" (the Menu narrative was based on the magic realist novelette *The Baron*, since it suggests a halo of mystery without detaching from a sense of verisimilitude, rather as waking up in this mysterious halo the emotional echoes of reality (Lopes, 2017) with a reference to the meal where the characters are inebriated while feasting on capon through the student's fake drunk pear that induces the reader/diners that they are facing a reality that is not what it seems, even if ingredients were chosen due to seasonality and direct references to the plot; our emphasis).

3.2 *Second and third gastronomic experiences | June 7, 2022 and March 31, 2023*

The subsequent pair of gastronomic encounters demonstrated a less constrained framework regarding guest attendance, attributed to the absence of COVID-19 restrictions, and opening to the general puclic. Moreover, these encounters exhibited a more condensed chronology within the gastronomic immersion. This outcome was not solely influenced by the absence of student involvement but was also shaped by the profound interest exhibited by the Cascais municipality, which held the project in high esteem and sought to foster the advancement of both the literary itinerary and the gastronomic endeavor named "A Taste of Cascais."

The continued collaboration involving A. Ribeiro, in addition to other tour guides affiliated with the Municipality (C. Mataloto) and ESHTE, alongside the partnership forged with the Cascais Experimental Theatre, CascaWines and Imppacto Catering, facilitated certain modifications to the menu. These adjustments stemmed from the presence of guests associated with distinct authors featured in the tour. For instance, during the third gastronomic occurrence, a noteworthy presentation and active involvement were orchestrated by the director of Fernando Pessoa's house museum, C. Riso. These discerning choices and innovative perspectives, concerning both the literary tour and the gastronomic project, emerged as a direct response to the insights gleaned from questionnaires completed by participants who attended the initial experience.

4 RESULTS AND CONCLUSIONS

According to the results from the questionnaires the literary tour of Cascais served as motivation to engage in the gastronomic experience for 71.5% of respondents. Conversely, 93% indicated that the gastronomic experience influenced their decision to undertake the Cascais journey. When asked about the most memorable moments from the literary tour, participants shared diverse recollections:

- The overall sensation of Cascais being a destination and source of inspiration for numerous authors.
- The ascent of Av. Carlos, evoking a sense of temporal displacement and immersion into another era.
- The revelation of a Literary Cascais hitherto unknown.
- The significance of Fernando Pessoa's presence in Cascais and the captivating view from Casa de Santa Maria (location where the gastronomic experiences have taken place since the first moment).
- The residences of writers, characterized by the location and the sea as a backdrop.

Concerning the gastronomic experience, participants elaborated on moments that left lasting impressions:

- The process of uncovering each dish and attempting to discern the authors' presence within their constituent elements, posing a gratifying challenge.
- The harmonious alignment between literary works and gastronomy, despite occasional deviations from literal interpretations, which, in the participants' view, added a more enriching layer.
- The fascinating realization of how each writer's essence was interpreted and materialized within a dish, encapsulating an abstract notion.
- The lamb loin associated with Eça de Queiroz, as it left the most indelible flavor memory.
- The impact of the dessert and the dish attributed to Alberto Pimentel, both of which resonated significantly.
- The holistic experience, including the narratives behind the dishes, the ambiance, the locale, and the decor.

- The meticulous planning evident throughout.

In terms of technology adoption during the gastronomic experience:

- 50% of participants did not use the QR code for supplementary information.
- 28.6% used the QR code solely at the commencement.
- 21.4% engaged with the QR code intermittently during the experience.

Regarding the need for elucidation regarding the connection between authors and gastronomic moments:

- 78.6% expressed the desire for additional explanations to clarify this relationship.

Finally, the entirety of the experience prompted all participants to express an unequivocal intention to delve further into the authors' works:

- 100% confirmed that the encounter spurred a desire to read and explore more about the featured authors.

These were some of the results as there were suggestions of other authors to consider, for instance. But food was considered one of the most representative elements of a country's identity. In the context of exploring novel destinations, the inherent curiosity and eagerness to engage with the local culture play an instrumental role in captivating visitors. This inclination not only contributes to the preservation of the place's identity and memory but also honors its indigenous customs. The act of partaking in a gastronomic encounter, laden with heritage and cultural essence, effectively imparts the authenticity of the host community to these visitors. Nevertheless, the true appreciation of such authenticity is contingent upon its seamless alignment with the envisioned encounter itself. This encompasses the ambiance where the experience unfolds, in tandem with socio-cultural traditions, narratives, significance, and an emphasis on locally sourced products. The pursuit of bona fide and meaningful engagements, characteristic of endeavors like creative tourism, has been progressively on the rise. Such initiatives permit participants to engage in co-creative undertakings alongside the local populace, thus uncovering the essence of a particular destination's culture.

Contemporary preferences gravitate towards personalized undertakings, emphasizing experiential immersion and sensory engagement. Gastronomic experiences, in particular, serve as a quintessential avenue for amalgamating the five senses, achieved through direct interaction with authentic individuals and indigenous anecdotes.

Accordingly, the gastronomic experience established herein also served as a mechanism to uphold local culture and heritage. This encompassed the valuing and reverence of diverse resources, propelling innovation and entrepreneurial pursuits. Notably, local hosts assume a pivotal role as destination ambassadors, leveraging co-creative endeavors to foster sentiments of affinity. Through such cultural co-creation, participants and visitors alike are enabled to immerse themselves within the cultural fabric, facilitated by gastronomy.

These events converge upon authors whose multisensory expressions unveil insights not only into the temporal and geographical contexts of their inception but also into those of their reception. The gastronomic encounters, in this vein, emerge as unique interpretations of literary compositions, akin to a transference of meaning across historical epochs. Presently, these culinary moments unveil themselves as novel forms of creative and communicative practices, amplifying diverse modes of interpretation and reception of literary texts.

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Experiencing and Envisioning Food: Designing for Change – Bonacho et al. (Eds)

Ice cream therapy: Designing a food alternative to oral liquid nutrition supplements

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ABSTRACT: Oral Liquid Nutrition Supplements (OLNS) are widely prescribed to older adults in the US and globally to prevent and treat malnutrition. However, consumer satisfaction is low, resulting in poor adherence rates. The overarching goal of this research was to design a functional frozen dessert alternative with proprietary ingredients that delivers equivalent nutrition to current OLNS products on the market, but with multi-sensory appeal that fits into the lifestyle of the older adult consumer. In this paper, we present the findings of consumer design workshops and product optimization for a functional ice cream alternative to OLNS designed to support the nutrition and health of older adults. The objectives of this study were to 1) optimize the flavor, texture, and packaging features of the product; 2) use gained insights to generate product prototypes; and 3) assess the acceptance of the prototypes among older adult consumers.

1 BACKGROUND

Oral Liquid Nutrition Supplements (OLNS) are widely prescribed in the US and globally to older adults and patients with a wide variety of medical conditions, including cancer and congestive heart failure, representing over two billion dollars in annual sales. However, there is very low patient satisfaction with these products resulting in compliance rates as low as 37% (Gosney 2003). They are expensive and unappealing; their low compliance rendering them ineffective as well. The goal of this research was to develop a functional frozen dessert with proprietary ingredients that delivers equivalent nutrition to bottled OLNS but with multi-sensory appeal that fits into the lifestyle of the individual.

1.1 *Clinical context: Unmet clinical need*

Optimal nutrition is critically important for healthful aging (Kamp et al. 2010). Older adults are at risk for malnutrition due to physiological, psychological, social, and environmental factors that can impact dietary intake (DiMaria-Ghalili & Amella 2005). Food intake typically decreases by 25% between the fourth and seventh decades of life (Bonnefoy et al. 2015). Malnourished older adults are at risk for functional decline, frailty, disability, and death (Fried et al. 2001, Janssen et al. 2004, Lee et al. 2005, Lee et al. 2011, Locher et al. 2007, Newman et al. 2001). Malnourished patients have a significantly longer hospitalization stay (12.5 versus 4.5 days), higher hospital costs per stay ($26,944 versus $9,485), and greater mortality rates (8.8 versus 1.7%) when compared to patients without malnutrition (Corkins et al. 2013). Further exacerbating nutritional risk in older adults, primary care physicians and many gerontologists lack nutrition-related training and comfort in basic dietary counseling. Hence, they are apt to quickly prescribe OLNS to older adults as a "guarantee" that, despite variations in dietary practices, preferences and appetite, the patient will be receiving the key macro- and micro-nutrients needed for survival (DiMaria-Ghalili & Amella 2005). While high protein/high calorie OLNS are prescribed to supplement dietary intake to manage malnutrition in older adults when the gastrointestinal tract is functional, patient adherence is abysmal (Gosney 2003).

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OLNS represent a $2B industry and are a fixture of healthcare, especially for older adults. In hospitals, OLNS are provided to patients by prescription or standard order set (Dyck & Schumacher 2011, Hines et al. 2010, Jensen 2013). Usually one 8-ounce serving twice daily is providing up to 500 kcal/day and 15 grams of protein/day if fully consumed (Kamp et al. 2010). The Drexel Food Lab has been exploring alternatives to the widespread prescribing of OLNS that might improve compliance. The current use of OLNS does not accomplish its goal it does not enhance nutritional care of the aging population, is ineffective, and expensive.

The research aims for this project were as follows:

> *Aim 1: Explore consumer perception and acceptability of a functional ice cream alternative to oral liquid nutrition supplements.*
>
> *Aim 2: Optimize the manufacturing standard, branding, and launch strategy of a functional ice cream alternative to oral liquid nutrition supplements.*

1.2 *Gold standard and current standard of care*

Clinicians monitor the effectiveness of OLNS by assessing function (e.g. hand grip strength), nutrition (e.g. Mini Nutrition Assessment [MNA] and serum markers), wound healing, and weight gain (Milne et al. 2009). Desired long term outcomes include improved quality of life (QOL), and decreased length of stay and infections (Milne et al. 2009). However, if an older adult does not consume the OLNS as prescribed, the effectiveness is limited, if not non-existent (Hubbard et al. 2012). Several important factors influence adherence to OLNS prescriptions in older adults. These include lack of thirst, early satiety, unappealing and limited flavors, palate fatigue, and difficulty handling flimsy OLNS containers (Gosney 2003). Evidence suggests that positive outcomes are not observed unless adherence to OLNS consumption is at least 75% (Dyck & Schumacher 2011, Simmons & Patel 2006, National Institutes of Health 2012). In addition to the failure to reach intended outcomes, OLNS wastage through non-consumption is between 24% to 63%, representing a significant cost to malnutrition management (Gosney 2003). Improved adherence to OLNS is prerequisite to improving the management of malnutrition in hospitals and home settings alike.

Leading OLNS, under the brands Ensure® (Abbott) and Boost® (Nestle), are made from ingredients, including, water, corn maltodextrin, sugar, and whey protein isolate. Thrive® ice cream, similarly has ingredients including soluble corn fiber, artificial flavor and cellulose. Ensure® is the market leader in adult nutrition consumer spending and healthcare institutional spending. For decades, there was no competitor OLNS product that was meaningfully different from an ingredient or taste perspective to improve nutrition. This deficit was recently highlighted in the 2015 American Geriatrics Society (AGS) Choosing Wisely® recommendations that includes providing appealing food in lieu of OLNS for treatment of unintentional weight loss in older adults (Janssen et al. 2004).

2 CONTRIBUTION

The research presented in this article is part of a larger effort to improve the health and well-being of older adults in need of nutrition supplements. To provide a healthy and delicious alternative to unpopular OLNS. Aim 1 specifically, which is the focus of this research, is an attempt to design a consumer-aligned, gold standard food product to ensure acceptability and compliance for the subsequent phases of commercialization and the clinical trial. Through this process, the research team learned about adapting research plans amidst a global pandemic, conducting research with older adults, formulating a nutrient-dense and organoleptically appealing frozen dairy dessert, and developing marketing strategies including visual brand identity and messaging to appeal to the intended audience of adults 60 years of age or older.

3 MATERIALS, METHODS, PROCEDURE, AND RESULTS

3.1 *Approach*

The data presented in this article are from a series of remote focus groups held between January and March 2020 and expanded upon the initial research which was conducted in 2017.

Two unique groups independently participated in three focus group sessions each. In total, six focus group sessions were conducted with eight total participants, four participants per group. In addition to the four participants in each focus group, two research team members facilitated the focus groups with additional research staff virtually present as notetakers with their video and audio turned off. The three-part series progresses from broad to narrow research questions beginning with conversations about food preferences and eating habits; shifting to specific probes into nutrition, OLNS and frozen dairy desserts; and then to product taste testing, and feedback on visual brand identity and messaging.

3.2 *Setting*

Food-related focus groups are commonly held in-person because the subject matter is tangible food products and taste-testing is often required. However, focus groups for this project were conducted on Drexel University's HIPAA-compliant Zoom in order to ensure the safety of research staff and participants amidst the COVID-19 pandemic. In this way, participants attended the focus groups from their homes and had ice cream samples delivered to them.

4 PART 1: UNDERSTAND FOOD HABITS AND PREFERENCES

4.1 *Experimental setup*

The first phase of focus groups sessions consisted of a virtual session with five adults over the age of 60. The primary objectives of part 1 were: (1) Elucidate and explore the food habits and preferences of older adults who are at risk for malnutrition, and (2) Explore perceptions and acceptability of a frozen dairy dessert alternative to traditional oral liquid nutrition supplements in older adults. A focus group guide was created to facilitate conversation among focus group participants and members of the research team. The focus group sessions lasted between 60 and 90 minutes and followed an outline that progressively narrowed the subject matter to nutrition, sweets, and finally, ice cream.

4.2 *Results*

During the focus groups, themes emerged related to the food habits and preferences of older adults. Many of the participants were managing chronic illnesses or discomforts including diabetes, gastric bypass, heart disease, and digestion trouble, and viewed ice cream as an occasion-oriented food. Participants cited eating ice cream as an event: ordering dessert at a restaurant, going to get a cone at an ice cream shop, or a treat between dinner and bedtime.

When asked about traditional OLNS, participants gave positive and negative feedback. Older adults said that OLNS are too sweet resulting in watering down the product. They also thought that the function of the nutrition supplement is prioritized over the taste. This same feedback was offered up about functionally similar products like protein bars, which one participant said, “tastes like sawdust.”

Focus group participants positively commented on the flavor, nutrition profile, energy, and convenience of OLNS. Specifically, consumers liked the vanilla flavor of one brand and the grab and go convenience. As for nutrition profile, participants commented that traditional OLNS is a good source of protein. One participant noted the drinks replace her morning coffee as a source of energy.

Feedback about traditional OLNS confirmed the hypothesis that older adults prefer food to meal replacement drinks. Additionally, the research team took into consideration both the negative and the positive qualities in developing of the functional ice cream oral nutrition supplement (ONS) for the taste testing in part 2. Most importantly, flavor, nourishment, specific nutrients like protein, and convenience are attractive qualities.

5 PART 2: TASTE TEST AND BRAND FEEDBACK

In the second phase of this study, the purpose was to taste-test samples of the functional ice cream ONS and receive feedback on the samples. In addition, the research team gathered feedback on concepts for brand messaging and themes for future commercialization.

5.1 *Experimental setup*

There were two primary goals of this second phase of focus group sessions: (1) Taste test product samples and gather feedback for the purpose of product refinement and optimization, and (2) Learn more about how a food product can better meet the needs of the target consumer through brand messaging and packaging. Eight participants divided up between two virtual sessions participated in part 2 of the study. Prior to the study, two four-ounce product samples were delivered or shipped to the participants’ homes in insulated coolers with dry ice. Two facilitators guided the conversation to gather feedback on the frozen dairy dessert ONS samples: (1) vanilla with brownie mix-ins/inclusions and (2) strawberry with brownie mix-ins/inclusions. Then, participants were asked about potential branding concepts.

During the taste test, participants were also given information through a screenshared presentation. The presentation showed the nutrition facts for the samples and name brands as well as the ingredients for the samples (see Figure 1).

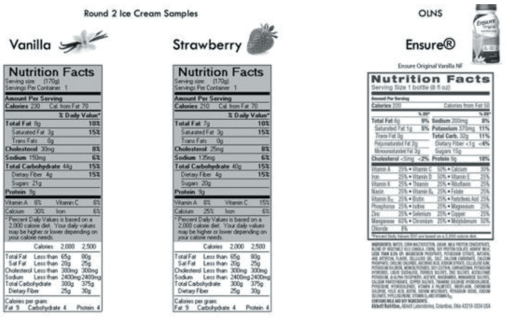

Figure 1. Nutrition facts for the vanilla and strawberry ice creams and Ensure® OLNS.

5.2 *Results: Taste testing vanilla and strawberry frozen dairy dessert samples*

The feedback on the frozen dairy dessert ONS samples included a mixture of positive and negative. The vanilla with brownie mix-ins sample received a 3.75 out of 5 rating from the eight participants. The group

said the sample was lacking vanilla flavor, too bland, and had a strange aftertaste. There were mixed reviews on the sweetness with some participants saying it was not sweet enough while others said the sweetness level was just right. Positive feedback included texture and the functional brownie mix-ins. Participants said the sample was easy to scoop and had an "iced milk" texture that was not too creamy or heavy. The brownie mix-ins received positive reactions based on their chewiness. The size of the inclusions received mixed reviews. One participant said this about the vanilla sample: "It would never be a chore to eat this."

The strawberry with functional brownie mix-ins sample received a slightly lower rating: 3.7 out of 5. Negative feedback included a lack of strawberry flavor, lack of strong pink color, and comments that the sample was not creamy enough. Some participants also said the brownie mix-ins were lacking or not distributed evenly in the container. Positive comments touched on strawberry option, the easy-to-scoop consistency and the "melt in your mouth" mix-ins.

In general, participants commented that they would like to see more flavor exploration. In response to the above comments, the research team strengthened the flavors and created more flavors including chocolate, cherry, banana, and vanilla for part 3 – the third focus group and final taste test.

5.3 *Results: Feedback on brand messaging*

The latter portion of this virtual session focused on brand messaging, brand themes, packaging, and distribution channels to inform the future commercialization of this product.

Brand messaging statements were presented to each focus group such as "For older adults who supplement their diet, this product provides…a superior nutrition supplement experience because the product offer multi-sensory appeal like real ice cream taste with brownie bits." And "For older adults who supplement their diet, this product provides…a satisfying dessert, both with taste and nutrition, because it is an effective way to achieve micro- and macronutrient goals without compromising flavor."

The reaction to the statements were mostly negative to specific word choices. Participants perceived "superior" as an inappropriately strong claim that is also gimmicky. They also recommended avoiding jargon like "multi-sensory". Instead, they advised focusing on the *better-for-you* qualities of the product. The conversation also brought up a tangential point about competition – the group warned against competing directly with regular ice cream. Instead, how can this product be marketed differently, perhaps as a frozen dessert rather than a traditional ice cream?

Finally, the focus group provided feedback on the third and final brand message: "For older adults who supplement their diet, this product provides…a path to maintaining a healthy weight and aging successfully because this food product is tested in a clinical trial."

Focus group participants reacted positively to the opening: "…a path to maintain a healthy weight and aging successfully…". Participants thought this was a compelling statement. However, they said mention of the clinical trial is not worth mentioning as it is too tedious to explain the details of a clinical trial. One consumer had the suggestion, "Say that it's like real ice cream, but with all the good vitamins, all the good nutrients…If I thought that I could eat this instead of taking all those vitamins, I'd be right with you."

5.4 *Results: Brand themes and packaging*

With future commercialization in mind, the research team presented focus group participants with visual collages and packaging concepts to understand preferences for brand themes and packaging. Themes included, "Comforting and Indulgent" (see Figure 2), "Healthy and Active", and "Retro and Nostalgic."

The second brand theme, "Comforting and Indulgence", received a markedly more positive reaction than the other two concepts (see Figure 2). Participants commented that this grouping of brands was appealing, aspirational, and, unlike the other themes, new and forward-thinking. This theme was said to reflect an active lifestyle and most aligns with a good-for-you ice cream that highlights protein. One participant succinctly worded this sentiment this way, "Healthy, delicious ice cream for people with a healthy lifestyle, an active lifestyle."

Throughout the sessions, the older adults commented on packaging elements they liked and areas for improvement. Participants agreed that the containers the samples came in were easy to open and stable; however, they preferred either a single serving or classic pint container for size. They also reacted positively to the chosen material, paper, due to its perceived sustainability. Participants also noted the use of primary colors, large fonts, and to-the-point information as positive qualities.

6 PART 3: TASTE TEST IMPROVED ICE CREAM AND NARROWED BRAND CONCEPTS

6.1 *Experimental setup*

There were two primary goals for part 3: (1) Taste test product samples and gather feedback for the purpose of preparing product formulas for clinical trial and commercialization, and (2) Gather feedback on initial branding concepts including name, tagline, and packaging. Part 3 of the study consisted of seven participants divided up between two virtual sessions. Prior to the study, four product samples in 4 (4 oz) containers were delivered or shipped to the participants' homes in insulated coolers with dry ice. To direct the conversation, two research team members facilitated the

Figure 2. Examples of products that represent "comfort and indulgence".

conversation to gather feedback. Flavors sampled included: (1) vanilla brownie, (2) chocolate brownie, (3) cherry brownie, and (4) banana brownie. After testing the samples, participants were then asked about initial branding concepts based on findings from part 2.

During the taste test, participants were shown the nutrition facts for the vanilla brownie and chocolate brownie samples compared to Ensure® (see Figure 3). The ingredients for the samples were listed on the following presentation slide for participants to view and discuss.

For part 3, it was hypothesized that the samples would receive more positive feedback than the samples tested in part 2. The research chef adjusted the product formulas to address the main criticisms including a lack of vanilla or strawberry flavors and more flavor exploration.

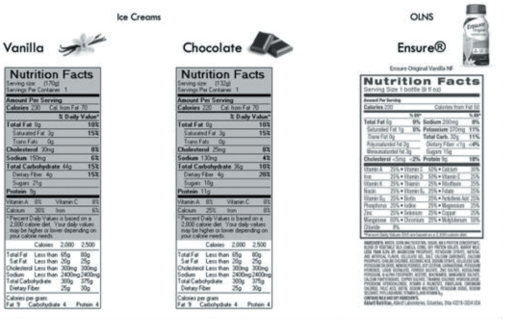

Figure 3. Comparative nutrition.

6.2 *Results: Taste testing samples*

Feedback on the reformulated frozen dairy dessert ONS samples reflected improvement in the product formulation as demonstrated by the feedback given by the seven participants in the study. Samples received positive feedback with results ranging from 4.5 (vanilla) to 4.7 (banana). The banana brownie and cherry brownie samples initially received negative feedback for the lack of color. However, lack of artificial flavor and food coloring was a selling point when participants made this connection. The older adults in the focus group also said the strong banana flavor paired with the brownie was a good combination. Finally, there were also comments about the aroma. One participant said it was, "…impressive just to smell." This quality set the banana sample apart from the others.

The negative feedback focused on personal preferences that are mostly arbitrary like the color of the fruit samples or the intensity of the chocolate brownie flavor. Meanwhile, the positive feedback demonstrated correction in the areas for marked improvement after the first round of taste testing including the strength of the respective flavors.

6.3 *Results: Brand messaging and names*

Before closing the focus groups, the facilitators and participants spent 15 minutes discussing their impressions of concepts for brand messaging and brand names.

The goal of getting the participants' feedback on brand messaging is to understand which statements about this product most resonate with older adults – the target consumer for the frozen dairy dessert ONS. This information is intended to inform the future commercialization of this product. Before introducing the revised brand messages, the facilitators screen-shared via Zoom a list of successful themes mentioned in the previous session (see Figure 4).

Based on the conversation from the part 2 focus groups, the brand messages discussed in part 3 were revised to the following. "This product provides…a path to successful aging with an ice cream for healthy, active lifestyles." "This product provides…a delicious frozen dairy dessert in a variety of flavors

with brownie-bits and soft ice cream texture." and This product provides…a satisfying, nutrient-rich ice cream fortified with protein and vitamins."

The reaction to this statement was mostly negative due to the use of the word "path". Participants viewed "path" as too strong of a claim because this ice cream is not a standalone solution. Instead of a path, the older adults said this product is one piece of a program to age successfully.

Participants had an interesting response to the phrase "frozen dairy dessert," which is technically how this product would be classified as it does not meet the standard of identity for ice cream. Specifically, the older adults in the focus group associate chemicals with desserts labelled as "frozen dairy dessert" versus "ice cream". Alternatively, participants would prefer the phrase "natural frozen dairy dessert" to connote a clean label. One participant suggested, "You should be marketing, at first, not to the general ice cream lover, but to people who need to eat healthy." In this way, this brand message differentiates itself from traditional ice cream by featuring the healthful aspects like protein and vitamins. Furthermore, the older adults said they would like the language to be more specific. For example, older adults said they would like to see reduced sugar and fat along with high fiber and protein.

Following the brand messaging conversation, the facilitators asked participants for their comments on brand names, logo styles, and packaging concepts (See Figures 5, 6, and 7). Participants viewed 16 brand names and additional logo styles. They were asked to share their initial thoughts and then pick their top three. Ultimately, there were four names that most participants did not like: "Mountain Top", "Tip Top", "Ice Cream Therapy", and "Half Full." Participants said these names did not reflect the product or the ice cream category in general. Moreover, one participant said this about *Ice Cream Therapy*, which is the tentative name given to the project, "[This name] pushes me away. Ice cream and therapy don't go together." Conversely, the names "Gusto" and "Super Scoop" received positive reactions from the groups of older adults. One participant made a name suggestion that was popular with the group: "Dream Cream". They elaborated, "It's the dream of eating something healthy and enjoying it."

Next, facilitators asked the focus groups about logo styles. The designs were created by a member of the research team as preliminary research for commercialization (see Figure 6). One participant found the "full scoop" logo in the bottom right "very attractive"; however, the conversation quickly led to the topic of the taglines rather than the layouts or fonts. "I would really like to see protein in some of [the taglines], because that would be what would pull me in," said one participant. Other participants in the groups echoed the idea that the taglines should be more specific than "nutrients" by citing specific nutrients like protein or fiber.

Another participant had an idea for a tagline: "Powerful, delicious, nutrient-rich ice cream." Themes of power, energy, great taste, and nutrition resonated with the older adults.

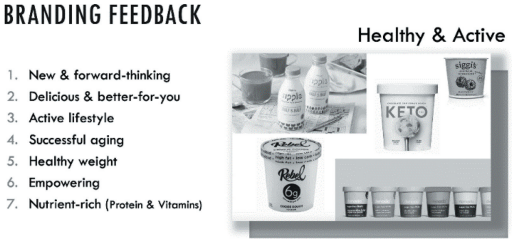

Figure 4. A recap of the branding feedback from the part 2 focus groups. This list of successful themes informed the revised brand messaging and brand names that were tested in the third and final focus group sessions.

Figure 5. These brand names were displayed to each focus group via Zoom screensharing. "Gusto" and "Super Scoop" were popular as was a participant name idea: "Dream Cream".

Figure 6. Eight logo designs were shown to the seven older adults in the focus group. Participants focused on the taglines and the importance great taste and specific nutrients.

The facilitators used the remaining minutes of both sessions to gather assessments of two designs for packaging. The nutrient-specific callouts around the rim of the lid were a popular feature. In fact, participants had ideas for more callouts: "high fiber", "low in fat", "reduced sugar", "real ice cream taste", and "perfect size". In addition, the older adults also commented on the importance of a package with great readability, which means clear wording as well as large, legible fonts. In other words, it will be important identify the key selling points and succinctly communicate in a salient way.

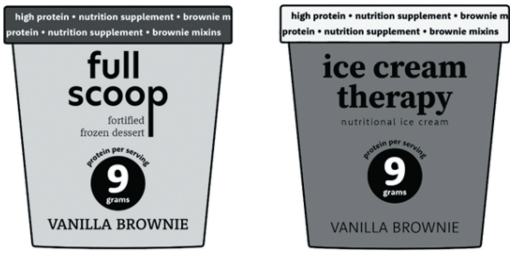

Figure 7. The older adults in the study viewed two packaging concepts. The comments focused on callouts around the rim of lid and clarity in terms of the readability.

7 DISCUSSION

7.1 *Limitations*

The inclusion criteria, especially amidst the COVID-19 pandemic, made the opportunity to participate less accessible to older adults who would have otherwise been eligible. For example, it was required that participants have access to a computer, Wi-Fi, and the ability to use Zoom technology independently. For this demographic, adults 60 years of age or older, this inclusion criteria deemed some interested parties ineligible.

The product samples were not closely controlled by the research team prior to taste testing, which could have negatively impacted the quality of the sample. The samples were delivered or shipped to participants 1-3 days prior to the scheduled focus group; therefore, it is possible that samples were left out at room temperature, or not stored at the correct temperature.

Lastly, it is important to note that the findings from the focus group sessions are not intended to be generalizable. Testing products, especially food, is subjective. Moreover, the eight participants in the study are not representative of a diverse set of cultures and geographies; therefore, the findings from this study cannot be applied to the entire demographic of adults 60 years of age or older or the general population.

7.2 *Learnings*

Older adults choose food with nutrition as a (top) priority. In part 1, we learned that nutrition as an older adult means being aware and making choices based on what's healthier. This means smaller portions with more nutrition while still allowing for regular sweet fixes.

Older adults have a penchant for inclusions in ice cream, especially brownie mix-ins. This is encouraging because mix-ins hold a considerable amount of the nutritional content necessary to match traditional OLNS. There is opportunity for other mix-ins like cookie dough and other protein-rich/fortified foods.

"Healthy" and "better-for-you" brand messages resonated with adults 60 years of age or older. Branding focused on comforting, indulgent, retro, and nostalgic were not popular with this consumer age group. Instead, brand stories focusing on empowerment, vitality, better-for-you, health, and an active lifestyle received positive reactions. In fact, better-for-you *and* delicious was attractive to this group. Products in the past that tout nutrition are seen as bland and not tasty. Consumers our research team spoke to are attracted to a product brand that can communicate nutrition and great taste.

Older adults seek to maximize specific nutrients and minimize others. During the taste tests or branding conversations, focus group participants wanted to know more than "nutrient-rich". Which nutrients specifically? Most older adults were seeking high protein and high fiber foods. On the other hand, which nutrients are minimized? The study cohort sought to limit fat and sugar intake.

Taste cannot be compromised for nutrition. Older adults want a nutrient-rich product, but more than that, they want a product that tastes delicious. In their experience, nutrition-forward products lack the taste of their conventional counterpart. Therefore, to attract the greatest audience of consumer – people who want to or need to eat healthy and people who want a frozen dessert that tastes like regular ice cream – a frozen dairy dessert ONS needs to taste delicious and have the nutrition for successful aging. As one participant phrased it, "It's the dream of eating something healthy and enjoying it."

8 FUTURE WORK

This study on consumer perception of the frozen dairy dessert ONS is part of a larger project that enters the clinical trial phase in summer/fall. The qualitative data collected from this study informed the gold standard product formula for the clinical trial. In addition, the research team moved forward with the vanilla brownie and chocolate brownie flavors for the clinical trial because they match the traditional OLNS flavors in the clinical trial. Pending supportive results from the clinical trial, product commercialization is the last aim of the project.

9 CONCLUSION

In general, consumer perception of nutrition-forward products is that they sacrifice taste for the nutrition profile. Older adults are aware of the importance of incorporating nutritious food into their diets, and they choose foods based on their nutrients like high fiber, high protein, low fat, and low sugar. Nevertheless, they enjoy indulgent treats, so this product may satisfy their desire for a delicious and better-for-you dessert.

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Experiencing and Envisioning Food: Designing for Change – Bonacho et al. (Eds)

Motivating NCDs patients with better dietary experience

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ABSTRACT: The Holistic Approach for NCDs Treatment Program has studied the initiative of combining Exercise and Dietary Control to the NCDs patients which the creation of the better dietary experience could lead to program's effectiveness. Therefore, the design has been included to the program from the beginning as the applied design process in which the development of the food has been through, from user research to empathizing, prototyping and test of prototype. The design also included the appearance of food, the packaging and the overall experience. The preliminary result has shown the positive result from the voluntary patients with some dissatisfaction for further improvement, as well as its potential in the field of dietary development, in which design, as the process and aesthetic, could be introduced to broader segment for food in healthcare.

1 BACKGROUND

1.1 *NCDs situation in Thailand*

Non-communicable diseases (NCDs) are major health problems that are the greatest component of the total burden of disease in Thailand and globally. In recent years, NCDs have shown increasing impacts on health status and rapid rising of the magnitude of health problems. Major risk factors of NCDs include harmful health behavior, physical inactivity and unhealthy diet, particularly over eating of added sugar, salty, fatty and greasy food with low fiber.

Department of Disease Control (2020) stated that the fatality rate per 100,000 from NCDs were mainly from the Cerebrovascular Disease, Chronic Heart Disease, Diabetes, High Blood Pressure and Cancer consecutively. The study (Department of Disease Control, 2020) showed the major reasons of those NCDs ranged from poor dietary habit, lack of physical activities, consumption of Tobacco and Alcohol products and pollutions.

In detail, the dietary habits could lead to Obesity, High Cholesterol, and Hyperlipidemia. The major poor dietary habits included consumption of less vegetable but more of Fat and Carbohydrate food products.

1.2 *Holistic approach for treatment*

The initiative to apply holistic approach for NCDs treatment was the collaboration from the Siriraj Hospital and Kasetsart University (Kaewmanee et al, unpubl). The treatment was aimed to change the Unhealthy and Risky Behavior by combining the Exercise and Dietary Treatment. The research team was multidisciplinary with broad range of expertise comprised of medical doctors, nutritionists and dietitians, physiologists, sport scientists, food scientists and product developers, and the product designers.

2 DESIGN INCLUSION

2.1 *Experience of food in hospital*

There were several studies that showed the patients' unsatisfaction with general service in hospital including the food (Chumkaew & Rungsayatorn, 2014; Vidhayapaet, V. 2015; Tassanasate et al, 2020). However, one study explored that the overall appearance of food, including colors, smell, taste, texture, hardness and other properties, had benefits for the patients, not only as the ease for chewing and swallowing, but also creating the patients' appetite. (Panuthai et al, 2002).

2.2 *Food design*

There was not any research of design inclusion to the dietary treatment program conducted in Thailand. The closest case was the experience improvement in dietary treatment by creating cooking recipes and menu improvement. Local and ethical menus were adjusted by using new local ingredients that were appropriate for Diabetic and Hypertensive Patients, such as Steamed fish with tomatoes & hot pepper paste (Planil Neng Jaew Makcates) (Ketbumroong et al, 2020).

Although it is widely known for applying design disciplines in the food. From 'Architectural theatricality, a food design perspective in hospitality studies', Tvedebrink, Fisker and Kirkegaard (2013) linked Food Design and Architecture by discussing how staging meal experiences can improve patient recovery in

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hospitals, and Zampallo (2016) described 'Food Design' into 6 sub-disciplines. The food design for NCDs patients were the integration of these sub-disciplines.

The designers were included to the team from the early phase of the research, for their tasks were not only providing the idea of how design could aesthetically help improving the patients experience, but also how design could frame the research process by applying the Design Thinking method (Brown, 2009) and Double Diamond Model (Design Council, 2005).

3 METHOD

The research framework had been planned in 5 steps including 1) Assessing the Current Dietary Treatment in the Hospital, 2) Understanding the Stakeholders in the hospital's food service system, 3) Determine the options and solutions, 4) Design and Create Testing Prototype, and 5) Deploy to Limited Voluntary Patients and to expand to Larger patient group in later phase.

4 RESULT

4.1 *Assessing the current situation*

The current Dietary Treatment in the Hospital had been assessed by an interview of doctors and nutritionists. The result showed the process from prescribing the dietary treatment for the patients as a one-way flow as shown in the Figure 1.

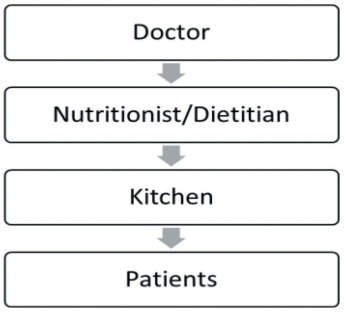

Figure 1. Dietary prescription process.

The doctor who took care of the patients would diagnose and prescribe the diet treatment program, then the prescription would be transferred to the nutritionists or dietitians to design the treatment program and plan the menu for each patient. The information of patients and program, then, would be handed to the kitchen to manage the cooking and provide each patient the meals according to the dietary treatment program. The patients were unable to provide feedback for each meal they had through the treatment system. And although there was the overall satisfaction survey on the preference of food from the hospital, but with limited budget and resource, the hospital was unable to provide better experience for the patients in their dietary service especially with the NCDs patients which most of the meals were plain and tasteless without flavor due to the cutting of many condiments that might affect the patients' health.

4.2 *Understanding the stakeholders*

The interview of stakeholders which contributed to the success of the treatment including dietitians and patients had been conducted in order to understand the circumstance during the dietary treatment. There were 30 patients as sample responders, provided the information and insights for their satisfaction and dissatisfaction for their current treatment. The details of the NCDs patients are shown in Tables 1-3 below.

Table 1. Responders' age groups.

Age Group	No.
Under 31	8
31 – 40	10
41 – 50	7
51 – 60	5

Table 2. Type of NCDs of responders.

Type of NCDs	No.
Diabetes	7
High Blood Pressure	15
Hyperlipidemia	10
Cerebrovascular Disease	2
Other	1
More than 1 type	5

Table 3. Period in the treatment.

Period	No.
More than 3 months	5
1-3 months	7
3-4 weeks	4
Less than 3 weeks	14

From the interview, most of the responders revealed dissatisfaction in their meals provided by the hospital, although half of them had been in the program for less than 1 month. The research team asked for opinions and feelings toward the meals in the treatment, both the taste and the appearance of the meal. Most of them showed negative feedbacks

to the meals in both flavor and appearance, as shown in Tables 4 and 5. Also, the research team asked the responders of their opinion on the menu repetition, majority of them showed negative opinion as shown in Table 6.

Table 4. Opinion on taste of the meal.

Opinion on taste of the meal	No.
Very Good	2
Good	4
Bad	12
Very Bad	12

Table 5. Opinion on appearance of the meal.

Opinion on appearance of the meal	No.
Very Good	9
Good	10
Bad	7
Very Bad	2
No Comment	2

Table 6. Opinion on repetition of meal in program.

Opinion	No.
Very repetitive	10
Quite repetitive	13
Acceptable	6
Fine	1

The responders also had complaints on the quality of the meals which were lack of variety in ingredients, as well as the freshness of ingredients. Moreover, the responders had expressed the menus they were not satisfied which included Boiled Vegetables, Steamed Chicken Breast, Stir-Fried Vegetable, Plain Soup, Boiled Rice, Rice Porridge, Salad and white eggs menu.

When the team asked about what could possibly make them feel better to the treatment, the responders revealed their ideas including (1) Less Repeated Menu or more menu variety, (2) More Flavors or more intense flavor in the food, (3) Better Appearance or better aesthetic of the meal, and (4) Feeling of Being "CARED FOR" or giving of better experience.

The interview with dietitians about the problems in dietary treatment revealed the main reason behind most NCDs patients caused by eating habit, was heavy rice consumption. As it has been very common for Thais to have rice in every meal, many of the patients consumed too much rice while they worked as labors or had intense physical activities. Even though they got older and had fewer activities, but the old habits made the rice in their meal the same amount, causing them excessive nutrition, especially sugar.

However, the dietitians showed the negative perception to the patients for their lack of discipline of keeping their diets controlled. There were many cases that patients had stopped or quitted their treatment just because they did not want the prescribed meal which they had no appetite on. These situations revealed why most of the responders had relatively short treatment period.

5 THE DEVELOPMENT

From the empathy stage, the research team had gathered the information, analyzed and concluded the frame and criteria as the statement for the development of food for the dietary treatment to combine with the exercise program which includes; (1) More Variety of Menus, (2) More Flavor Intensity, (3) Colorful Appearance, (4) Well-Designed and Standard Packaging, and (5) Design to Communicate to Patients. The research team continued the development process with the different tasks as follow.

5.1 *Menu creation*

The menu was planned from the Food Scientists and Dietitians and further developed with assist by the team of professional chefs. The ingredients were measured the nutritional facts, and the recipes were calculated for the appropriate nutrition and energy which could be adjusted to the demand of the NCDs type.

Then, the cooking test session was conducted for initial 18 menus to the program. The chef also provided the additional suggestion on cooking style and the decoration of the meals.

Figure 2. Cooking test.

Figure 3. Cooking test.

5.2 *Low GI rice*

Since rice consumption has been one of the causes to excess sugar to NCDs patients, the team acquired the new developed breed of rice led by the team of Kasetsart University which was a further development from previous Low GI rice (Songchitsomboon et al, 2009a, Songchitsomboon et al 2009b). The new 3G rice assesses Low GI index properties at 52, which is suitable for Diabetes patients, as well as other prescribed meal.

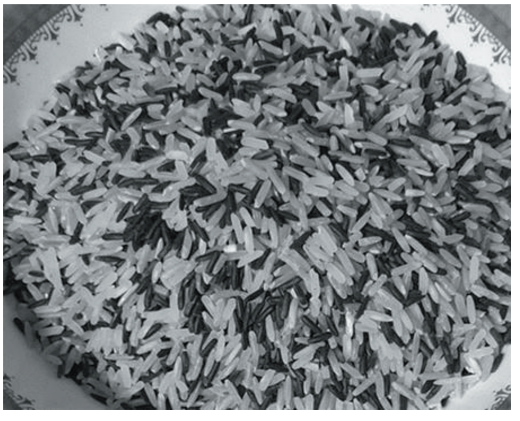

Figure 4. 3G Rice.

5.3 *Communication and packaging design*

Beside the meal itself, the research team had created the communication design and selected the packaging for the program aimed to provide better experience to patients. The program was named in Thai as "Kin Yoo Dee", translated as "Eat and Live Well".

The design direction was intended to ease the stress of having the prescribed menus during the program and emphasized the importance of the determination to "Live-Well" by their eating habits,

Figure 5. Kin Yoo Dee Design.

resulting in the design of a booklet for the patients when introduced to the program.

Figure 6. Booklet design.

The design was applied to the design of stickers for the packaging and boxes of each meal which were delivered to the patients' residences every morning.

Figure 7. Stickers design.

6 TESTING

The first batch for the Holistic Approach for NCDs Treatment combining Exercise and Diet Management Program had been launched with limited volunteers divided into 2 controlled group; the Exercise and Diet

control and the Diet control only. All meals of the day had been supplied daily to their households, and the combination of the Menus were planned to avoid feeling of repetition. After 1 month of launching, the preliminary examination showed that both groups had improved health condition which includes lower Blood Lipid, Blood Sugar and Blood Pressure. The group with Exercise and Diet control had shown better results than the Diet control only group. The Testing phase demonstrated the success of the Holistic Approach.

The feedbacks from the Food itself were not fully satisfactory. There were fair reception for the overall experience of the delivered food boxes. However, the complaints from some patients also directed to the design and preparation of the meal, especially the repetitiveness of the menu as the patients had demand for more variety of the food in the treatment program. There were also critics on the quality of food which were inconsistent and sometimes were not fresh as they expected.

From the administrative aspect, there were some internal problems faced when started. These problems included the delivery management, difficulty of management in the kitchen due to the customization of meals for each patient, and the budge. The research team would attempt to minimize and solve these before the full enrollment of the treatment program with around 120 volunteers in next stage.

7 CONCLUSION

Although Holistic Approach for NCDs Treatment combining Exercise and Diet Management Program has now been on the process and not yet to determine the success of design as a tool to create a better experience for the NCDs patients, but the work of Designers in this program had conducted and shown how 'Design' as a process was applied in the health diet controlled program.

The conceptual framework of Design Thinking and Double Diamond Model (Design Council, 2005; Brown, 2009) were practiced and included into the development of 'Food' for the NCDs patients from the start, in which the team had studied and empathized as the users of the prescribed food.

The design discipline also had influenced the way the research team worked, from the linear type into more collaborative and user-centric way. The Collaboration of the multidisciplinary team combined experts from different fields in order to develop healthy food for the NCDs patient.

Further development of the program still focused on the experience of the patients as well as the health condition. The design inclusion for the dietary treatment would be explored into different group of patients with different treatment for other diseases. Therefore, hospitals and healthcare providers would consider including design practice into their food management to create better experience for patients as well as the efficiency in the service system of food in the health facilities.

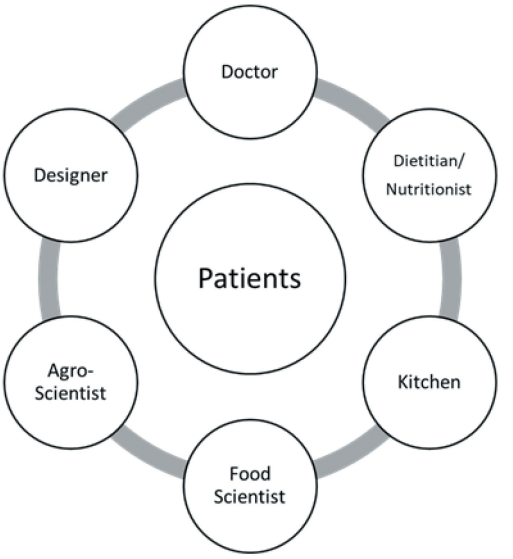

Figure 8. Project collaboration.

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Experiencing and Envisioning Food: Designing for Change – Bonacho et al. (Eds)

Paths for reducing sugar intake in Portugal: Main findings from the SUGAR Project

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ABSTRACT: Overconsumption of free sugars is associated with an increased risk of non-communicable diseases. Given that about one-fourth of the Portuguese adult population exceeds the WHO's free sugars intake limit, examining consumers' perceptions and practices regarding sugar intake becomes relevant. Here we review the main findings of the SUGAR project that used a multimethod approach to investigate this issue. Our studies show that, overall, people hold negative attitudes towards sugar, recognize some of its negative outcomes for human health, and favor the implementation of governmental strategies to reduce this consumption. Nonetheless, our data suggest ambivalence toward sugar intake and low knowledge about the topic (e.g., difficulty in identifying sugars in ingredient lists; unawareness of sugar intake guidelines). By identifying knowledge gaps and sources of bias related to sugar consumption, our results can be informative for developing interventions to reduce the consumption of free sugars.

1 THE SUGAR PROJECT: RELEVANCE AND SCOPE

Poor eating habits contribute to a decrease in average life expectancy and have been associated with many health conditions. The excessive intake of sugars is characteristic of such inadequate eating habits, contributing to increasing overall energy intake while reducing the intake of nutritionally richer foods (Mela & Woolner, 2018). The negative impact of excessive consumption of free sugars – that is, all "… monosaccharides and disaccharides added to foods and beverages by the manufacturer, cook or consumer, and sugars naturally present in honey, syrups, fruit juices, and fruit juice concentrates" on health seems to be particularly prominent (World Health Organization [WHO], 2015, p. 1). Specifically, overconsumption of this type of sugar has been associated with the risk of developing non-communicable diseases (e.g., overweight or obesity, cardiometabolic diseases, some types of cancer, dental caries), many of which are prevalent in Portugal (for a review, see Prada, Saraiva, Garrido, et al., 2022).

Based on the evidence linking sugar consumption and adverse health outcomes, several health authorities have issued sugar intake guidelines (for a review, see Mela & Woolner, 2018). The WHO's guidelines state that free sugars intake should be limited to less than 10% (ideally 5%) of the total daily energy intake (WHO, 2015). To illustrate, for a person with a 2000Kcal/daily intake, free sugars intake should be lower than 50 gr per day. At first sight, this threshold might seem quite high. However, consumers often focus on table sugar (e.g., the amount of sugar they add to coffee), underestimating the amount of sugar in the food or beverages available at the supermarket or the hospitality industry (Prada, Godinho, et al., 2021). For example, drinking a single can of soda can contribute to about 70% of the WHO's daily free sugars intake limit. Indeed, free sugars seem to be ubiquitous in current food offer (Acton et al., 2017; Popkin & Hawkes, 2016), not only in sweet products (e.g., soft drinks, cookies) as well as in less obvious products (e.g., canned foods; bread). Hence, it is not surprising that sugar intake patterns are worrisome in multiple countries (Azaïs-Braesco et al., 2017), and Portugal is no exception. According to recent data, 24% of Portuguese adults, 41% of children, and 49% of adolescents' sugar intake exceeds the recommended amount (Lopes et al., 2017)

In this chapter, we summarize the findings of a project that aims to contribute to addressing this

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issue by examining the extent to which Portuguese consumers':

1. Understand the anticipated health consequences of excessive sugar intake;
2. Are aware of governmental interventions to reduce sugar intake and, if so, if they accept these interventions;
3. Prioritize information about sugar content and know about sugar intake guidelines;
4. Are knowledgeable about which ingredients constitute sugar sources;
5. Are influenced by claims about the amount or type of sugar in processed foods;
6. Can infer the sugar content of real-life products and how perceived sugar content modulates the perception of other attributes (e.g., caloric content, perceived taste).

2 MAIN FINDINGS

2.1 *Perceived associations between excessive sugar intake and health*

Excessive sugar intake represents an increased risk of developing non-communicable diseases (e.g., obesity, cardiometabolic diseases, dental diseases; Mela & Woolner, 2018). Yet, it is unclear whether people are aware of these adverse health outcomes (cf., Park et al., 2018).

We have conducted two qualitative studies that provide insights into this issue. One of these studies (Prada, Godinho, et al., 2021) used focus groups with a sample of 40 Portuguese college students. Overall, participants shared the view that sugar is not harmful if eaten in moderation. Still, they identified as potential consequences obesity, diabetes, cardiovascular diseases, skin problems, and general conditions (e.g., sugar as a cause of inflammation). The other study (Prada, Saraiva, Godinho, et al., 2021) presents the findings obtained from 42 interviews with Portuguese parents, showing that participants associated children's excessive sugar intake with similar conditions (e.g., obesity, diabetes, oral health problems), also emphasizing other issues (e.g., agitation, inattention, and hyperactivity). However, individuals sometimes downplay the impact of the adverse consequences of excessive sugar intake (e.g., considering it is less harmful than other nutrients or substances such as fat or preservatives) or acknowledge the potential negative health outcomes but believe that they will not experience them (Miller et al., 2020; Prada, Godinho, et al., 2021).

To assess the anticipated consequences of excessive sugar intake, we asked Portuguese individuals to freely report all health conditions they associated with such overconsumption and then rate the strength of these associations for eight specific health conditions (Prada, Saraiva, Garrido, et al., 2022). Most participants (79%) reported at least one health condition associated with excessive sugar intake (a total of 1812 health conditions were coded by two expert judges). The most frequent associations were related to risk factors for cardiovascular diseases (e.g., diabetes, obesity, hypercholesterolemia). Still, associations to cardiovascular diseases (e.g., stroke, heart attack/myocardial infarction, arteriosclerosis), oral health problems (e.g., cavities), oncological (e.g., cancer), and mental health conditions (e.g., depression, anxiety, fatigue) were also widespread. Moreover, participants rated all the indicated health conditions as highly associated with excessive sugar intake, particularly diabetes, overweight/obesity, and oral problems.

2.2 *Knowledge and acceptance of interventions aiming to reduce sugar intake*

Public perception of governmental interventions has the potential to shape the design, implementation, and compliance with a given policy (e.g., Reynolds et al., 2019). The few studies that specifically focused on the public acceptance of actions aimed at reducing sugar intake included samples of British and American (Petrescu et al., 2016) and Swiss participants (Hagmann et al., 2018). To examine public knowledge and acceptance of interventions in Portugal (Prada, Rodrigues, et al., 2020), we asked participants to indicate all the interventions to reduce sugar intake they could recall and to indicate the level of agreement with the set of eight interventions described in Hagmann et al.'s study (2018).

Our findings showed that only about one-third of the participants could remember at least one intervention. Interventions related to increased prices or taxation for high-sugar products (particularly soft drinks); reduction in the weight of individual sugar packets; and limited availability of products offered in health care or education facilities were the most frequently mentioned. Moreover, participants reported accepting all interventions (e.g., public health campaigns, sugar reduction in products, portion size reduction, taxation) apart from the one proposing sugar replacement by artificial sweeteners. The most accepted intervention was the one related to explicitly labeling sugar content on food packaging.

Overall, participants were very receptive to the implementation of interventions aimed at reducing sugar intake and reported positive attitudes toward the need to address excessive sugar intake in Portugal.

2.3 *Perceived importance of information about sugar content and knowledge about sugar intake guidelines*

Despite the efforts of governments worldwide to comply with the current sugar intake guidelines, the goal is far from being reached. Thus, it becomes highly relevant to explore the extent to which these guidelines are well known among the general

population. Previous research with Canadian (Vanderlee et al., 2015) and Northern Irish participants (Tierney et al., 2017) suggests this is not the case.

We examined awareness of the guidelines as well as the importance (and frequency of use) of information about sugar content (Prada, Saraiva, et al., 2020). We observed that participants indicated that sugar content is the most important attribute in the nutritional information panel to watch out to stay healthy, consulting it more frequently than other indicators (e.g., caloric content). However, participants were unaware of intake guidelines. Specifically, almost two-thirds of the sample responded that they did not know about these guidelines or heard about them but did not remember the exact limit of sugar intake. Those who did provide an estimate indicated that the guidelines ranged from 0 to almost 100 g of sugar per day. Moreover, participants were moderately confident in their ability to understand the definition of free sugars, but less so regarding the ability to recognize this type of sugar in products. These findings point out the need to further examine consumer knowledge about sugar sources.

2.4 *Knowledge about sugar sources*

Research suggests that increasing knowledge about sugar is associated with reduced consumption of food and beverages with sugar (Gase et al., 2014; Lee & Joo, 2016; Park et al., 2018). Critically, consumers' knowledge about this topic tends to be low.

We adapted a task developed by Tierney et al. (2017) and asked participants to categorize a set of 15 sugar sources described according to two criteria: composition (i.e., intrinsic vs. added/free sugars) and origin (i.e., natural sugar vs. artificial sweetener; Prada, Saraiva, et al., 2020). They could also select an "*I don't know*" option. According to the scenario presented (i.e., list of ingredients of packaged cookies), all items were sources of added sugar, and all were natural except for aspartame and saccharine. Overall accuracy was inferior to 50% in both cases, such that lactose, fructose, and glucose were frequently miscategorized as intrinsic sources of sugar. Moreover, although aspartame and saccharine obtained the highest frequencies of artificial responses, responses were still below the 50% threshold. Participants also often incorrectly categorized other sugar sources as artificial, namely fruit concentrate corn syrup or xylitol. It is also interesting the high percentage of participants that mentioned being unsure (i.e., "*I don't know*" responses) about the categorization of ingredients like xylitol or maltose in both criteria.

Summing up, accuracy in the sugar source categorization task was far from ideal, and participants actually seemed to recognize this lack of knowledge as they often indicated not being able to categorize a given item. Our results also indicate consumers' receptivity to certain ingredients, as consumers tend to mistrust food additives, viewing them as less natural and healthy (Szűcs et al., 2019).

2.5 *Impact of cues related to the amount and type of sugar on consumers' perception of products*

Previous studies have suggested that nutritional claims (i.e., statements about a particular nutritional characteristic of the product) may help consumers make healthier and informed food decisions (for reviews, see Kaur et al., 2017; Talati et al., 2017). This is only possible if the consumer can correctly interpret them. Critically, that is often not the case (Anastasiou et al., 2019). For instance, claims may mislead consumers (Roe et al., 1999) when they attribute excessive health benefits to a food product or infer the healthiness of a product solely based on the presence of the claim (e.g., Kaur et al., 2017). A curious example is the positive effect of a fictitious claim ("MUI-free") on perceived healthiness (Priven et al., 2015). Moreover, consumers may overlook potentially negative attributes (e.g., high sugar) due to the presence of positive claims (e.g., "with calcium" (Hastak & Mazis, 2011; Wellard et al., 2015). For example, a systematic comparison of thousands of products has shown that products labeled as "reduced calories", "light", and "low fat" present higher sugar content than their "regular" counterparts (Nguyen et al., 2016).

Claims about sugar may refer to the quantity (e.g., a "low sugar" food must contain up to 5gr of sugar per 100 gr of product) or the quality (e.g., "with coconut sugar") of this nutrient. Previous research has suggested that both types of sugar-related claims can promote the perception that the product is healthier (Nobrega et al., 2020; Sütterlin & Siegrist, 2015) or has fewer calories (Patterson et al., 2012). However, these claims may also lead to negative expectations for other attributes such as taste (Lähteenmäki et al., 2010; Nørgaard & Brunsø, 2009; Raaij et al., 2009).

In a recent study (Prada, Saraiva, Sério, et al., 2021), we sought to systematically examine how different types of claims about sugar influenced the perception of food product categories (i.e., yogurts, ice creams, cookies, and breakfast cereals). In two experiments (combined n = 406), we asked participants to evaluate the perceived healthfulness, caloric value, and expected taste of products with (vs. without) sugar-related claims. Specifically, the claims were on the sugar content ("0% sugar", "sugar-free", "no added sugars", "low sugar" - Experiment 1) or the type of sugars or sweeteners of natural origin ("sucrose", "cane sugar", "honey" and "stevia" - Experiment 2).

Results from Experiment 1 revealed that all products with claims about reduced sugar content were rated as healthier, less caloric, and less tasty than the regular alternatives. Still, products with the comparative claim (i.e., "low sugar") were perceived as the

least healthy, most caloric, and tastiest. The impact of claims related to the type of sugar (Experiment 2) was not as straightforward, varying according to the specific claim and evaluative dimension (e.g., products with stevia rated as healthier, less caloric, and less tasty; products with honey simultaneously rated as healthier and tastier). In general, the ratings did not depend on the product category, suggesting that the impact of claims may be generalized to other product categories. We also observed that, for both experiments, the frequency of consumption of products with sugar-related claims was positively associated with the general perception of these products, the influence of nutritional information on consumption decisions, attention to sugar intake, and interest in nutrition.

Overall, our results show that sugar-related claims may influence consumers' perceptions about food products, but the direction of that influence depends on the type of claim and evaluative dimension. Noteworthy, claims about sugar content led to perceive the products as more healthful and less caloric. Hence, a potential caveat is that the mere inclusion of nutrition claims may result in overconsumption (for a review, see Brown et al., 2018) which is particularly concerning for nutritionally poor products. Moreover, the negative expectations regarding the taste of products –sometimes described as the "Health-Pleasure" trade-off (e.g., Loebnitz & Grunert, 2018) - may be detrimental to consumers' purchase intention and consumption patterns of these types of products. Finally, a limitation of our experiments is that, although we contextualized the claims using four food categories, the claims were not paired with specific food exemplars. Because food packaging often includes myriad clues, the claims may become less salient. Hence, it is important to test how different cues influence consumer perception of real-life food products.

2.6 *Impact of perceived sugar content on consumers' perception of food exemplars*

Food packages are designed with different visual (e.g., shape, layout, size, illustrations) and informational attributes (e.g., characteristics of the product) that may influence the processing of information regarding the product (for reviews, see Hallez et al., 2020; Silayoi & Speece, 2007). This information is often the basis for inferences about the credibility of a product (and its manufacturer; for a review on credence cues, see Fernqvist & Ekelund, 2014). Besides branding attributes, credence cues include a) statements about the beneficial nutritional properties of the product (e.g., "low sugar") and/or how it may impact consumers' health (e.g., "Calcium may reduce the risk of osteoporosis"); b) attributes related to the food origin, production method, and ethical or environmental concerns (e.g., country of origin, organic farming, fair trade, animal welfare); and c) descriptive food names (e.g., names that elicit sensory experiences or appeal to memories and tradition.

Aiming to examine the relationship between these packaging cues and the nutritional quality of the product, namely sugar content, we decided to focus on a single category - breakfast cereals. These are ultra-processed foods (Cordain et al., 2005), which, despite typically containing high amounts of sugar, energy, sodium content, and saturated fat, are highly heterogeneous in terms of their nutritional quality (Chepulis et al., 2017; Nieto et al., 2017; Priebe & McMonagle, 2016). Hence, consumers must be able to distinguish between less healthy and healthy food alternatives, namely those with lower sugar content.

In a recent study (Prada, Saraiva, Viegas, et al., 2021), we analyzed 289 exemplars of breakfast cereals from two major retailers in Portugal and collected information on their nutritional profile (e.g., sugar, salt, fiber per 100g), price, packaging features, and type of food claims presented (e.g., statements about the composition, sensory features, the origin of the product) and ingredients list. Overall, the sugar content of breakfast cereals was high (M = 19.9g), and less than 10% of the products complied with the current national guidelines (i.e., 5g of sugar per 100g of product). Sugar sources were listed in the top three ingredients for over 85% of the products, using multiple designations (sugar, sucrose, beet/cane/coconut/organic sugar, malt, syrups, etc.). On average, each product included about four claims, and sugar content was lower when the claims were related to the product composition. Critically, the sugar content was particularly high for children-oriented products (M = 26.4g). Products with higher sugar content also were cheaper and had lower quantities of fiber, proteins, and salt. Our findings suggest the need to implement strategies to reduce sugar in this product category (e.g., incentive manufacturers to reformulate products).

Based on these findings, we became interested in examining how consumers perceive the nutritional profile of a product based solely on the information provided in the packaging. This mimics what often occurs in naturalistic contexts, as consumers usually do not have the resources and/or motivation to comprehensively analyze the nutritional information facts panel (WHO, 2017). High consumption of breakfast cereals may be due to the lack of awareness regarding their sugar content. Therefore, we conducted two studies (Prada, Saraiva, Viegas, et al., 2022) in which we selected exemplars from our previous study to investigate the relationship between perceived and objective sugar content.

In Study 1 (n = 90), all the exemplars were high in sugar, whereas in Study 2 (n = 85), exemplars contained low, moderate, or high sugar content. Study 1 revealed that participants accurately perceived all exemplars as containing high sugar. Study 2 showed that participants were able to distinguish between different sugar content levels. For example, overall, participants' categorization of each product according to

the nutritional traffic light system was accurate (e.g., around 60% of products with objective high sugar content [over 22.5 gr of sugar per 100 gr of product] were correctly categorized as "red"). Notably, perceived sugar content also impacted how participants evaluated the products in other dimensions. Besides being rated as having more sugar, products with objective high (vs. moderate or low) sugar content were perceived as tastier, as having more fat and calories, but also as less healthful. Participants who perceived the exemplars as containing more sugar also reported using nutritional information more often and consuming these products less frequently.

Taken together, these findings suggest that, when instructed to do so, consumers seem to be able to recognize the sugar content of the product exemplars, even when they consider that they belong to a category that is typically high in sugar. Yet, this does not imply that they understand how much sugar they are ingesting per portion of a given product (e.g., on average Portuguese consumers of breakfast cereals eat 1.5 portions daily (Lopes et al., 2017) nor how that portion contributes to the total daily sugar intake. Notably, as our results suggest, knowledge may not be the only factor to consider when addressing the problem of excessive sugar intake (for a review, see Gupta et al., 2018). Future studies should also explore the motivations for consuming these products (e.g., hedonic or convenience aspects) and consider these motivations when designing interventions to empower consumers to make healthier food choices (e.g., providing alternatives that are equally tasty and accessible).

3 CONCLUSIONS

Our findings suggest that Portuguese individuals seem to be aware of the potential negative outcomes of excessive sugar intake, prioritize information about sugar content, and agree with governmental interventions to address this issue. Nonetheless, they also report difficulties in identifying certain ingredients as sources of sugar and, in general, are unaware of sugar intake guidelines. Moreover, claims about sugar content (or type of sugar) may modulate the way consumers perceive products. By focusing on products available in the market (breakfast cereals), we also observed that, although the range of sugar content is wide, on average, products are not complying with current national and international guidelines for sugar content.

Reducing the intake of free sugars in the population is a complex issue that, besides governmental action, demands the engagement of other parties in the food system, such as the production industry, retailers, the hospitality sector, and the media (Evans, 2017). Change may be attained by implementing strategies such as population education (e.g., national dietary guidelines), point-of-purchasing labeling (e.g., food package nutrition fact panels), fiscal (dis)incentives (e.g., soft drinks taxes), industry quality standards (e.g., mandatory or recommended limits for sugar, trans fat, etc.), and food marketing standards (e.g., limited marketing towards children of products that fail to meet nutrition standards; Mozaffarian et al., 2018; Popkin & Hawkes, 2016).

The findings of the SUGAR project are relevant to inform policymakers, educators, and health professionals and support interventions aiming to promote healthier eating habits and reduce sugar intake.

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Experiencing and Envisioning Food: Designing for Change – Bonacho et al. (Eds)

Making sheep milk consumption more attractive through positive product interaction

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ABSTRACT: While New Zealand is among the world's largest producers of sheep meat, sheep milk products have not played a major role in the country´s agricultural output. The lack of sheep milk consumption is in part explained by the dominance of the bovine dairy sector and the consumer´s perception of sheep milk as animal rather than human food. This research explores food product design as a tool to encourage interactions and positive experiences with sheep milk. For this research, more than 22 dairy stores and food events were visited to collect data through different qualitative techniques. The data was transcribed and transformed into "utterances" (Kolko, 2014). Visual utterance analysis was used to identify insight statements and key product requirements. The product concepts and prototypes were evaluated iteratively by potential consumers to find a final product concept. The potential consumers enjoyed the tasting activities and showed great interest in continuing to buy sheep milk products. It was observed that food product interactions can be purposefully designed to create positive or pleasurable experiences around negatively perceived foods, an important input for shifting perception.

1 INTRODUCTION

1.1 *Sheep milk production and consumption in New Zealand*

New Zealand pioneered the export of frozen sheep meat in 1882 and continues to be a world leader in sheep breeding, meat, and wool production; nevertheless, the country has never had a significant sheep milk industry (Griffiths, 2015).

As Griffiths (2015) noted, a key reason for this is the lack of tradition of sheep milk consumption regardless of its many benefits and qualities, as appreciated in many other countries around the globe.

Griffith´s 2015 Business Plan for the New Zealand Sheep Industry suggests that, given international interest in sheep milk products, such a sector could be worth a billion-dollar to New Zealand by 2025 (Griffiths, 2015; Buckley, 2015)

1.2 *Psychology of food choice*

One of the most popular food choice process models (Falk *et al.,* 1996; Furst *et al.,* 1996; Connors *et al.,* 2001) describes three major components that operate together when people construct food choices: the life course, influences, and personal systems (Shepherd & Raats, 2006).

Life course is the key component of the model. It is documented that most of the people participating in consumer choice studies often attribute current eating patterns to previous experiences. This means that non-previous, negative, or positive experiences shape perception and current eating patterns (Schifferstein & Hekkert, 2008).

1.3 *Product design on shaping perception*

Food product design is a powerful tool for offering people positive experiences and shaping perceptions Catterall (1999). This is particularly important when working with negatively perceived foods (Shepherd & Raats, 2006).

Objects communicate with humans not through words but through visual patterns and physical codes which need to be finely displayed depending on the message one wants to communicate (Bassi, 2015). In this sense, visual-spatial relationships such as distance (e.g., between objects), containment (e.g., provided by one object to another), and verticality (e.g., the relative height of one object versus another) need

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to be carefully considered (Van Rompay & Ludden, 2015).

Van Rompay & Ludden (2015) mention that when designing for experience, decisions on the product weight, materials, textures, and flavour (in this specific case) influence aspects such as: usability, ergonomics, and also the constitution of a product's expression or character (Karana, 2009; Schifferstein & Hekkert, 2008). All these decisions must be informed by consumer insight collection (Orth & Thurgood, 2018; Kujala & Nurkka, 2012; Allen, 2002).

This paper presents a case study where consumer insight is collected to inform a food product design to bring a positive experience for New Zealanders who have possibly never consumed sheep milk products before.

2 METHODS

2.1 *Location*

This study was developed in New Zealand. The data was collected in different regions, such as Palmerston North, Wellington, Hamilton, and Auckland. The product prototypes were manufactured in the facilities of Massey University, namely the College of Creative Arts in Wellington and the PD Lab of the School of Food Technology in Palmerston North.

2.2 *Data collection*

The data was collected using three different qualitative techniques. 1) Non-participatory observation: different selling locations such as Moore Wilsons, Kingsmeade, Origin Earth, Common Sense Organics, Chalk and Cheese, Over the Moon, The Dutch Shop, Bel Mondo, Zany Zeus, C'est Cheese, Le Marche France, the Wellington Farmers Market, New World, Countdown and others were visited in order to observe consumers attitudes and behaviours in relation to sheep milk products. Also, different food events such as The Butcher's Show Series in Victoria University, The Food Show in Wellington, The Food Show in Auckland, The National Field Days in Hamilton, and Wellington on a Plate in Wellington were attended to collect information. 2) Semi-structured interviews: consumers, producers, sellers, researchers, and different actors of the value chain were interviewed to understand better the dynamics around sheep milk products in New Zealand; in total, 50 people were interviewed. 3) Social experiments: two types of social experiments were run to understand better people's reactions towards sheep milk products: cheese tasting exercises in different suburbs of New Zealand and co-creation of plates using sheep milk ingredients at the BizDojo co-working space in Wellington, New Zealand. In total, 30 people participated in these activities.

2.3 *Product prototyping*

Parallel to the data collection analysis, several sketches, concepts, models, and prototypes were created and regularly shown to potential consumers in informal settings to see their reactions. Several iterations were made based on the feedback obtained. Eight consumers evaluated five product concepts considering the seven product requirements established previously. One prevailing product concept was refined and presented as the prototype that successfully provoked curiosity for exploring sheep milk flavours.

2.4 *Data analysis*

The data collected using the aforementioned techniques was transcripted, printed, and transformed manually into "utterances," as Kolko (2014) described. Afterwards, visual and utterance analyses were used to group the data, find key patterns, and identify product design insights. The learnings obtained from product prototyping were also included in this data analysis.

Based on the insights for food product design and production requirements, seven key product requirements were identified to guide the product concept definition and the prototyping process.

3 RESULTS AND ANALYSIS

The results in this section are presented as a series of insight descriptions, followed by a set of questions for exploration and product prototypes. Finally, the refined prototype is presented together with some reflective thoughts and recommendations for introducing sheep milk products into the New Zealand market.

3.1 *Disgust imagery, intensity, and expectations*

-Insight description: sheep milk products are perceived as strong, too "sheepy," and different: "-I don't like sheep cheese, I have nothing against it, it is just you know… too different." During the tasting exercises, flavour intensity was highly associated with rind appearance: light and plain rinds = low flavour intensity, while complex colored or textured rinds = high flavour intensity.

It was possible to identify associations of sheep milk with previous negative experiences like very strong goat cheeses or even farm related memories: "To consume sheep milk products comes wrapped in the experience of lambing and crutching, in dags, sweat, urine and the stress of a wool shed in full flight" (Prichard, 2017; Peterson & Prichard, 2015).

Several people mentioned that they had never heard about sheep milk consumption before and could not imagine themselves consuming it unless they have some sort of allergy or health condition that limited cow's milk consumption. In addition,

some said the anticipated experience of consuming sheep milk was terrifying.

Questions for exploration: Can a cheese rind be modified to inform the taster about the cheese flavour intensity? What does a cheese rind that communicates cleanliness look like? How is it possible to turn the threat produced by sheep cheese into an attractive and intriguing stimulus to be experienced?

Prototyping: rind colour and textures were explored in order to communicate flavour intensity. Also, skimming and replacing a percentage of sheep milk with cow milk cheese was implemented to decrease the characteristic smell of sheep's milk odour in the final product.

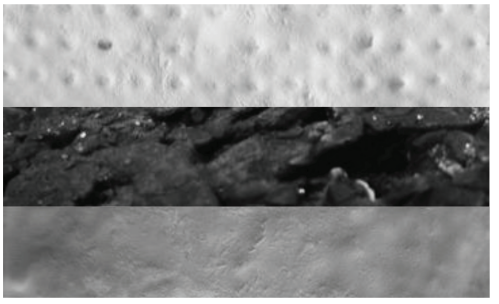

Figure 1. Cheese textures.

3.2 *Novelty and familiarity*

Insight description: Kiwis are conservative in relation to dairy consumption. Cow milk is the primary type of milk consumed. Cheddar cheese is the most consumed all around the country: "-The only cheese we ever ate was in large blocks of Tasty or Colby-bright yellow processed Cheesedale." Most of the interviewed participants perceived sheep milk consumption as a novelty. However, most New Zealanders attending the National Field Days stand 2017 near Hamilton and other food events mentioned they were attracted to sheep milk products because of their perceived novelty.

Questions for exploration: how is it possible to find balance within the paradox of novelty: "It is too new that it scares me, but it is too new that it excites me"? Is it necessary to have a familiar element in the product to encourage people to consume it for the first time? How is it possible to highlight novelty but at the same time cause a good impression? Is Cheddar cheese a good familiar point for New Zealanders to start trying sheep milk products?

Prototyping: several sheep milk cheese products were formulated ranging from the very familiar cheddar cheese (Figure 2) to the very unfamiliar and novel representations such as the Manchego style sheep's cheese, the Camembert style sheep´s cheese, or the Philadelphia style sheep cheese to see how people react to different levels of newness in sheep milk cheeses.

Figure 2. Sheep milk cheddar cheese.

3.3 *Curiosity, sense of adventure, and cheese style exploration*

Insight description: consumers showed a huge curiosity in trying not just one of the cheeses on the table but all of them during the tasting sessions. The participants seemed to be very excited and optimistic when they discovered that such a variety of cheeses was produced in New Zealand. From this exercise, not all the cheese styles presented were highly liked, but in most of the cases, the consumers discovered at least one new cheese style they really liked.

Questions for exploration: should the product present several styles of sheep milk cheeses to encourage exploration and give the tasters the possibility to discover that there are so many different types of sheep cheeses with varying levels of flavour intensity? How can we help consumers discover they could like (or even love) some sheep cheeses? Is it possible to place different cheese styles in the same box without having cross-contamination or food safety issues? Is it possible to present different cheese textures in the same box?

Prototyping: various types of cheeses were evaluated, and several form compositions, packaging materials, graphics, and shapes were explored to bring together three different cheese styles.

Figure 3. Packaging prototype for bringing together three different cheese styles.

3.4 *Strategies for anxiety management*

Insight description: during the tasting exercises, most consumers seemed to be anxious when trying sheep milk cheeses for the first time. Some of their techniques to manage anxiety were: going slowly through the tasting exercise, paring the cheese with some other ingredients, eating more crackers than cheese, choosing small pieces of cheese, and choosing the first cheese depending on the expected intensity associated with the rind appearance. The risk of picking very strong or unpleasant stimuli and complementary product waste was reduced by using those techniques, and continuing to taste some other cheese varieties was still an option for the participants.

Questions for exploration: as this product aims to be the very first experience for Kiwis with sheep cheeses, should it be presented in small or thin pieces to reduce expected stimuli intensity and avoid product waste? Also, how small or thin can a piece of cheese be without losing its rind appearance?

Prototyping: cheese mold making and some other techniques for cheese shaping, slicing, and presentation were explored.

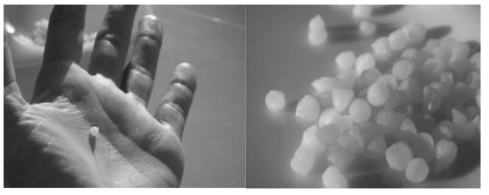

Figure 4. How small can a piece of cheese be? Exploration.

3.5 *Eating scenario, interaction, and modularity*

Insight description: cheese is part of a social ritual in New Zealand and many other countries. For New Zealanders, it is customary to prepare beautiful cheese tables to eat together with friends. For them, it makes eating cheese more fun.

Questions for exploration: Van Rompay & Ludden (2015) point out that starting at the most basic level, even the most mundane movements carry their own meanings. How can the product encourage a more significant interaction between the food object and the consumer? Can the product design make it easy for consumers to design their own cheese tables for experiencing sheep cheese tasting in a social scenario? How can the product provide the possibility of having both a social experience or a personal, intimate one?

Prototyping: modularity and movement through product shaping and packaging segmentation were explored.

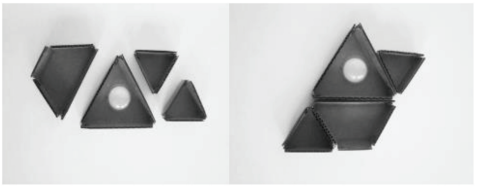

Figure 5. Modular packaging exploration.

3.6 *Land, farming, and a sense of belonging*

Insight description: the dairy industry has a strong cultural, economic, and social impact in New Zealand. Dairy is part of New Zealand's National identity: "Dairy remains a very important part of New Zealand lifestyle." Dairy farmers in New Zealand have been regarded as trusted honest workers, synonymous with New Zealand values: "Every Kiwi baby-boomer remembers having to drink a quarter-pint bottle of warm milk at playtime, which at my school had been left outside on the steps of the hall in the morning sun" (Wevers, 2017). Although New Zealanders feel disconnected from their farms, from the farmers and their stories, when they were presented with sheep milk products produced in different regions of New Zealand, they felt very proud and curious to try them all.

Questions for exploration: how can a food product connect people with their lands, farms, and farmers? Is it possible to reference some New Zealand regions to the consumer through shape, flavour, and textures?… Is it possible to pack a little journey around New Zealand regions within a sheep cheese box? Is it possible to resemble land shapes, morphology, and geographies in a product? Is it possible to imitate land textures by manipulating cheese curds and rind textures?

Prototyping: rock and land morphology were explored through sketching, cheese molding making, packaging forms, cheese shaping, and cheese making to rind texture experimentation and observation.

Figure 6. Cheese molding making.

3.7 *Final food product prototype*

After evaluating different results from exploration questions and product concepts together with consumers, seven product requirements were identified: 1) It provokes people to try sheep cheeses; 2) it presents more than one cheese style; 3) it provides tiny bites of cheese to be tasted; 4) it informs about the different flavour intensity levels that are possible to find in sheep cheeses; 5) it provides a rich opportunity to interact with the product; 6) it informs about the connection between sheep cheeses and New Zealand regions; 7) it can be easily reproduced at industrial levels. After evaluating five product concepts, the one shown in Figure 8 was found to be the one that better fit the seven established criteria.

Table 1. Average values obtained during the evaluation of five different product concepts regarding the seven product design criteria.

Criteria	C1	C2	C3	C4	C5
1	3	1	5	5	5
2	5	5	5	5	5
3	3	5	3	4	5
4	2	4	4	4	5
5	2	4	5	2	5
6	1	3	3	5	5
7	2	3	5	5	5
Total points % Fullfillment	18	25	30	30	35
	51	71	86	86	100

*C5=Final prototype shown in Figure 7. Evaluation done by 8 potential consumers during a cheese tasting session using a 5-point scale.

The final prototype presents three bite-size sheep cheese styles coming from different regions of New Zealand. From the most familiar to the most unfamiliar: Cheddar sheep cheese from Ohakune, Brie sheep cheese from Gisborne, and Red Wine Manchego sheep cheese from Marlborough. The three kinds of cheese present different intensity flavours identified by their colour rind, in order of intensity: white, yellow, and purple. The consumer can buy a box with three cheese bites and a set of crackers to have a personal consumption experience or buy several boxes to easily arrange a tasting table for degustation. Because of the proposed shape, the consumer is free to create as many different arrangements as they want, increasing the possibility of interaction. This cheese sampler box can be launched as the first collection of many, useful to discover New Zealand through its different sheep cheese flavours.

Figure 7. Spheric sheep cheese prototype evaluation during Field Days 2018.

4 CONCLUSIONS

It was possible to observe people enjoying sheep cheese prototypes during the whole design process even when they were confirmed to be very unfamiliar products associated with strong disgusting flavours. Thus, it is possible to create positive experiences around "disgusting" foods, shedding light on the path for introducing its consumption. Product design definitely plays an important role, being the provoking tool to ignite curiosity and closing the gap between the unknown and the new positive experiences. Through design, we can trigger behavior, good or bad, on behalf of the reputation of a specific signifier, in this case, "sheep milk." Product design is shown to have the power to provoke consumers to try sheep milk for the first time and, possibly, in a very idealistic near-future scenario, help them change their minds from sheep milk = lambing and crutching, in dags, sweat, urine to sheep´s milk = delicious, creamy, beautiful cheeses, one good experience at the time.

The main recommendations from my research to inform those trying to introduce sheep milk products into the New Zealand market are: to link the products to the goodness of the land of New Zealand, their origin, their farms, and their people; to create product concepts that encourage exploration, interaction, and discovery of the many different flavours and textures sheep milk can offer (be very careful on regulating flavour intensity); to create solid resonating design concepts to obtain attention from your audience; finally, to be bold, don´t hide sheep milk; make it shine!

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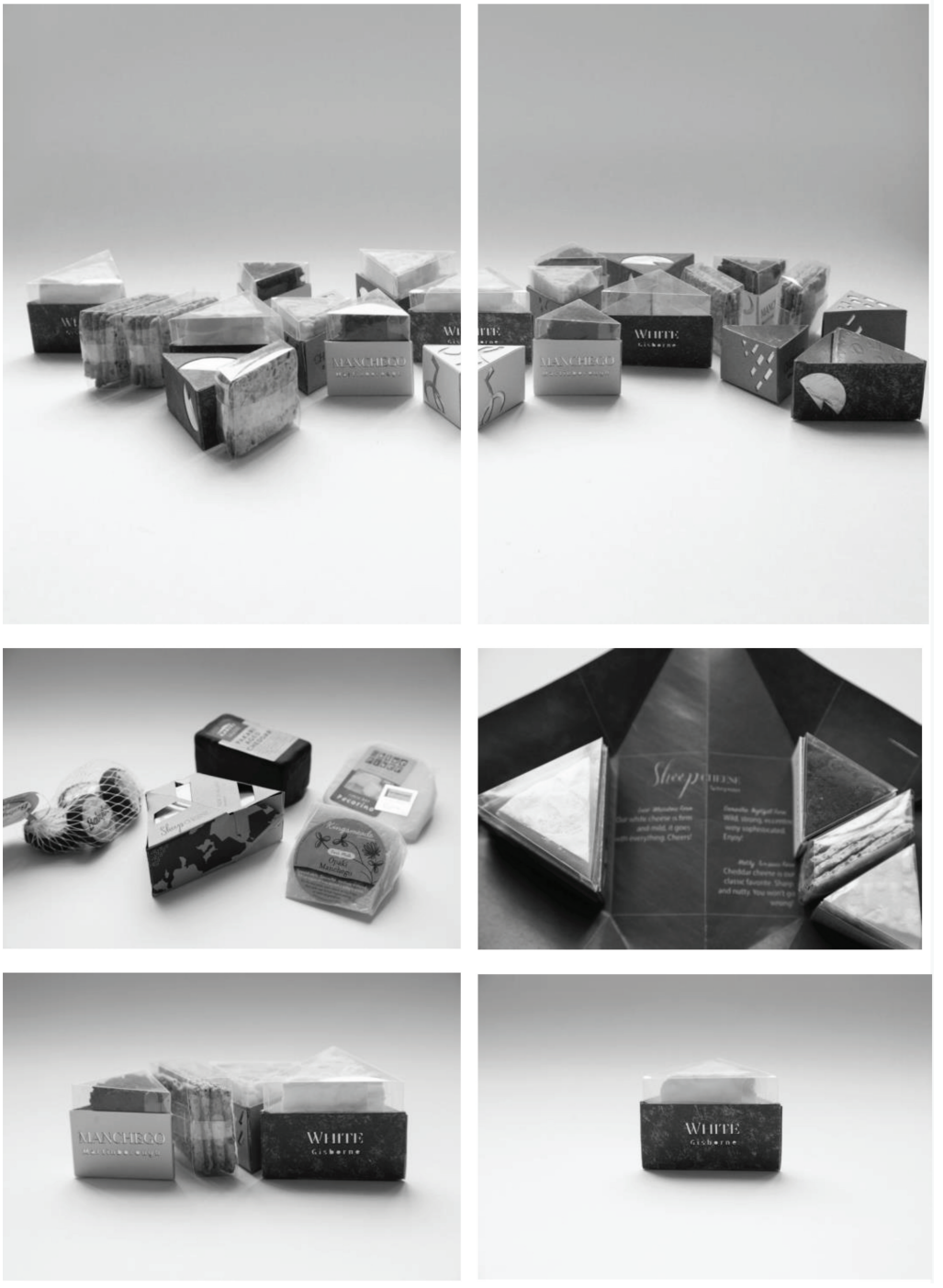

Figure 8. Final sheep cheese product prototype.

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Experiencing and Envisioning Food: Designing for Change – Bonacho et al. (Eds)

Chefs as change-makers: Updating a creativity model for sustainable *Haute Cuisine*

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ABSTRACT: Seen as catalysts in the food system, chefs are often crucial to innovation right from the beginning, through their creative process. But does a sustainable approach in Haute Cuisine impacts the process? The study shows the chef's creative process aligned with a larger mindset rooted in experiences, education, and culture which sets a critical attitude concerning sustainable practices, and even if remaining the same (in structure and nature), a different vision with sustainability at its core involves an adjusted framework.

1 INTRODUCTION

1.1 *Chefs has change-makers in Haute Cuisine*

There is growing interest in sustainable practices in *Haute Cuisine* as consumers shift to plant-based and flexitarian diets or take a political stance on restaurant policies concerning environmental choices and staff's wellbeing. When ethical values can be a source of competitive advantage and organizational efficiency, either by placing the restaurant toward society and the planet or providing education for customers and staff, chefs are on the front seat in a time of most necessary change. How can chefs transform *Haute Cuisine* to become more sustainable, equitable and just? Chefs have the role of change-makers and intermediaries between tradition, innovation, and culture that create sustainable culinary systems (Pereira et al, 2019).

Sustainability in the restaurant industry can be seen as a way of bringing together economic, social, and environmental goals, whilst being responsible regarding clients, staff, society and the planet (Jang et al, 2017). A sustainable approach is concerned with food choices, diet trends, and the narratives created around ingredients, products or consumer habits. *Haute Cuisine* has changed over the last decades, evolving fast towards 'less meat, more vegetables' diets, local quality or as customers became more interested in the restaurant values and the chef's voice outside the kitchen (Sloan et al, 2015, Parreira, 2020). How can chefs transform Haute Cuisine to become more equitable and just?

Recognizing sustainable practices also turned into a priority to institutions and rankings like the Michelin Guide (introducing Green Stars in 2020 for restaurants which combine "culinary excellence with outstanding eco-friendly commitments") or La Liste (with the Game Changer Award for "[a]n exceptional chef or restaurateur who has campaigned to change kitchen and industry culture"). The creative process of a dish, from the initial idea to the restaurant menu, through evolution of the concept and all the technical and technological steps, fulfill a recognizable pattern in the chef's work. Because *Haute Cuisine* anticipates future scenarios, dictates trends and works as a *laboratory*, the chef's role is crucial to manage the complex nature of these combined variables in order to create change.

But does an approach based in sustainability impacts the chef's creative process? This paper aims to discuss the update of the creativity model for a sustainable *Haute Cuisine*.

2 HAUTE CUISINE'S CREATIVITY MODEL

2.1 *The chef's creative process*

Creativity is applied through a highly complex and non-linear process which includes multiple drivers and several obstacles along the way. For a chef, the creative process starts with information gathering and applied knowledge, followed by the definition of a concept, its implementation and final evaluation. In *Haute Cuisine*, creativity is used as an aggregator, capable of fostering synergies between the scientific, technological and artistic dimensions (i.e. creativity is an enabler). The creative process reinforces a specific creative dynamic, repeated in each dish and capable of sustaining the choices made by the chef, first in the generation of ideas, then in the development of the chosen idea and finally in its implementation (Parreira, 2014).

Whilst creating a dish, the chef considers different contributions, from managing technical and technological issues, to scientific knowledge and the development of an artistic sensibility (Jouary, 2013). From

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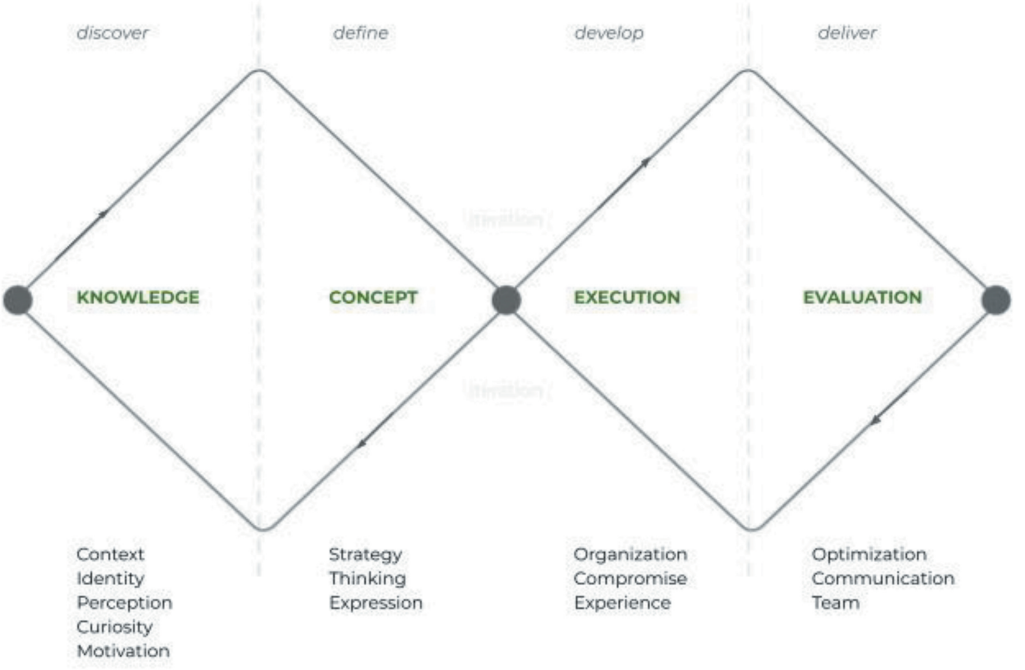

Figure 1. Haute Cuisine's creativity model, based on the double-diamond Design Council's model 4 phases: discover, define, develop, deliver (Parreira, 2016).

the abstract to the concrete, the choices made by the chef throughout the process determine a direction to follow. However, its sequential character must be taken with relativity since the process does not develop in an orderly way or always in the same direction. Many advances and setbacks can occur as the steps are carried out in a winding path, where multiple experiments take place that become part of the dish (e.g. a new technique) or are discarded (e.g. a ingredient) (Parreira, 2014).

2.2 *Haute-cuisine creativity model*

Creativity is present in all human activities as much as creative processes share a common profile regardless of their specificity. Design and *Haute Cuisine*'s creativity model is based on the shared project dimension and on the complexity inherent to work processes whose result is often simple (i.e. in both areas the aim is to achieve a reproducible result). The creative process in activities with a strong project component is more than the sum of technical, semantic or methodological knowledge (Pombo & Tschimmel, 2005). Creativity is identified as an aggregating element: the procedures, actions and dynamics in Design and *Haute Cuisine* are organized through the creative process and determined by the central role project represents in both fields, and shown in the *Haute Cuisine*'s creativity model based on the double-diamond Design Council's model (Parreira, 2016).

The model includes four steps, Knowledge—Concept—Execution—Evaluation, working in an iterative, non-linear path. For the emergence of ideas at an early stage of the chef's creative process, different information converges (e.g. technical, scientific or conceptual), the individual characteristics of the chef, such as personal identity and perception being present. The chef's curiosity and motivation are vehicles recognized as catalysts, often translated into the continuous search for new techniques and the permanent quest for references. Each dish begins with an approach strongly marked by scientific knowledge and technological developments, but where the perception of those involved is also preponderant. The sensorial nature of food, whether for the chef or the customer, is very important in the generation of ideas, with perception playing an important role in the creative process' initial moment. The influence of different types of knowledge (scientific, personal or social) in the emergence of ideas is relevant in this phase.

The creative process second step constitutes the ability to define a concept that represents the selection of an idea (to the detriment of others), which is decisive for the following steps. With a broad starting point, in which the possibilities are countless, the conceptualization represents the chef's thinking. When defining the concept, the chef expresses his or her vision of the dish but also reflects on the surroundings, constraints and difficulties that may arise. The existence of a strategy for the dish, where the different

possibilities are considered and reasoned choices are made, marks a moment in the creative process centered on the action of thinking. Conceptualization translates into the existence of fragmented mental dynamics that, through reflection, give rise to the concept.

In step three, execution is assumed as an intermediate phase between the definition of the concept and the final evaluation of the result. It's the moment in the creative process in which the experimentation is carried out and the dish implementation is planned. In this third phase, the organization underlying planning and execution implies the ability to generate compromises between what is desired and what is possible, and to find a balance. Experience is seen as a means to give form and body to the concept, combining logistical and material issues with others related to consistency of execution or reproducibility.

In the last step, evaluation brings together a set of concerns expressed by the chefs that can be found at two levels of action: process' verification through tests (i.e. in execution and public acceptance) and collaboration as a strong component inherent to the process. In this final phase, in which the implementation of the dish is defined and decided, the team plays an important role, so the chef's communication skills are also crucial.

To summarize the creative process in *Haute Cuisine*: the idea is developed intuitively, the defined concept materializes into a prototype that is tested and evaluated. If a satisfactory result is achieved, the dish is served to customers and feedback is collected. Every time a new dish is developed, the chef considers the interaction with the customer, the emotional reactions and the role of the senses, as well as the visual dimension, the cost and other logistical issues, suitability and reproducibility (Parreira, 2014).

3 FOR A SUSTAINABLE HAUTE CUISINE

3.1 *Sustainability and the creative process*

Haute Cuisine is a multidisciplinary territory integrating the complex reality of a dish, with the context it results from and the history it carries. The chef's creative process accommodates multiple contributions to the dish, from its cultural implications to all the financial and logistical issues regarding its creation, execution and consumption. Despite the cultural relevance broadly recognized in food, sustainability's main pillars cover mostly social, environmental and economic areas which, in regard to the restaurant industry, should always be considered alongside culture. As Ocampo and her colleagues (2021) note, "[t]he complexity of sustainability needs to be embraced and not feared" which translates into acceptance concerning the challenges a sustainable practice demands and the changing scenarios it creates, specially in Michelin-starred restaurants (Batat et al., 2020). Because a sustainable approach in *Haute Cuisine* considers the whole food system, "[t]he creative process accommodates sustainability in every step, from the idea to the concept, during development and whilst validating the final dish" (Parreira, 2020: 49). In order for change to happen, sustainability at the restaurant level can be measured through sustainable food, energy and water efficiency and conservation, decreased waste, reusing and recycling, and community's efforts to improve environmental conditions (Richardson & Fernqvist, 2022).

If sustainability is taken in the creative process less like part of the concept (behind a dish) in the beginning and more as a pillar, driving creativity throughout the entire process, "one can even consider a sustainable [Haute Cuisine's creativity] model where the chef's creative process backbone relies on those principles and values, from start to finish" (Parreira, 2020: 49, 50).

3.2 *Methodology*

The aim of this research is to understand if the creative work of chefs who "campaigned to change kitchen and industry culture" (La Liste, 2022) and whose commitment with being "accountable for both their ethical and environmental standards, and work with sustainable producers and suppliers to avoid waste and reduce or even remove plastic and other non-recyclable materials from their supply chain" (Michelin Guide, 2021) can be described and explained by the existing model (2014). And, if any, which differences are relevant and should be included in an evolved double diamond updated version aligned with a sustainable *Haute Cuisine*.

Phenomenology is used as research method (Finlay, 2008), following the same protocol the previous study applied (Parreira, 2016). Both primary sources (semi-structured interviews, participant observation) as well as secondary sources (public presentations, social media presence and other interviews) are used for data collection. Using case studies in Portugal, selected chefs from restaurants with La Liste Game Changer Award 2022 (chef João Rodrigues, from Feitoria restaurant) and Green Michelin Star 2022 (chef Carlos Teixeira, from Esporão restaurant and chef Benoît Sinthon, from Il Gallo D'Oro restaurant) offer an opportunity to apply and check the creativity model validity (Knowledge—Concept—Execution—Evaluation) in order to follow the current sustainability mindset.

When applying phenomenology through Giorgi's descriptive variant (1997), two levels of analysis are identified: first, the original data is composed of simple descriptions (obtained through open or semi-open questions) and, in the second level, the researcher describes the essential structures of the experience (based on reflective analysis and interpretation of the chef's descriptions). The method is put into practice following a precise and rigorous protocol, whose initial step involves familiarizing the researcher with all the data collected. Data analysis is

preceded by a total immersion on the part of the researcher in the chefs' discourse, with the sole objective of understanding the language used and capturing the full meaning of the subject's experience.

3.3 *Findings*

Sustainability as an approach highlight chefs as role models, leading change within the industry, driving innovative initiatives and inspiring not only other chefs, but also the customers. In this study, the chefs acknowledge their responsibility regarding the choices made in the restaurant but also through messages in everyday actions as well as their role in providing a voice to causes and people leading sustainable practices. For example, chef João Rodrigues leads "Projeto Matéria", a non-profit initiative that brings sustainability to the table. This platform seeks to promote national producers with sustainable (agricultural and animal production) practices which respect nature and the environment. The aim is to contribute to the conservation and preservation of national identity and culture, as well as creating economic viability for those producers.

The seasonal and less used (low value) local resources are in the center of sustainable choices in restaurants awarded with a Michelin Green Star. For chef Carlos Teixeira, the restaurant (Esporão) shows a strong commitment with the "farm to table" model and with the idea of being increasingly self-sustaining : "we believe more and more that the products that surround us are not a limitation, but what inspires us to make a seasonal, local and conscious cuisine". The restaurant location in Herdade do Esporão, a major wine and olive oil producer, with organic production and a distinctive terroir is an important drive for sustainability, through the use of seasonal products from the restaurant's organic kitchen garden (vegetables) or from local suppliers (freshwater fish). A strongly eco-environmental context and Esporão's brand extended philosophy informs a conscious approach, respect for the environment (e. g. reduced plastic use in the kitchen) and zero waste strategies (e. g. nose-to-tail or fermented products, using every part or extra vegetable in order to avoid waste).

Location assumes special importance in the chefs sustainable cuisine. In Il Gallo d'Oro, Benoît Sinthon recognizes how crucial the overall context is: "I've always worked a lot with vegetables, herbs and fruits from the Madeira island, so the idea is to highlight on the menu what our vegetable garden has the best and freshest", in a farm to table strategy, with more flavour and less waste with fresh ingredients. Once again, seasonal products from the organic kitchen garden (vegetables, herbs) are the backbone of the chef's creative process, much as the ocean connection, using 90% local fish and creating new products (e. g. sword fish caviar).

A more democratic kitchen environment comes with a different strategy and organization, which involves all team's members, the consumer and the community. In chef João Rodrigues own words: "Sustainability is a driving force for responsibility. Resources must be used with respect for nature, for people and for society. Reducing waste, transforming everything and using the whole". Following the pattern, seasonal products from local producers are used, showcasing both ingredients and those who produce it (also with "Projecto Matéria", the non-profit platform bringing together producers and listing contacts for the domestic public). The whole, nose-to-tail strategy, is applied to vegetables, fish and meat, highlighting the origin of ingredients (sourced from sustainable practices) and proximity (for resources efficiency). But it's the social responsibility with team, suppliers and the public that marks a distinctive structure for sustainability in the restaurant.

Briefly, the study's conclusions reinforce the assumption that sustainable practices are strongly determined by:

- the work context,
- the restaurant location,
- a more robust social dimension,
- Circular Economy dynamics throughout time in the restaurant's environment.

3.4 *Discussion and conclusions*

The study shows the chef's creative processes aligned with a larger mindset rooted in experiences, education, and culture which sets a critical attitude concerning sustainability. Both chefs and the restaurant industry share a responsibility towards society concerning the challenge of sustainability, in the restaurant and at large, in a personal capacity and "have a critical role to play in both public and private consumption and influence other actors from production to consumption" (Richardson & Fernqvist, 2022). Chefs' motivations towards a sustainability approach consider both the planet and the people (at a macro level) whilst integrating in the dish sensory expressions related to pleasure and the place were the experience happens (Batat, 2020).

Furthermore, sustainable practices are strongly determined by the work context, a more robust social dimension and Circular Economy dynamics in the restaurant, throughout time. Although the model's phases stay the same and its iterative nature remains, collaboration and co-creation through education (both for staff and customers) assume special relevance, and the chef's place exceeds the restaurant domain with a leading presence in emergent discussions like climate change or social innovation. Because of that, an evolved Haute Cuisine's creativity model, without changing its structure, should accommodate all participants' commitment, and the power of leadership.

The chef's creative process as a tool for change takes shape in different ways, though the approach is always intentional pursuing sustainable goals or eco-oriented paths. Due to their privileged role, as leaders

and opinion-makers, "chefs need to be recognized as change makers in the food system as dedicated individuals that initiate and facilitate progress toward large-scale transformation in complex systems" (Richardson & Fernqvist, 2022). Frequently, change is considered a result from the sum of different small actions, namely in the kitchen, materializing "towards a more sustainable and natural path, presenting a cuisine more focused on produce and with more proximity with local producers and native produce" (Madeira et al., 2022: 269). In a sense, a sustainable food experience is seen as both functional (based in eco-friendly practices) and experiential (with sensorial, creative aspects) that may determine the outcome (Batat, 2020).

While the chef's creative process continues the same, regarding structure and nature, a different vision with sustainability at its core involves an adjusted framework. The chef beyond the restaurant reveals a new role with a social responsibility to the community, facing the planet's global problems and building projects, and businesses with a purpose. Solutions rooted in social innovation are frequently marked as more equitable and inclusive, therefore social change and sustainability in *Haute Cuisine* entails a creative process well-grounded in the chef's relation with society.

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Experiencing and Envisioning Food: Designing for Change – Bonacho et al. (Eds)

Changing the world, one meal at a time: Critical & fictional approaches in design education

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ABSTRACT: This paper considers the food and design connection to imagine future foods through critical and fictional design approaches, as well as discuss the limits and potential of contemporary design practice. Using Design Fiction to explore *food in communities*, *plastic environmental impact in food contexts*, *food waste* and *urban green edible spaces*, students are asked not to generate answers but to come up with questions worth discussing as projects are developed and results regarding the academic experience are discussed.

1 INTRODUCTION

1.1 *Changing the world, one meal at a time*

Everybody eats: food is a primary need, essential to our survival. But food is also a cultural asset, crucial to our identity and the life in community. Future food scenarios are also at the center of climate change discussion, and an important part of social, economic and political dynamics to imagine a preferable future and move into new possibilities.

Visionary designer Buckminster Fuller (1895--1983) has been credited with the idea that the best way to predict the future is to design it. Although there is no evidence that Fuller ever said those words, his sustainability-focused projects seem to reinforce this idea (when what was then the future now becomes the past). As physicist Dennis Gabor (1963: 207) points out "[t]he future cannot be predicted, but futures can be invented. It was man's ability to invent which has made human society what it is". From a design perspective, food systems can be reimagined to acknowledge present challenges and future needs, looking for alternative paths to a more sustainable world. Designers may predict the future by inventing it, through imagination and planning but also by providing a stating point for discussion and reflective practice.

In this paper, Design Fiction is used as an approach to imagine desirable scenarios and critically explore future alternatives for the food system place in human society, namely through the multidimensional value of food in communities, the environmental disaster of plastic used in food contexts, food waste (both at home and in the food industry) and how may food be grown in the city. The complex nature of the problems and the diversity of questions emerging from this process offers an opportunity to explore ficcional tools in a design education context with undergraduate communication design students.

The chosen areas of interest — food in communities, plastic environmental impact in food contexts, food waste and urban green edible spaces — provide food for thought as design students acknowledge the food system complexity. Using Design Fiction and the tools it supplies can be decisive to designers' education, in order to understand how theoretical and practical knowledge blend and how new world visions can be presented to society.

2 FOOD AND DESIGN FICTION

2.1 *Future food systems as a field of study for designers*

Why focus on food as part of a designer's education program? "Because food is by far the most powerful medium available to us for thinking and acting together to change the world for the better. Food has shaped our bodies, habits, societies and environments since long before our ancestors were human. Its effects are so widespread and profound that most of us can't even see them, yet it is as familiar to us as our own face. Food is the great connector, the stuff of life and its readiest metaphor. It is this capacity to span worlds and ideas that gives food its unparalleled power. It is, you might say, the most potent tool for transforming our lives that we never knew we had" (Steel, 2020). In

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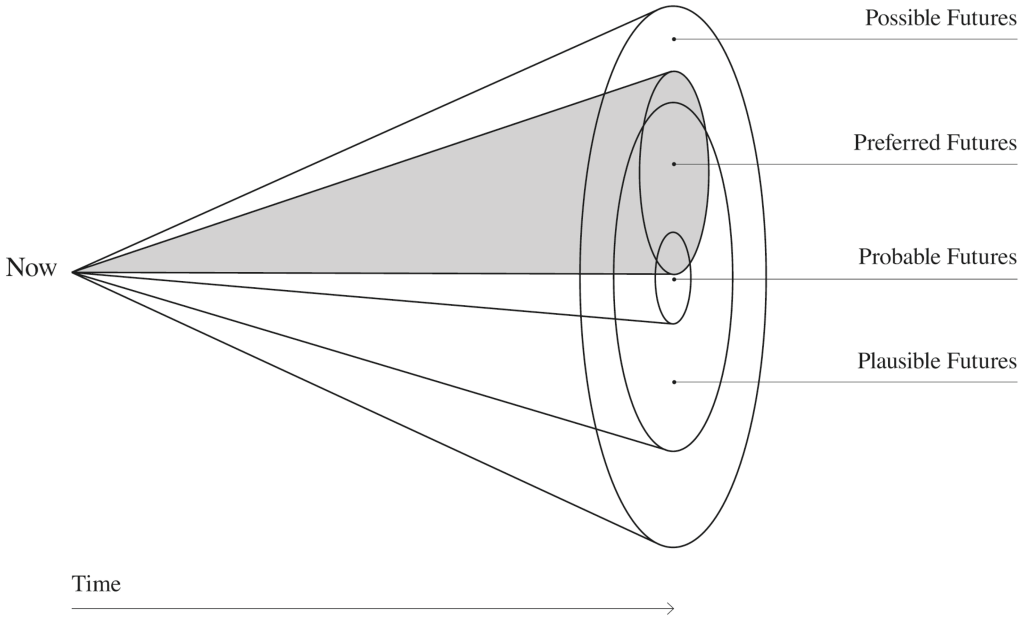

Figure 1. The futures cone diagram adapted from Jospeh Voros (2003).

the same way that the evolution of our foods reflect socio-economic and anthropological trends, the design world uses the same social, cultural and aesthetic markers to express itself. Whether it considers nature or culture, perception or action, technology or science, there are many parallels that can be drawn between design and food (Parreira, 2014). By designing kitchen utensils or elements in an eating space, reducing kitchen and distribution waste or building sustainable networks, design "is crucial in understanding and intervening in many aspects of food systems at large" (Parasecoli, 2017: 19). Food-centered projects in design education are important because the connection reinforces critical transdisciplinarity (bringing holistic, out-of-the-box thinking) and helps to develop creativity for both the designer and the food system (Margolin, 2013).

2.2 *A critical design perspective and design fiction*

A critical perspective for design can be found in Anthony Dunne and Fiona Raby (2013) seminal work at the London's Royal College of Art, as they consider the designer's role not as problem solver but instead as someone who questions how the future might be and which problems are worth posing. Rather than designing things, designers are set on ideas whilst speculating how things could be in order to open debate and discussion about the kind of future we want. Dunne and Raby (2013: 3) postulate that if designers speculate more that will increase the possibility of a more desirable future through scenarios that "are by necessity provocative, intentionally simplified, and fictional. Their fictional nature requires viewers to suspend their disbelief and allow their imaginations to wander, to momentarily forget how things are now, and wonder about how things could be".

This new paradigm is better represented as a cone diagram (Figure 1) where the present is at the vertex and time is represented in projection, opening up the cone to show different categories of future: a) Probable futures are those futures very likely to happen; b) Plausible futures have a lower probability of happening than the first category; c) Possible futures include both probable and plausible futures, as well as other non-probable and non-plausible scenarios; d) Preferred futures are those futures, probable, plausible or non-plausible, wished by a certain group which contributions allow for changing a desirable future into a probable one (Dunne & Raby, 2013). From a critical perspective, design is not focused on trying to predict the future but on building it by creating a meaningful dialogue about possibilities and preferred scenarios.

In this context, Design Fiction is a design approach oriented towards the speculative exploration of possibilities that consider different futures (probable, possible, plausible or preferable) to a given thematic context. Elisabet Roselló (2017) considers that "[w]ith the advent of new societal, cultural and economic logics and models, new imaginaries for the future are needed along with new tools to construct them. Design Fiction is a new methodology that allows us to prototype tangible objects, with a deliberate specific aesthetic and an implicit narrative property. With these objects we can travel to future scenarios and reflect on how we want tomorrow to be". More than a design domain on its own, Design Fiction can be a tool for

designers to start the conversation on a specific topic and how it will turn up in the future.

Drawing from his work at the Near Future Laboratory, technologist Julian Bleecker (2009: 7) sees Design Fiction as "creative provocation, raising questions, innovation, and exploration". Through the project dynamics, what the designer is looking for is for the public to enter into a narrative or fictitious scenario, and by using a tangible artifact, explore or question a given scenario.

3 CRITICAL AND FICTIONAL APPROACHES IN DESIGN EDUCATION

3.1 *Introducing an academic experience*

This paper presents an educational experience developed with undergraduate students. The experience took place during the 2021/2022 academic year led by this paper's authors at FBAUL — Fine Arts Faculty, University of Lisbon — at the Communication Design Department.

The project developed addresses four specific subjects: *Food in communities*, *Plastic environmental impact in food contexts*, *Food waste* and *Urban green edible spaces*. Using Design Fiction as an approach, the project is divided into two stages. First, we encourage critical thinking about these issues in order to challenge assumptions and preconceptions on what can be the relationship between food and contemporary design practice. Our aim is to increase students' consciousness about relevant food-related issues nowadays, and to improve their design knowledge and skills through critical ideas and speculative concepts that may illustrate future scenarios.

At the second stage, these scenarios are the starting point for imagined fictional conferences, debates or exhibitions concerning the chosen problem or question identified, organized into a one-day event. Students must select specific authors (to discuss the topic), create a program (around the chosen problem or question) and define a title-concept for their communication project. The goal is to turn a food-related fictional future scenario tangible through the design of a visual identity and several artifacts to communicate and promote the event.

3.2 *Part I (individual exercise)*

The project's first part (individual exercise) is oriented towards exploring the topic and recognizing the problems and issues that surround it. The aim is to build critical awareness on the importance of design and food connection, as well as reflect on desirable futures in this field. The work initiates as an individual exercise, with the search for examples of existing projects that can trigger the definition of a possible context or issue.

Considering *Food in communities*, *Plastic environmental impact in food contexts*, *Food waste* and *Urban green edible spaces,* students are asked to choose one of these topics and, in this context, identify a design problem/question that can serve as a starting point for the development of a specific project. Next, a design approach must be proposed that challenges the status quo and suggests changes, taking into account the circumstances and limitations of design practice.

As a way to address the proposal's constraints, the students describe a possible project briefing by answering questions: Why? (the main reason for the project) What? (the problem or question to address) What for? (the goals to be achieved) For whom? (the public the project is intended to). These answers can be used as a guide to determine a dedicated design approach and clearly communicate the project to other designers. At this stage, students are not meant to develop themselves the project but instead be able to create objectives and boundaries for their topic of choice so another designer can work from there.

Results use narratives to direct the projects to reflect on a problem or question that can be tackled by design. It usually start as a "what if" question. What if we have a kitchen in every school, so the whole community could use it to build up food literacy for children and their families? (*Food in communities*) What if, instead of plastic, we use edible materials to make containers, packaging, plates and cutlery? (*Plastic environmental impact in food contexts*) What if food photography and food aesthetics didn't reinforce the notion of "perfection", and didn't influence our perception of imperfect food, contributing to food waste? (*Food waste*) What if local communities are responsible for the urban space, using the walls to create green environments throughout the city together with urban art? (*Urban green edible spaces*).

The examples presented show different paths to explore the chosen topic, with the identification of an issue worth discussing. Extrapolations were based on factual information about current issues from a critical point of view. Students presented proposals in the form of a narrative, guiding design decisions based on interactions and relationships between users and artifacts, rather than the solution-problem paradigm.

3.3 *Part II (team work)*

From the exploration and research carried out in the individual exercise (part 1), students are asked to curate and imagine an event that, connecting design with food, enables the debate on the problems and issues that were identified. For that, they should be able to define the concept/title, choose author(s)/theme of reference and plan a program with activities. To create a ficcional scenario, students should also design the project's visual identity, including the brand (symbol and/or logo), colours, typography and eventual iconography (images, pictograms), plan dissemination media formats, such as a poster, press

Figure 2. *Harvest Lisbon* opening event's program for the homonymous contest & brainstorming notebook for contest participants. (2022).

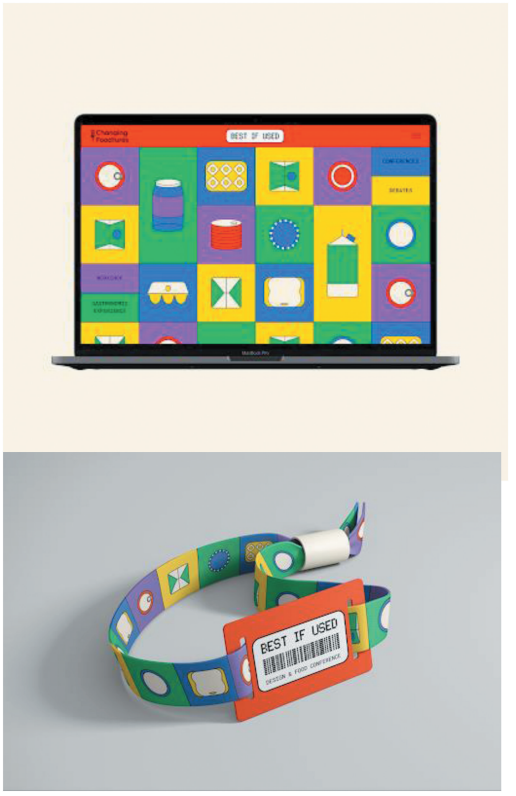

Figure 3. *Best If Used* digital platform & conference ID for the event. (2022).

advertisements and social networks posts, and design the whole communication materials for the event (for example, a fold-out program).

With the objective to create bridges with the real world and provide tangible artifacts, this process allows the suspension of disbelief in possible futures and the development of a narrative or scenario that reflects reality. Although just partially, some results are shared to provide a better understanding of the academic experience, as well as support the findings presented further on the paper.

Harvest Lisbon (Figure 2) is a fictional project for the opening event associated with the homonymous contest. The competition aims to develop projects to use spaces in the city center of Lisbon for urban gardens, focusing on creativity and new technologies; projects must address the lack of spaces for growing greens in the city and the difficult access to organic products at affordable prices, seeking to create solutions and contribute to sustainable practices, economy and community well-being. Resulting from choosing the *Urban green edible spaces* topic, it mutated into a creative contest format, a one-year long competition with prizes for relevant and innovative ideas in the use of urban spaces for kitchen gardens in Lisbon.

Best If Used (Figure 3) confronts the difficulty in interpreting the "shelf life" of food, which consequently leads to food waste. The event seeks to open horizons by raising awareness and presenting innovative projects that encourage to "design" a more sustainable food future. By knowing the state of their food, consumers make choices based on their senses rather than the "best before" printed on the pack, avoiding food waste. *Best if Used* is organized by *Changing Foodtures*, a fictional organization that seeks to promote events that specialize in the presentation and discussion of problems, ideas and solutions for the future of food.

Pretty Eddible (Figure 4) is an Exhibition (with photos by Solène Riff, Aliza Eliazarov, Klaus Pichler, Maisie Cousins), Lecture/Discussion under the theme Can we find a way to make waste desirable? (with Marije Vogelzang, Massimo Bottura and Fruta Feia project presentation) and Dinner (by chef Dan Barber). The project addresses *Food waste* as the chosen topic. Just as chefs Dan Barber and Massimo Bottura redefined the aesthetic standards of food and

Figure 4. *Pretty Eddible*'s program & posters for the exhibition opening, Lecture/Discussion and Dinner. (2022).

Figure 5. *Tag tag tag*'s wayfinding design & program for the event. (2022).

came up with solutions to food waste, to show that visually "ugly" food can also be beautiful.

Through new perspectives, *Pretty Eddible* wants to offer an alternative concept of beauty; praise something that we normally consider ugly and that has no place at the table. The event is prepared as a global experience, first a photographic visual exhibition, then a roundtable and later a meal in order to provide the public with a sensorial perspective on the subject, so they can be part of the movement.

Tag tag tag (Figure 5) starts with a question: How can sales in stores be rethought, eliminating plastic, vinyl or self-adhesive paper price tags? Hence the name, the event looks for the answer through talks and debates, presenting and discussing practical cases and good practices in design from two different perspectives (one more prospective and the other in the short/medium term). It also presents an Exhibition space with design projects, as it seeks to create a conversation around the plastic's use problem for ideas, actions and new dynamics in the industry and the research field.

The four examples had a strong thematic basis and chose a design perspective that fulfilled expectations for this stage, starting from a critical world vision on food and a disruptive format for a ficcional one-day event. Because students had to imagine a context for the project (rather than being given one) the exposure to a critical and fictional approach stimulated them to change the focus and pursue all desirable possibilities and preferred futures.

The dimensions of critical thinking in the imaginary scenarios created indicate an open mind and curious vision towards the subject, a fair analysis and reasoning of options, and choices made based on research, knowledge and flexible thinking. Whilst dealing with complexity, ficcional projects seek for enlightenment on how our worlds are built and for whom do we build them, which can be seen in the examples presented.

3.4 *Findings*

The change of focus from the problem-solution paradigm to the project-as-experience is the main advantage of a ficcional approach. The project is seen as a medium to connect people with artifacts and start a conversation, moving away from a narrow search for problem-solving to comprise a larger context. As James Langdon (2015) suggests "the fiction in design fiction is not primarily about

the impossible, or the futuristic, but about the multiplicity of possibilities in any ordinary decision making process", regarding Design Fiction as a instrument to explore all possibilities. This view is specially fitting to a territory encompassing food and communication design, as visual messages frequently rely on narratives and storytelling. When communicating food, designers apply an holistic perspective that considers not only the product or service developed but also all the consequences of its implementation (Marques et al, 2020), as the design process focus not in the creation of artifacts but in the systems they fit on.

What impacts did critical and ficcional approaches have on students' research and thinking? In this experience, the goal was for the proposed alternatives to amplify current social and technological developments in order to observe the future to reflect on the present (Lupton, 2017). Ficcional contexts were used to introduce a complex field, allowing students to work in their project without the limitations of a real situation or the constraints of existing technologies (Bleecker, 2009). Students' analytical skills increased when critical thinking tools were applied at the beginning of the process, and throughout the whole project: first, finding a problem or question to address the food and design relationship (problem-posing), then reflecting on the implications of the speculative choices (reflective skepticism), considering different perspectives (multi-view); and finally, applying complex and cross-functional principles (systemic thinking).

How important was the integration of the food system subject in a design education context? Victor Margolin's (2013: 379) believes "it is possible to build a body of knowledge about food or design without explicitly mentioning the other", since design has always been part of food contexts, and food has provided the design field with demands, both as a material and an experience. If we consider design and food history, with cross-influences and mutual contributions along the way, the two are heavily implicated.

For a more practical balance of our academic experience, and from an educational point of view, negotiation was part of the process (as the exercise was individual and the project was developed in a team), which enabled personal interaction and work division between team members. This structure provided for group discussion and reflection, with positive outputs for the final result. On a less positive note, the broad diversity of themes to work with (*Food in communities*, *Plastic environmental impact in food contexts*, *Food waste* and *Urban green edible spaces*) created an extra challenge as some students had to adapt to sometimes completely different fields than the ones they researched in the first place. In the future, choosing one or, perhaps, two themes (instead of four) might be a better option.

4 CONCLUSIONS

Discovering and exploring food systems through a critical perspective allows for problems and questions to emerge, making space for Design Fiction to provide a method to envision the future. Both utopic and fictional, the results encourage the imagination of food design preferable futures. The topics covered prompt the exploration of new areas such as food within the design process.

In a way, students are looking for questions worth discussing: Which products or systems to change first, and how does it result in different habits and new dynamics that present new possibilities? Results are in line with the expected, some disruptive and some more connected with the present food design landscape. Why do we eat with our eyes first, and how does that lead to food waste? How do we feed a growing population by changing their diet, one insect at a time? How do we promote a more resilient, socially inclusive and sustainable city by using car parking space for growing? These approaches also test the boundaries of contemporary design practices through Design Education, as Teal Triggs (2020: 44) indicates that "a definition of critical practice argues for the idea of 'improving' something through design, engaging with reflective practice as a way of challenging the designer's process or contexts".

From our experience, we argue that, as a tool, Design Fiction is a flexible and open approach that can adjust to distinct fields and diverse educational objectives, accordingly with the fictional nature of academic environments.

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Experiencing and Envisioning Food: Designing for Change – Bonacho et al. (Eds)

Cooking in health care – a new approach to a new profession

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ABSTRACT: An Erasmus Plus project, titled NECTAR (aN Eu Curriculum for chef gasTro- engineering in primAry food) aims to deliver an EU Occupational Profile for Chef Gastro Engineering (CGE) and an EU Curriculum for the certification of this profile. This occupational qualification is a new and challenging profession in healthcare, able to manage a kitchen in any health care facility, to reach vulnerable people aging in place with food intake issues, and inspired by personalized, balanced, and sustainable nutrition criteria. These new professionals fit in a multidisciplinary network of chefs, doctors, dieticians, and nurses, to allow the long-term sustainability of food service and tackle malnutrition of elderly and patients. The competences for these professionals will be addressed by a learning-outcome based curriculum (EQF5) modelled in a flexible and modular way to support the contextualization in different EU countries. Five pilot courses will test the curriculum, with EQF 4 level students.

1 MALNUTRITION IN HEALTHCARE

1.1 *Malnutrition among patient and patients*

One third of patients have malnutrition at hospital admittance. Similar prevalence is found at discharge, and in geriatric care institutions (Norman et al. 2021), indicating that hospitals and patient/elderly care institutions do not decrease malnutrition when they oversee meals' service.

The literature also suggests that malnutrition during healthcare is associated with increased rates of morbidity and mortality, prolonged hospital stay, impaired wound healing, high readmission rate, and increased costs for overall care (Cardenas et al. 2020).

Guidelines on this subject propose to address malnutrition by standardizing diagnosis and treatment (White et al., 2012), and by promoting intervention strategies that include comprehensive assessment, supportive interventions, nutritional counselling, food fortification, oral nutritional supplements, enteral nutrition, parenteral nutrition, and even regular physical exercise for aged inpatients with malnutrition or at risk of malnutrition (Volkert et al. 2019). Even though, some challenges remain, as current clinical interventions are not completely effective and there is a need for additional strategies, aimed at minimizing the impact that illness, poor health or old age have on nutritional intake (Norman et al. 2021).

1.2 *Malnutrition causes*

Malnutrition is multicausal and its determinants include causes associated with a new or ongoing disease process that hinder food intake or nutrient absorption. Clinical variables such as obstruction of the gastrointestinal tract, pharmaceutical interactions or treatments that affect taste, such as chemotherapy-radiotherapy, a widespread range of patient and care-centred factors, such as advanced age, increase dietary requirements and dietary losses. A change in habits, reaction to an emotional situation, complementary examinations, surgical treatments, misuse of therapeutic fasts, lack of nutritional assessment, lack of intake control, lack of nutritionists or nutrition services, are all associated with malnutrition (O'Keeffe et al. 2019; Besora-Moreno et al. 2020).

In hospitals and other care institutions, malnutrition is often characterized as a vicious cycle. As increased dietary requirements tend not be met, they cause additional depletion and exhaustion of energy and nutrimental reserves and thus, increase malnutrition and intake needs. Once established, malnutrition affects the organisms' response capabilities to care, promoting a situation of immunosuppression and

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susceptibility to infections or even further health damage (Malone & Mogensen 2022).

Meal dislike and food refusal are potential determinants of malnutrition during institutionalisation.

In hospitals and other large care institutions, food is often prepared and distributed in a massive, depersonalised way, complying with the medically prescribed composition, but disregarding individual preferences and choices, cultural and religious backgrounds.

Texture, palatability and presentation are very important to patients (Trinca et al. 2022), but these important attributes tend to be neglected.

2 FOOD SERVICE SUSTAINABILITY

2.1 *Consumer satisfaction*

Institutions struggle with a constant challenge to offer adapted, nutritionally balanced, and sensory-rich meals, prepared, and served by trained staff, aware and able of dealing with such peculiar costumers (Gaspar et al. 2018).

Improving food service at care institutions is cost-effective and consumer satisfaction improves well-being and willingness to accept meals. (Greig et al. 2018). At the same time, if the food served pleases the consumers, the amount of discarded food decreases, increasing food service operation sustainability.

2.2 *Food service efficacy*

To improve the efficacy of food service, health professionals - doctors, nurses, therapists, dietitians/nutritionists must be able to work together and articulate with kitchen and foodservice professionals. This will ensure food management and kitchen coordination, allowing food service to address end-user's needs caused by conditions such as taste deteriorations/alterations, swallowing and chewing problems.

Simultaneously, the personalization of recipes and cooking processes will attend to cultural backgrounds, individual preferences, and taste.

3 NECTAR PROJECT

3.1 *The consortium*

An Erasmus Plus project, titled NECTAR (aN Eu Curriculum for chef gasTro- engineering in primAry food), involving Odisee University College (ODISEE), Si4life – Scienza e Impresa insieme per migliorare la qualità della vita (SI4LIFE), Istituto Professionale Statale per l'Enogastronomia e l'Accoglienza - IPSSAR Marco Polo (MP), Regione Liguria (RL), Santa Casa da Misericordia de Albufeira (SCMA), University of Algarve (UAlg), Wiener Institut fur Arbeitsmarkt – und Bildungsforschung (WIAB), Medizinische Universitat Graz (MUG), Wirtschaftkammer Steiermark (STYCC) –Styrian Chamber of Commerce, Regione Campania (RC), Fondazione Istituto Tecnico Superiore per Tecnologie Innovative per i Beni e le Attività Culturali e Turistiche (ITS-BACT), EIP on AHA Reference Sites Collaborative Network (RSCN), coordinated by Odisee University College, aims to deliver an EU Occupational Profile for Chef Gastro Engineering (CGE) and an EU Curriculum for the certification of this profile.

3.2 *A new occupational profile*

The NECTAR project will address the mismatch between the skills currently offered by cooks and chefs working in hospitals, residential care, and homecare and those demanded by healthcare institutions, private service providers and final end users, considering that most cooks and chefs are not specifically trained to produce meals for health care institutions and:

- Show a gap in job-specific skills such as nutritional physiology, information and communications technology, and engineering applied to food.
- Existing curricula for the specialization of chefs are designed and delivered under local initiatives and don't refer to a formalized EU Occupational Profile for Chefs and Cooks working in a health and care setting based on WHO and EU policy recommendations.
- Policy makers, institutional stakeholders, private and public healthcare providers, Vocational Education Training providers and certification bodies need guidance, time, and funding for investing in an integrated culinary/clinical approach.

The project is based on a co-creation design-approach for sustainable service innovation and value creation. During the development of the Gastro-engineer profile and competences, all partners from different professional sectors in food and healthcare contributed for the content according to submission requirements.

The skills considered essential for these new professionals include Basics of Nutrition and Dietetics, Food Chemistry and Biochemistry, Taste and Sensory Acceptance, Taste and Health, Menu Engineering,

Cooking and Distribution Process Systems, Quality Assurance, Technology of Cooking and Distribution Processes, and also Financial Analysis and Planning, Applied Law, Ethics and Cultural Embeddedness.

This development process started with the definition of the new occupational profile and profession. After this definition, by January 2021, partners continue to collaborate to design course learning outcomes, produce modular learning materials and quality control tools, that will be translated in the different languages and used in different teaching environments.

The occupational profile for CGE is defined as follows:

The CGE primarily produces tasty, healthy, and safe meals that are appropriate for the end-users in a particular context. In healthcare, the CGE combines science, craft, and art to manage all gastrological aspects of Primary Food Care (PFC). The chef engineers culinary cooking systems, as well as distribution and information/communication structures and processes, including the designing, building, operating, maintaining, improving, and innovating of these systems for the benefit of all end-users. Based on his/her primary professional profile, the CGE is capable to do all this in a technical, organoleptic, and nutritionally responsible way. At the same time, the CGE is taking all relevant quality requirements, food safety, socio-economic ecological aspects, and cultural embeddedness of food into account.

3.3 *A new curriculum*

The definition of this occupational profile and qualification is needed to formalize a new and challenging profession in healthcare, one able to manage a fully equipped and ICT supported kitchen in any health care facility, to reach vulnerable people living at home who have problems with food intake, and inspired by personalized, balanced, and sustainable nutrition criteria.

Learning outcomes have already been specified for the curriculum:

1. Manage suppliers and buy in sustainable food ingredients.
2. Screen, assess and monitor on client-level.
3. Create recipes for a general population and for people with specific needs, complying with recommendations of health professionals.
4. Manage the kitchen and coordinate personnel.
5. Ensure quality of food and follow safety regulations.
6. Use and adapt cooking techniques to the specific care setting and client.
7. Communicate, interact and collaborate with clients and interprofessional team.

These learning outcomes target core competencies that are identified as suited to a CGE:

- 1-A. Identify costs of required supplies
- 1-B. Identify most sustainable and high-quality suppliers and plan and manage the supply process related to the context
- 1-C. Use local and seasonal ingredients and detect them in the territory to guarantee an efficient supply for the kitchen
- 1-D. Avoid and manage waste while planning meals to promote full use of ingredients and promoting use of leftovers according to HACCP and local law
- 2-A. Assess clients' needs in collaboration with health professionals
- 2-B. Collaborate with health professionals to plan how to alternate food texture regarding swallowing problems or other relevant adapted food medical conditions (e.g., dementia, diabetes, kidney diseases)
- 2-C. Adapt screening, assessment, and monitoring activity on the base of the proper level of care and use ICT tools to support this
- 2-D. Critically select and use the proper screening and monitoring tools to assess individual food preferences and needs
- 2-E. Detect clients' satisfaction and impressions after food consumption experience with interdisciplinary team
- 3-A. Create, or compile recipes targeted to the general population considering cultural choices or religious ones and put them in a balanced and tasteful menu
- 3-B. Create, and compile adapted and person-centered recipes complying with recommendations of health professionals as far as physiological (age-related) and pathological conditions
- 3-C. Handle food related client data in ICT systems
- 3-D. Supply menus and balanced menu cycles
- 4-A. Manage the kitchen budget (e. g. make budget plans and assure they are followed) with respect to food and utilities
- 4-B. Recruit personnel for the kitchen with human resources recruiting team and define, create, implement, and control training plans and schedules
- 4-C. Schedule personnel shifts and manage staff
- 4-D. Ensure regular maintenance of kitchen equipment
- 5-A. Acquire and ensure high food quality and safety in the kitchen starting from raw and semi-finished food products, materials, storage of raw materials, processing, cooking, and storage of food (components) and regenerating it.
- 5-B. Assure that the work of the kitchen staff is compliant with food safety and hygienic standard and maintain a secure working environment
- 5-C. Plan and execute food tasting for healthcare professionals to test and review menus and new dishes
- 6-A. Use the proper cooking techniques according to the healthcare context
- 6-B. Use the proper food preparation techniques for the right context
- 6-C. Use specific techniques of food preparation considering personal healthy diets and cultural and religious choices
- 6-D. Adapt food consistency, fortification, and taste according to the needs of the client.
- 7-A. Effectively interact and communicate with different clients and the interprofessional team with verbal (also written) and non-verbal communication

- 7-B. Collaborate with healthcare professionals to educate and promote healthy behaviours among clients
- 7-C. Work in a person-centered interprofessional healthcare team and collaborate with other professionals or stakeholders
- 7-D. Enact sense of initiative and entrepreneurial attitudes, mindsets, and skills
- 7-E. Enact digital competence in daily activities and work.

As shown in Figure 1, these new professionals need to fit in a multidisciplinary network of chefs, doctors, dieticians, and nurses, to allow the long-term sustainability of food service and to tackle malnutrition of elderly and patients (Winters et al. 2021).

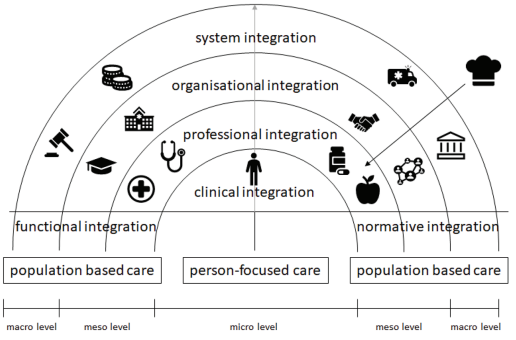

Figure 1. Conceptual framework for integrated care by Valentijn et al. 2013 modified to show the role of the chef/cook in an integrated nutritional care team (Winters et al. 2021).

3.4 *European qualification*

Qualifications for cooks and chefs are heterogeneous both at EU and national level and managed by different regional or national authorities. In some EU countries, the implementation of a level 5 European Qualification Framework (EQF5) specialization course is still not feasible, but certainly needed for future improvement in the sector.

Based on these premises, the NECTAR Curriculum will be modelled in a flexible and modular way to support the contextualization in different EU countries, aiming at the final CGE qualification at EQF5 level.

3.5 *New learning materials*

Project partners are currently developing lesson plans, extensive training materials and quality control tools, to ensure the feasibility of further use in new projects and different regions and with other students.

During project development, NECTAR partners decided to focus specifically on three target audiences to be closely involved in the NECTAR open educational course content employing a blended learning approach for the overall program: vocational educational training (VET) providers, VET teachers and Chefs/cooks working in health and social care settings.

The educational toolkit platform in preparation is provided in the format of an open educational resource, free to access for anybody interested in the content offered. The iMOOX platform will be used as core educational platform for delivery of educational content related to the CGE curriculum.

This open access policy may lead to a broad target audience possibly attracted by the topics offered during the NECTAR online training course, probably with varying professional and socio-cultural backgrounds of the participants.

3.6 *Pilot courses*

The effectiveness of the Curriculum will be tested in five pilot courses: two of them will target EQF5 (Belgium and Campania) and three (Portugal, Austria, and Liguria) will provide a specialization in EQF4. Trainees' entry level will be EQF 4, minimum, in every pilot. Validation of prior learning is considered.

Feedback evaluation from the pilots, gathered among students, trainers, institutions, and external partners, together with the overall quality management documents, will provide information for curricula and methodology improvement, leading to a final "package" that can be delivered and applied in other institutions and countries, training new professionals for rehabilitation/therapeutic cooking.

3.7 *The Portuguese approach*

Every pilot will award a certification for the CGE qualification. In Portugal, to comply with *Agência Nacional para a Qualificação e o Ensino Profissional (ANQEP)* professions' list, the designation should be Specialization in rehabilitation/therapeutic cooking.

The Portuguese approach, developed in close collaboration between UAlg and SCMA, will train 20 students for 8 months, during a total of 750 hours, including presence learning, e-learning, work-based learning, and innovative methods. A focus on the Mediterranean Diet eating patterns will be adopted, to meet both foodservice sustainability and consumer's choices.

3.8 *Expected results*

The NECTAR project aims for the following results:

- A reference EU Occupational Profile for Chef Gastro Engineering fitting the actual and current needs of care institutions and a culinary/ clinical integrated approach.
- A reference EU Curriculum for CGE based the CGE Occupational Profile. The EU curriculum will play a reference role at European level for CGE VET. The curriculum will be i) "learning

outcome oriented" and compliant with the main EU standard and tools for VET; ii) general and "across-the-board", as well as flexible and adaptable to different contexts and EU countries.

- Web based step-by-step guide supporting the CGE EU Curriculum localization. It will be available for free on the web for any VET designer who would like to adapt the EU curriculum to his/her national or local context. It will include downloadable tools and practical guides.
- Guidelines for teachers for curriculum implementation. The guidelines will contain indications and methodological recommendations for teachers on how to use and customize the tools proposed by the project, as well as how to identify the most adequate teaching and learning methods for the delivery of the activities.
- NECTAR Educational toolkit platform. On this platform, the e-learning course modules will be provided. It will be in English and will support a Multilanguage interface.
- Pilot Teachers Online Training. Through the Educational toolkit platform, teachers of the pilots will be trained to the use of patterns and plans, the whole teaching toolkit, as well as to the guidelines for curriculum implementation.
- Teaching Toolkit and Multilingual Open Contents, which will be a collection of documents supporting the knowledge transfer process by considering different teaching approaches/methods and relevant pedagogical concepts; it will enrich the delivery of the project with Multilingual Open Contents.
- The design documents of five localized curricula in Belgium, Portugal, Austria, Liguria and Campania, starting from the EU Curriculum, instantiated into specific pilot courses, detailing specific materials, timing, course programs, teachers, logistics, etc.
- Five pilot courses in Belgium, Portugal, Austria, Liguria and Campania, with 20 to 60 students per pilot. The total amount of hours will span from about 750 to 1000 and will include presence learning, e-learning, work-based learning, and innovative methods. Every pilot will award a certification for the CGE qualification.
- Recommendations to public and private employers, but also policy makers and regulatory bodies, enhancing the integration of this CGE in care institutions.
- NECTAR Memorandum of Understanding, between competent institutions which sets the framework for the CGE Curriculum credit transfer; it is supposed to be signed by at least all VET Providers and Regulatory Bodies, full partners of the project, and by at least 10 external ones.

4 CONCLUSIONS

Evidence indicates that food service quality is crucial for health care success and sustainability, for it is critical to ensure adequate nutrition and thus maximize health and quality of life of those who are cared, being them patients, fragile elderly, or even healthy old people.

Chefs working in health care institutions in different European countries have different levels of vocational training, according to each country framework but they all lack specific knowledge and training on the special needs of their customers, defined by social and cultural background, old age, present or past pathologies.

The NECTAR project proposes to create a modular course, defined, and prepared in a multidisciplinary and transnational collaborative way, complete with a set of learning materials, that can be applied in future initiatives to train new professionals for rehabilitation/therapeutic cooking.

The new EU Occupational Profile for Chef Gastro Engineering will close the gap in chef's present training, preparing gastro-engineer professionals to to integrate multidisciplinary health care teams and provide adequate, healthy, safe, and tasty meals in health care facilities.

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Experiencing and Envisioning Food: Designing for Change – Bonacho et al. (Eds)

Food Design in China - A visual analysis based on VOSviewer

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ABSTRACT: This paper examines the current status of research in the field of food design in China. First, data analysis of the literature in the field was conducted through VOSviewer to deconstruct food design in China in terms of research status and trends, spatial distribution and keyword co-occurrence. A bibliometric analysis of the literature in the field of food design in China was conducted to analyse relevant annual statistics, research by individual institutions and authors, research hotspots and keyword coupling, and frequency. As China's GDP grows year on year and the living standards of its residents improved, Chinese people become more concerned about food consumption and health risks. As a result, research hotspots in this field are also in these areas. At the same time, Chinese research institutions are paying more attention to food design, and the research hotspot for food design in China is also increasing year by year.

Keywords: Food Design, China, VOSviewer, Keywords Analysis

1 INTRODUCTION

The Chinese have always said that (Min yi shi wei tian) Food is fundamental for the people (Yang et al., 2021). At the same time, designer foods (called health food) are used in Chinese traditional medicine (Rajasekaran & Kalaivani, 2013). The Chinese attach great importance to food, but research in food design has only been increasing since 2007, before which there was little research in this area. Meanwhile, unlike in the West, food design in China is still in a developmental stage, only reaching a peak of research enthusiasm in the last decade. For example, the designer Bretillot founded the first research work on food design at the Ecole Supérieure d'Art et de Design de Reims in France in 1999 (EATER, 2020). Milan-based Scuola Politecnica di Design and the International University of Languages and Media announced in 2015 the launch of a food design programme (Winston, 2014).

Nevertheless, in China, the discipline of food design has not yet become mainstream in the public eye. Simultaneously, Chinese people are becoming more concerned with food quality and healthy eating etc., as their lives have become more affluent, and new demands are being placed on the development of the food industry in China (Browning et al., 2019). Concurrently, the research area for food also focuses on topics such as food consumption and health. Therefore, this work attempts to analyse the literature in food design in China through VOSviewer to find out the current research hotspots and development trends (Yu et al., 2020) of food design in China.

After this bibliometric analysis, the conclusion is that the Chinese food research focuses on three main areas of concern: food risk, consumption and health. Hot spots and trends in the development of food design in China will also focus on these areas in the future. In terms of research impact, there is room for the field to continue to be explored in depth in China. Regarding the intersection of food and design disciplines, the depth of intersection between food and design in China needs to be improved.

2 RESEARCH METHODOLOGY AND DATA SOURCES

2.1 *Research methodology and tools*

This paper uses bibliometric analysis to understand research hotspots, frontiers and trends in research, and developments in food design in China. The idea of search (data collection) - data statistics - visual

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analysis – conclusions (Suter, 2012) would be followed in this research.

The tools for conducting the data analysis rely on the bibliometric visualisation software VOSviewer, developed in 2009 by the CWTS institute at Leiden University in the Netherlands (Vu et al., 2020). VOSviewer allows analysis for large data samples, focusing on calculating distances between clusters and reflecting interrelationships (Cobo et al., 2011). It is widely used in bibliometric intelligence discovery and data analysis (Rialti et al., 2019).

This article was used VOSviewer version 1.6.18 to analyse the current state of research food design in China regarding word frequency co-occurrence, spatial distribution and development process.

2.2 *Data sources*

The research object of this paper is the literature data related to food design in China. The source of all search data was the Web of Science database (Core Collection). The search was conducted as a Topic search, with the search term "Chinese Food Design", and the literature time frame was from 1991 to 12 February 2022 at 5:16 pm. The search yielded a total of 1,443 documents. The detailed search and document information is shown in Table 1. The maximum value of 25 was set for each document in all cells after importing the data into VOSviewer to ensure the breadth of the study data.

3 ANALYSIS OF THE CURRENT STATE OF RESEARCH AND TRENDS

The difference in the number of publications within a discipline at different periods can reflect the changing research status of the field (Fagerberg, 2004). After analysing the 1,443 relevant papers searched and compiling annual statistics on the number of papers published in the field of food design in China, it can be found that the annual number of papers published in each of the eight years from 1991 to 1998 was below 10 (see Table 2 for the exact number). From 1999 to 2007 the number of papers published increased slightly and the overall change was stable. From 2008 to 2021, the number of papers published in the field rose rapidly, and the heat entered a period of rapid growth (see Figure 1). Figure 1 shows that the research heat in food design is gradually increasing in China.

4 SPATIAL DISTRIBUTION

4.1 *Author distribution*

The Citation-Authors cell was analysed in VOSviewer by adjusting the Minimum number of Citations of an author to 3, resulting in 238 available authors and a Citation-Authors clustering profile see Figure 2.

The nodes are connected by a line, which shows the relationship between the nodes. The thicker the connection line is, the closer the connection is. Also, the tempo

The nodes are connected to each other by a line, which shows the relationship between the nodes. The thicker the connection line is, the closer the connection is. A spatial analysis of the distribution of authors, together with an analysis of their weights, gives an idea of who the core researchers in the area of food design in China are.

The most cited article is by Zheng Wei with 1029 citations, followed by Gao Yutang with 932 citations and Yang Gong with 901 citations. In descending order of citations, the top 6 most-cited authors are shown in Table 3.

Table 1. Information and ways to search the literature in Chinese food design.

Database	Search Method	Search terms	Time frame	Literature Category		Number of search results	Search time	Record Content	Export Records to
Web of Science Core Collection	Topic	Chinese Food Design	Form the whole year 1991 to 2022 12 February 2022	Type	Number	1,443	12 February 2022 Time: 17:16 Lisbon time GMT +1	Full Record and Cited References	TXT File
				Articles	1,295				
				Proceeding Papers	88				
				Review Articles	81				
				Early Access	26				
				Editorial Materials	5				
				Book Chapters	1				
				Retracted Publications	1				

Table 2. Statistics on the number of annual publications in Chinese food design.

Year	Number	Year	Number
1991	1	2000	11
1992	5	2001	17
1993	2	2002	14
1994	1	2003	15
1995	3	2004	18
1996	2	2005	19
1997	6	2006	20
1998	3	2007	18
1999	13	2008	41
Year	Number	Year	Number
2009	47	2018	118
2010	43	2019	137
2011	56	2020	176
2012	47	2021	188
2013	65	2022*	21*
2014	56		
2015	87		
2016	84		
2017	109		

* Statistics as of 12 February 2022. Time: 17:16. Not for a full year of 2022.

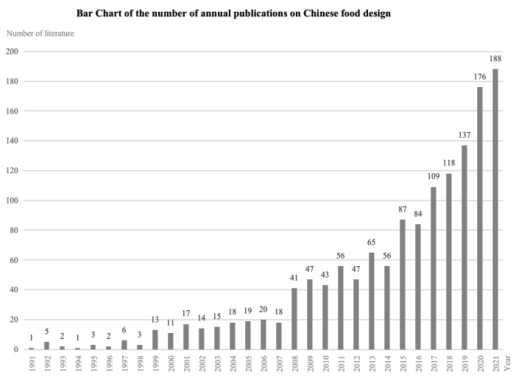

Figure 1. This graph represents the number of publications in the field of food design in China each year.

Figure 2. Authors cited relationship network graph.

4.2 *Institutional distribution*

An analysis of the institutions involved in food design in China gives an idea of the core institutions and the specific strength of their contribution.

Table 3. The top 6 most cited authors in Chinese food design.

Author name	Citations	Publications number
Zheng Wei	1029	16
Gao Yutang	932	14
Yang Gong	901	12
Li Honglan	588	9
Cai Hui	536	9
Shu Xiao-Ou	525	10

In VOSviewer, select Citation- Organizations and set the Minimum number of documents of an organization to 5 and the Minimum number of citations of an organization to 0. After filtering the 132 organizations unrelated to each other, the remaining 116 valid organizations were obtained and formed a Figure 3 clustering network view.

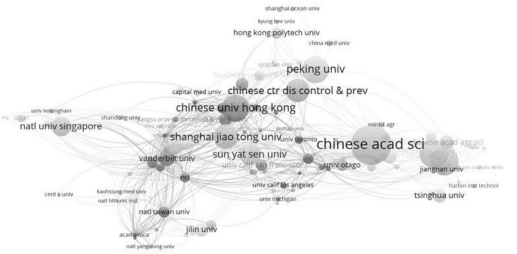

Figure 3. Organisational network graph.

The Chinese Academy of Sciences has the highest number of articles on food design in China, followed by the China Agricultural University. In descending order of the number of publications, the top ten research institutions are shown in Table 4.

According to the results of this data, the central research institutions of food design in China are primarily universities and academic academies.

In terms of publication authority, the most cited institution is the Chinese Academy of Sciences, followed by Vanderbilt University Athletics. Five of the top ten institutions are from the United States in descending order of citations.

Chinese institutions occupy the other four positions (see Table 5).

4.3 *Keyword co-occurrence analysis*

By analysing the frequency of occurrences of a keyword in the literature data, the density relationship and so on, we can know the research hotspots of Chinese food design research and the direction of current research trends.

The all-keywords unit of Co-occurrence in VOSviewer 1.6.18 was selected. In addition, the minimum number of occurrences of a keyword was set to 5, i.e., each keyword appeared at

Table 4. The Chinese institutions with the highest number of published publications in Chinese food design.

Institution abbreviation (Full name)	Publications number	Citations
Chinese acad sci (Chinese Academy of Sciences)	57	2381
China agr univ (China Agricultural University)	41	344
Zhejiang univ (Zhejiang University)	40	420
Peking univ (Peking University)	39	1001
Chinese univ hong kong (The Chinese University of Hong Kong)	39	757
Shanghai jiao tong univ (Shanghai Jiao Tong University)	35	1090
Chinese ctr dis control & prevent (Chinese Center for Disease Control and Prevention)	34	767
Sun yat sen univ (Sun Yat-sen University)	31	675
Natl univ singapore (National University of Singapore)	28	852
Sichuan univ (SiChuan University)	24	241

Table 5. The International institutions with the highest Citations of published publications in Chinese food design.

Institution abbreviation (Full name)	Publications number	Citations
Chinese acad sci (Chinese Academy of Sciences)	57	2381
Vanderbilt univ (Vanderbilt University Athletics)	22	1778
Harvard univ (Harvard University)	19	1626
Univ toronto (University of Toronto)	12	1482
Shanghai canc inst (Shanghai Instiute of Cancer)	15	1370
Shanghai jiao tong univ (Shanghai Jiao Tong University)	35	1090
Nci (National Cancer Institute)	14	1070
Univ minnesota (University of Minnesota)	12	1052
Univ n carolina (University of North Carolina)	15	1018
Peking univ (Peking University)	39	1001

least five times, and 494 valid keywords were obtained.

The top 40 occurrence keywords with the highest frequency of Chinese food design, like consumption, risk, health, obesity, English, and prevalence, are shown in Table 6. The keywords density profile is shown in Figure 4. The keywords' clustering profile is shown in Figure 5.

The keywords are China food as the core, radiating other areas such as Consumption, Risk, Health, Obesity, Prevalence, Quality, Nutrition, Women, Diet, etc. For example, food-centered clusters are highly correlated with both China and Consumption-centered clusters. The other clusters with the high frequency of occurrence also have a high degree of co-occurrence with these primary high-frequency keywords. Each of the three clusters, China, Food, and Consumption, has correlations with additional keywords, although these are overlapping.

It is also worth noting that the keyword "design" comes in at number 20 in terms of frequency of occurrence, appearing 28 times. This suggests that there is still much space for integrating food and design in China's food design sector.

The analysis resulted in six clusters and the top ten keywords that appeared most frequently in their affiliations. Please refer to (Table 7) for the setting of each cluster. The core clusters were food, China, health, risk, Chinese and disease, and the other keywords associated with these six core clusters. The keywords under each cluster are listed in descending order of frequency.

Design, Growth, and Management, for example, are used as secondary high-frequency keywords in the Food cluster. Consumption, Quality, Impact, and Attitudes, on the other hand, are presented as secondary high-frequency terms with China as the core. China's current hotspots for food design research revolve primarily around these six clusters and extend to other secondary areas.

Meanwhile, China, Food, Consumption, Risk, Health, Obesity, Chinese Prevalence, Quality, Nutrition, Women, Diet, Impact, Attitudes, Physical-activity, Behavior, and so on are the most researched hotspots, indicating that these are the current focus of attention in the field of food design in China.

5 CONCLUSION

As an interdisciplinary field, food design has received increasing attention in China from its beginnings as a fringe area. Moreover, its research fervour has entered a period of rapid rise in China. A visual analysis of Chinese food design leads to the following conclusions.

i. Within the academic field in China, researchers are paying more attention to food design and consumption, the risks of food, food-induced health problems, obesity and disease rates. Women's issues are also being looked at in food design in China, mainly in consumption, health and dieting.

Table 6. The top 40 occurrence keywords with the highest frequency of Chinese food design.

Serial number	Keywords	Occurrences	Serial number	Keywords	Occurrences	Serial number	Keywords	Occurrences
1	China	185	22	Performance	35	35	Associations	22
2	Food	143		Safety	35		Perception	22
3	Consumption	116		United-states	35		Preferences	22
4	Risk	109		Willingness-to-pay	35	36	Chinese women	21
5	Health	106	23	Men	34		In-vitro	21
6	Obesity	104	24	Perceptions	33		Protein	21
7	Chinese	95		Products	33		Trends	21
8	Prevalence	69	25	Dietary patterns	32	37	Childhood obesity	20
9	Quality	68	26	Epidemiology	31		Food-intake	20
10	Nutrition	63		Model	31		Glucose	20
	Women	63	27	Body-mass index	30		Isoflavones	20
11	Diet	59		Identification	30		Organic food	20
	Impact	59		Information	30		Trust	20
12	Attitudes	55	28	Adolescents	29	38	Hypertension	19
	Physical-activity	55		Determinants	29		Nutrition transition	19
13	Behavior	53	29	Validation	28		Oxidative stress	19
	Children	53	30	Cardiovascular-disease	27		Sodium	19
14	Risk-factors	51		Coronary-heart-disease	27	39	Blood-pressure	18
15	Association	44		Metabolic syndrome	27		Dietary pattern	18
	Design	44		Prevention	27		Fat	18
			31	Fruit	26		System	18
16	Growth	42		Metabolism	26	40	food-frequency questionnaire	17
	Overweight	42		Optimization	26		foods	17
							glycemic index	17
							acculturation	17
17	Adults	41		Postmenopausal women	26		consumers	17
	Management	41	32	Knowledge	25			
18	Disease	40	33	Traditional chinese medicine	24			
	Food safety	40	34	Calcium	23			
19	Patterns	38		Cancer	23			
20	Mortality	37		Dietary intake	23			
21	Metaanalysis	36		Satisfaction	23			
	Pharmacokinetics	36		Validity	23			
	Population	36						

In addition, as the standard of living of the Chinese population increases and the overall standard of living of the nation increases, so make the Chinese people's demands for food quality.

ii. According to VOSviewer's analysis, a summary of the relevance of the six clusters of Chinese food design can be divided into three main clusters, China (Chinese), Food and Consumption, and Health Risks and Diseases, where the main research in this area is also focused. It can be speculated that future research trends and hotspots in Chinese food design will also develop in these clusters in the short term.

Figure 4. Keywords Graph.

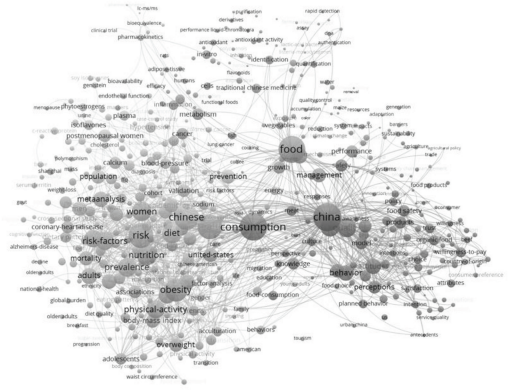

Figure 5. Keywords co-occurrences Graph.

iii. In terms of research impact, as Chinese institutions have been conducting more research in food design year by year, they have also achieved concrete research results, while there is still much room to improve their impact within the scientific field. The analysis of citation data shows that the West mainly contributes to the more influential literature.
iv. There is still room for improvement in the degree of intersection between the two disciplines in the Chinese academic field regarding the intersection between food science and design. The design is only at the second level under the food cluster in the cluster analysis. The mining of other keywords also provides more entry points for future researchers when intersecting with food from the field of design.

As the bibliometric analysis can only deal with already searchable literature, and there is a time lag in the publication of research results and publications, it only reflects the current research in the field. In future studies, additional relevant information on searchable publications will need to be added.

Based on the study of word frequency co-occurrence, spatial distribution and development process of food design in China, it can be seen that the development of food design in China is moving from a single intersection to involving several other complex disciplines.

In summary, the future of food design in China will remain a hot research topic. The future development of the discipline in China is also promising.

Table 7. The six Cluster and its affiliated top 10 most frequently occurring keywords.

Cluster	Keywords	Occurrences	Cluster	Keywords	Occurrences
1	Food*	143	4	Risk*	109
	Design	44		Prevalence	69
	Growth	42		Women	63
	Management	41		Risk-factors	51
	Performance	35		Association	44
	Identification	30		Adults	41
	Metabolism	26		Mortality	37
	Optimization	26		Metanalysis	36
	Traditional Chinese medicine	24		Cardiovascular-disease	27
	Cancer	23		Coronary-heart-disease	27
				Metabolic syndrome	27
2	China*	185	5	Chinese*	95
	Consumption	116		Diet	59
	Quality	68		Pharmacokinetics	36
	Impact	59		Population	36

(*Continued*)

Table 7. (*Continued*)

Cluster	Keywords	Occurrences	Cluster	Keywords	Occurrences
	Attitudes	55		Prevention	27
	Behavior	53		Postmenopausal women	26
	Food safety	40		Chinese women	21
	Safety	35		Isoflavones	20
	Willingness-to-pay	35		Hypertension	19
	Perceptions	33		Foods	17
	Products	33			
3	Health*	106	6	Disease*	40
	Obesity	104		Men	34
	Nutrition	63		Epidemiology	31
	Physical-activity	55		Validation	28
	Children	53		Calcium	23
	Overweight	42		Validity	23
	Patterns	38		Sodium	19
	United-states	35		Blood-pressure	18
	Dietary patterns	32		Food-frequency questionnaire	17
	Body-mass index	30		Energy	16
				Reproducibility	16

* Core vocabulary for each cluster.

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Experiencing and Envisioning Food: Designing for Change – Bonacho et al. (Eds)

Food Design as a link between design and gastronomy in higher education

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ABSTRACT: Considering Catalan gastronomy and design's global impact, this study explores Food Design in higher education. Its core goal is to assess Food Design's potential as a link between design and gastronomy, laying the groundwork for a dedicated program in this geographical area. It focuses on a collaborative academic case study involving ELISAVA, Barcelona School of Design and Engineering and *EspaiSucre* Gastronomy master's students in Barcelona, creating projects to re-think food systems. The research validates the hypothesis that merging design and gastronomy enriches Food Design as a catalyst for change. It employs mixed methodologies, qualitative and quantitative such as surveys, literature reviews, and the *Double Diamond* approach to define Food Design objectives. The *How Might We* method shapes project ideas through workshops connecting students to experts. Case studies reveal the value of food design projects from designer-chef collaborations. Despite historical separation, this research highlights transdisciplinary teamwork's potential and emphasizes the ongoing need for exploration to shape higher education programs in Food Design.

1 INTRODUCTION

1.1 *Design, food, industry, and gastronomy*

The perspective presented by Margolin (2017), which argues that design has played a role in the creation of cities emerging from the advent of agriculture, underscores the essential connection between design and food. This connection gave rise to mass society because of the industrial revolution. Margolin also contends that recipe books are objects of (Food) Design since they alter the outcomes of our dietary choices and convey the cooking methods of the chefs who publish them.

Design has always a role in various aspects and stages of human food consumption. From designing agricultural fields to creating tools for easing laborious agricultural tasks, to the transportation of food, its handling, processing, preservation, and the design of spaces where we engage in the purchase or consumption of the nourishment we need (Stumerer et al., 2013; Capella, 2015; Ruscalleda, 2021).

It can be said that all design disciplines have been closely intertwined with food throughout human history, extending into the 20th and 21st centuries, where a connection with the food industry has also developed, albeit often in a dependent manner.

Schifferstein (2016) in *"What design can bring to the food industry"* argues that despite designers being trained to create new products, their contribution to innovation in the food industry is minimal. Their relationship with stakeholders in the food universe, including chefs, cooks, and industrialists, has often been distant and characterized by dependence. Transdisciplinarity between design and gastronomy (Bonacho, 2019; Massari, 2021) has not been widespread. However, it's noteworthy that in the last two decades in Catalonia (Spain), instances such as the co-creation relationship between Luki Huber, an industrial designer coming from Switzerland, living in Barcelona, and the chef Ferran Adrià at elBulli restaurant team served as precursors to transdisciplinary collaboration (Bullipedia, 2019).

1.2 *Developing food design*

If, as Stummerer *et al.* (2020) state, design is defined as the parts of our environment crafted by humanity, then food is an integral component of this process (Stummerer *et al.,* 2020). Building upon the ideas of authors like Fry (2012), Ricard (2017), and Margolin (2017), who discuss the inception of design in the Paleolithic period when the first eating utensils were created alongside hunting tools, it can be agreed that this marked the beginning of Food Design (Capella, 2015; Bonacho, 2019; Stummerer et al., 2020), despite the term denoting the intersection of design and food only emerging in the 1990s.

The concept of Food Design was coined through the SPAMT project by Martí Guixé at the H2O gallery in Barcelona in 1997 (Guixé, 2021). This project aimed to induce social change in relation to food since, in the 1990s in Catalonia, the advent of

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computers altered the schedules and culinary habits of individuals engaged in design and other fields where computers had become essential tools for work (Guixé, 2021).

A few years later, in the early years of the 21st century, in various parts of Europe, some young designers began to develop projects that linked design with food and used the name Food Design to designate them (Vogelzang, 2021; Massari, 2021; Zampollo, 2021). Despite our study is developed in Barcelona, Spain, we deemed it necessary to outline the beginnings of Food Design development in the European context to comprehend what occurred in the emergence of this new term.

To provide a theoretical framework for the emerging field of Food Design, in 2006, the Italian association ADI (Associazione per il Disegno Industriale) created the ADI Food Design Manifesto, formulated by Paolo Barichella. Within this manifesto, there exists a consensus definition of the term Food Design among Italian designers (firenzeurbanlifestyle, 2022), which subsequently spread throughout Europe. It states that *"Food Design is the activity of devising the most effective processes for making the action of experiencing an edible substance in a given context, environment or circumstances of consumption"* (ADI, 2006). It's worth noting that at that time, this concept had not yet permeated Spain with the same intensity even though in the ensuing years, we observed designers initiating projects that bridged design and food across Catalonia. It may be a challenging task to precisely define and communicate the holistic meaning of the term Food Design. Nevertheless, it is worth the effort to ensure that society perceives it as a design domain capable of creating impactful projects that positively alter the weaknesses in the food chain (Stummerer *et al.,* 2020).

1.3 *Transdisciplinary food design*

Transdisciplinarity is proposed in the context of this research, as an insight that helps to overcome the complexity by allowing the union of multiple domains of knowledge to lead to the construction of new scenarios (Massari, 2021).

Massari (2020) defines transdisciplinarity *"not only as the integration of different branches of knowledge on a given topic, but also as the a given subject, and also as the reciprocal assimilation of knowledge between the subjects performing the task"*.

Over the past two decades, academic and professional food-related design projects proposals have enriched the concept of Food Design approaching it to other fields of knowledge. Consequently, Food Design only holds meaning when a Food Designer is equipped with knowledge spanning gastronomy, different disciplines of design, and is able to envision the needs of the food industry (Bonacho, 2019). This holistic and transdisciplinary perspective is essential for practicing this profession effectively. Without it, we might refer to a designer working with food or a chef incorporating design principles.

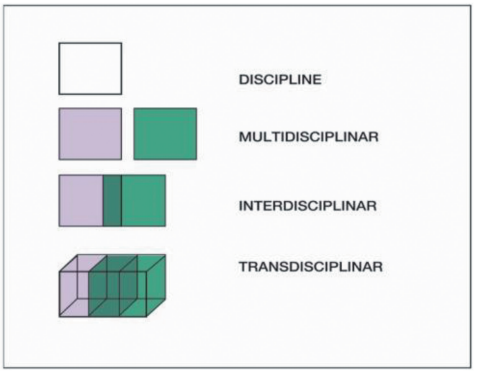

Figure 1. Disciplinary, multidisciplinary, interdisciplinary, and transdisciplinary representation diagram (Massari, 2021): Author's adaptation, 2022.

1.4 *The study*

In the stated context, working from a transdisciplinary perspective, this study revolves around the examination and analysis of the 2020 Food Design undergraduate final degree projects assigned to fourth-year design students at Elisava working together with master's degree students specializing in restaurant pastry at *EspaiSucre* School in Barcelona. It counts on a transdisciplinary team of 11 students, 7 hailing from various disciplines of design (including 4 in product design, 1 in graphic design, and 2 in spatial design) and 4 chefs. Their collaborative goal is to develop projects within the realm of Food Design to improve Food Systems, with a keen focus on assessing whether this joint creative process enhances the quality of project outcomes.

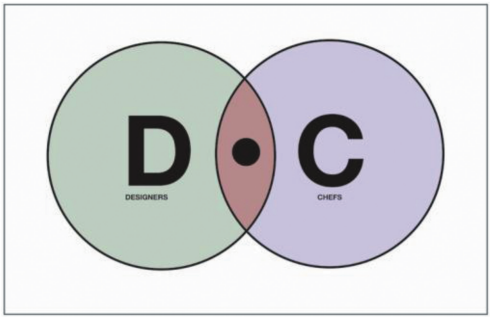

Figure 2. Infographic of the study proposed relationship between Designers and Chefs. Author, 2021.

Additionally, project mentors play a pivotal role in guiding the students, drawing from their expertise in both gastronomy and design. Each mentor specializes in their respective domain, and collectively, they

offer comprehensive guidance to the students. Notably, the studio benefits from the involvement of esteemed experts, including Xano Saguer and Ricard Martínez as renowned pastry chefs, Stefano Colli as a space designer, Luís Eslava as a product designer, and Mariana Eidler as a food designer and art director.

1.5 *The study objectives*

The main goals of the study are:

1. Exploration of Food Design's Role: Investigate Food Design as a pivotal connector between gastronomy and design, with a focus on transforming co-created ideas into tangible and impactful projects. Additionally, create a pilot and evaluate the feasibility of establishing a higher education program in Food Design at ELISAVA.
2. Academic Enhancement: Assess the academic value of collaborative creative processes aimed at optimizing the development of projects that offer innovative results.
3. Bridging Gastronomy and Food Design: Address the gap between the gastronomy and Food Design worlds by fostering collaboration. Explore instances where designers and gastronomes join forces, with a particular emphasis on scenarios where both professions co-create.
4. Agent of Change: Investigate whether Food Design projects can act as a catalyst for change, potentially addressing challenges within the food industry and the broader food chain.

1.6 *Phases of the study*

To reach the stated goals, the study comprises four phases: research and data collection, proposal formulation, analysis to define solutions, and the creation of visuals prototypes or written reports for result communication.

Within the project, each phase has a primary function that we define below:

1. Exploratory and Discovery: Beginning with a review of the current state of the art, students from various disciplines engage in collaborative research teams. Eleven students participate in workshops led by experts from both design and culinary fields to refine their research. Culinary students gain design knowledge, and design students learn about gastronomy. Prior to starting the process, there is a practical cooking session, fostering teamwork.
2. Generative: Students generate ideas and create project proposals. Each team comprises a chef and a product designer, with additional support from space and graphic designers.
3. Evolutionary: Teams develop projects while each student formalizes their discipline-specific contributions. Weekly tutorials and expert guidance support the transdisciplinary collaboration.
4. Communicative: All students collaborate on project communication, with graphic design student taking the lead in coordinating and formalizing the process.

2 METHODOLOGY

2.1 *Team selection*

The selection of the student team is conducted by ELISAVA and *EspaiSucre's* final degree project coordination team. Designers are chosen based on their academic performance, irrespective of their specific knowledge or discipline. Consequently, the final team is formed through a blend of diverse disciplines, fostering a multidisciplinary approach.

2.2 *Research methods*

The methodology employed in this study seeks to substantiate the hypothesis that the integration of design and gastronomy knowledge can enhance the quality of Food Design projects. In this experimental approach, we adopt a qualitative methodology akin to conventional design research techniques.

The study commences with an initial survey (M1) of the students, revealing their limited familiarity with the subject matter. A follow-up survey is conducted at the study's conclusion, unveiling significantly divergent definitions.

To illustrate, consider the initial definition of Food Design of one of the students taking part of the Food Design final project team. Marta Torras states that Food Designs is *"a specialized field of design that examines all elements influencing food, encompassing preparation, tasting, and the overall dining experience, and applies artistic experiences."* Upon completion, Marta redefines Food Design as *"A territory centered on utilizing design and research projects to address challenges within the food industry. Food Design combines the expertise and sensibilities of both design and gastronomy to question forms, consumption patterns, tastes, and the communication and presentation of products and experiences"*. The evolution in Torras' definitions reflects a shift in perception and an acquisition of knowledge throughout the study.

It's also interesting Berta Daina's perception of Food Design undergoes transformation during the study. Initially, she defines it as *"a discipline that views eating as an experiential act, aiming to convey a message and engage the user through the fusion of design and food."* However, by the study's conclusion, she characterizes it as *"the convergence of two complementary disciplines, dedicated to crafting products, services, and comprehensive food-related experiences, often rooted in meaningful discourse and reflection."*

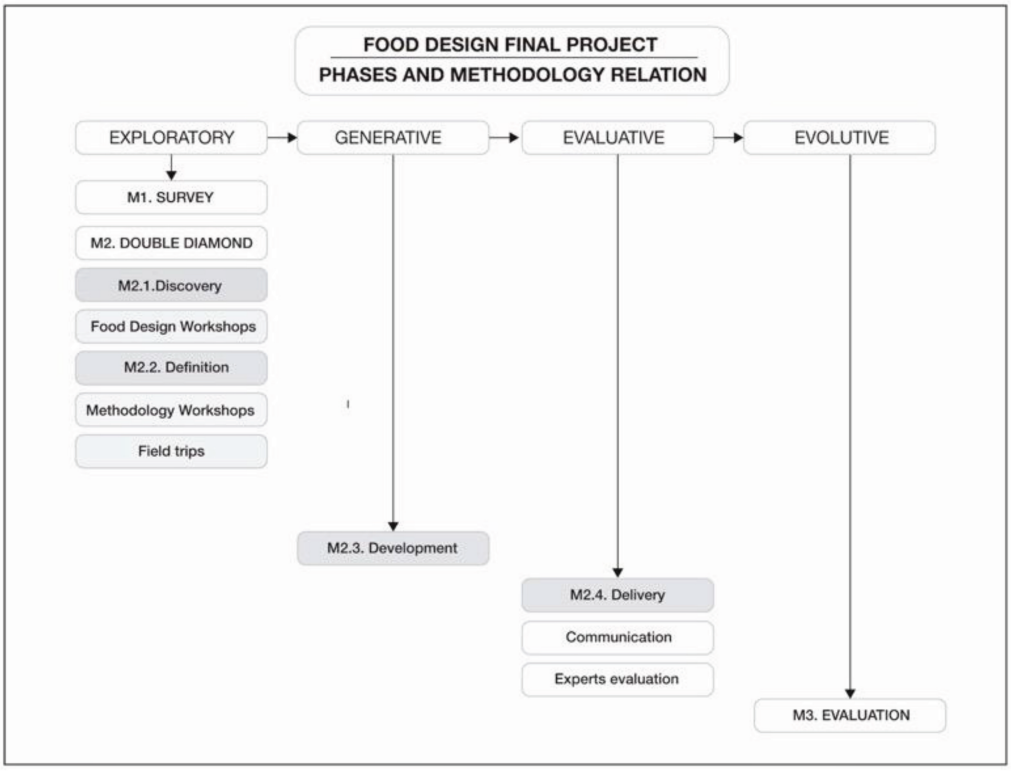

Figure 3. Phases and methodology relation.

The surveys provide invaluable information in contrasting the educational progress of the participating students. The development of their definitions showcases a growing comprehension of the term, aligning with the study's goal. This shift in perspective highlights the holistic and transdisciplinary learning journey experienced throughout the study.

To outline the steps taken by the student team throughout their creative process, the study employs a series of defined phases integrating observation methodologies related to the study phases.

The study uses the Double Diamond methodology, (M2) to start creating, which specifies four key phases:

1. Discovery: understanding the problem
2. Definition: defining the problem
3. Development: developing ideas for solutions
4. Delivery: choosing and developing the solution

Each of these phases employs a variety of methods tailored to achieve their respective objectives.

To discover and grasp the realm of Food Design, two types of workshops are conducted during this phase: Food Design training to understand the problem and Design methodologies Workshops to define it.

1.- Discovery (M2.1): Food Design Training Workshops: These workshops aim to educate the student team with a comprehensive understanding of Food Design, gradually delving into the world of food from a macro to a micro perspective. Leading experts in the fields of design and gastronomy, renowned in their sectors, facilitate these workshops.

1.1- Group Leader: Fabio Parasecoli (NYU): Food Studies - *Collaborators: Lotte Meeuwissen, Xano Saguer, Mariana Eidler: Food Design Projects* This workshop delves into the societal aspects of food, focusing on current and future food methods. It acquaints the students with the global role of Food Design in the contemporary world. The workshop, held at Elisava, involved 45 students, organized into teams consisting of a TFG student, an international student, and a cook. They collaborated on reinterpreting the classic Catalan dish, "bread with tomato," under a creative concept.

The teams prepared the dish and tested it with students from various Elisava courses. The workshop also emphasized ethnographic methods, encouraging students to observe and gather data to evaluate the dish's reception by diners. Notably, this experience demonstrated the merging of creative methods through the collaborative synergy of students, resulting in intriguing visual and gustatory outcomes.

1.2- Group Leader: Mariana Eidler (Elisava): What is Food Design - *Collaborator: Xano Saguer (EspaiSucre)* This workshop focuses on comprehending the term "Food Design". It underscores the importance of cross-disciplinary collaboration

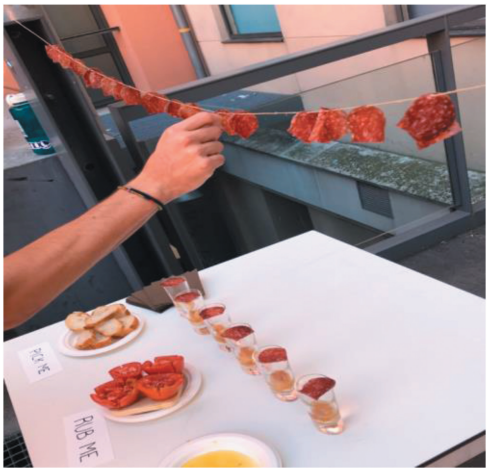

Figure 4. "Pa amb tomaquet" workshop. Author, 2019.

between the fields of design and gastronomy to optimize project outcomes. The workshop takes place at *EspaiSucre* and offers insights into the creative methodology developed by Jordi Butron and Xano Saguer at the pastry school, which complements the world's first sweet food restaurant, located in Barcelona. Students gain familiarity with *EspaiSucre* and grasp the scope of the proposed project, which involves creating products, services or innovative gastronomic experiences that seamlessly integrate gastronomy and design.

1.3- Group leader: Xavi Llarch (Elisava Alumni residing in London). The Decorators.This workshop is designed to explore the potential of creating Food Design projects through co-creation within public spaces, while considering the environmental context.

1.4- Laura Gispert and Guillem Alemany: Elisava Alumni projects on Food Design. 2019 graduates shared their innovative projects and their potential future impact. This activity empowers students to envision themselves as Alumni and realize their capacity to create projects with a significant social impact in the realm of food.

Laura Gispert introduced "Voilà," a project offering an eco-friendly solution to disposable plastic cutlery. It involves the development of an organic cutlery brand that features compostable or edible utensils, challenging the conventional "use and discard" approach with a more sustainable "use and consume" concept. The project embraces a holistic and inclusive perspective, catering to vegans and individuals with celiac disease. Its mission is not only to replace plastic with an innovative and eco-friendly product but also to provide a gastronomic experience, enhancing nutritional value, flavor, and texture.

Guillem Alemany presented "Sex-abled," a Food Design project that reimagines the connection between sexuality and individuals with functional disabilities from an inclusive standpoint. The project advocates for the right of all individuals, regardless of their abilities, to freely express their sexuality. It highlights the challenges posed by societal taboos, the criminalization of sexual assistants, and the lack of inclusivity in recognizing individual desires.

1.5- Group leader: Martí Guixé (Elisava Alumni, designer and artist): Ex-designers bar. The teams visited the Ex-designers bar by Martí Guixé, a project that consumed five years of design work to craft a 3D-printed bar. This project encompassed everything from the furniture to the glasses, the bar structure, and even the walls. The primary objective during this visit was to connect with Martí Guixé, the visionary who pioneered the concept of Food Design. The experience aimed to convey that Food Design can manifest in diverse forms and projects, inspiring us with the possibilities it offers.

2.- Definition (M2.2): Training workshops on design methodologies.

2.1 Group leader: Stefano Maffei (director of the master's in service design and the Master's in Food Design of the Politecnico di Milano) Methodology: Service Design.

Stefano Maffei's workshop was designed to introduce students to the concept of Service Design, a relatively new field within the broader design spectrum. Its main purpose was to emphasize that any gastronomic experience should be viewed as a service catering to the needs of those who will partake in it. To facilitate this understanding, students were equipped with a comprehensive work kit to foster idea development, allowing them to delve deeper into the intricacies of Food Design services.

2.2 Group leader: Mariana Eidler (Elisava): Methodology: How might we. In this workshop, our primary aim is to introduce students to a creative methodology that can help find Food Design innovative gastronomic experiences. This approach encourages them to explore "how might them" find disruptive scenarios and consider unrelated elements that, when combined, can give rise to novel projects. Students not only grasp this methodology but also put it into action, forming cross-disciplinary teams. Within these teams, they collectively make decisions about the creative directions that will underpin their future projects.

2.3 Group leader: Luki Huber (Food Designer and product designer). Methodology: Manual Thinking.

This session aims to introduce students to Luki Huber's experiences at elBulli and explore the creative potential in the interaction between objects and food. Huber presents a creative methodology called Manual Thinking, utilizing mind maps to connect seemingly unrelated ideas to food concepts. Students find this approach valuable as it helps identify project needs and possibilities.

2.4 Group leader: Mariana Eidler: Co-creation. The aim of this session is to foster co-creation among students from diverse disciplines and fields. Students are introduced to various co-creation and

ideation techniques that assist them in visually representing the concepts they are developing.

2.5 Group leader: Carles Casas: Hard Rock Café. Methodology: Emotional Marketing. The goal of this session is to emphasize the significance of incorporating emotions into all gastronomic experiences. It's interesting to note that there is a disparity in understanding this methodology between designers and chefs. Designers recognize the need to convey emotion, while the chefs tend to believe that their dishes inherently contain emotion.

2.6 Group leader: Jordi Butrón: Methodology: Dessert tasting. In this workshop, design students take part in a dessert tasting session, featuring creations by *EspaiSucre* culinary students using the *EspaiSucre* method. Designers gain insights into the challenges of harmonizing flavors, textures, and aromas. They also come to understand that the same terminology can have distinct meanings in the realms of design and gastronomy.

Following the Double Diamond methodology, and still in the discovery phase, students travel to meet recognized chefs and take informative visits and presentations from the field of gastronomy. They meet:

Ramon Massanés: Alicia Foundation

1. Ramon Martínez: El Raiguer
2. Andreu Genestra: Aromata
3. Tomeu Arbona: El fornet de la Soca
4. Patricia Tomas: Hotel Es Princep

The purpose of these visits is to gain insights into the experiences of these gastronomy experts. They all shared their creative methodologies and culinary objectives, offering students the opportunity to learn about their professional journeys. It's noteworthy that all these experts acknowledge the role of design as an influential factor in their gastronomic work.

The outcomes from these workshops and visits play a crucial role in the education of the participating students. The work proceeds at a brisk pace, as these activities span a two-month period, commencing in the second week of January and concluding in the second week of March. Over this time, students have come to comprehend the essence of Food Design, which remains a design field without a precise definition. Nonetheless, it's important to underscore that the intensity of these workshops and conferences, coupled with the inherent challenges of collaborative work across diverse design disciplines, demands that students undergo a thorough process to fully integrate this newfound knowledge.

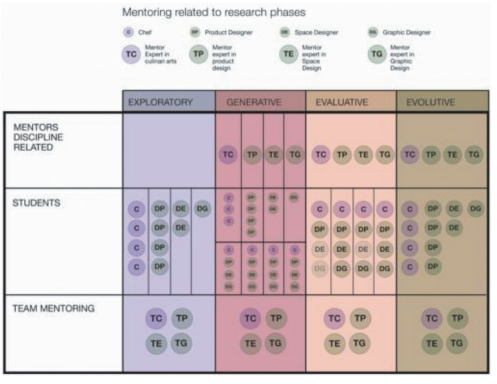

Figure 5. Mentoring process in terms of phases. Author, 2020.

3. Development (M2.3)

During the exploratory phase, students embark on their journey of discovery into Food Design, gaining an understanding of its sphere of influence. They then transition into the "Generative phase," where the focus shifts to defining the project with the goal of generating specific creative directions for each project.

Project development unfolds in three successive phases:

1. Initially, students collaboratively create four project proposals.
2. Subsequently, the students are grouped into four teams, each dedicated to developing one of these project proposals.
3. In the final phase, each student takes responsibility for formalizing the segment of the project aligned with their respective discipline.

The process of project development encompasses the meticulous formalization and ongoing evaluation of various facets within each proposal. This includes aspects such as the creation of gastronomic menus, the identification of essential items for the successful execution of the proposed service, the design of the physical environment where the gastronomic experience unfolds, as well as the development of graphic and communication materials intended for public engagement.

During the development of the project, in the Generative phase, students engage in the following key activities:

A. Formation of Multidisciplinary Teams: Students at Elisava apply to join the project, and their selection is based on their academic achievements. It's important to note that the disciplinary profiles are not chosen by the project's coordinators; instead, team composition is a result of the students who apply to participate. The selection process at *EspaiSucre* differs, as students are chosen based on their creative abilities and availability, considering that participation in this project provides valuable knowledge but also demands a significant time commitment on top of their master's degree studies. Students are free to create their teams under the condition that they include both a chef and a product designer. This results in four teams, each comprising a chef, a product designer, and two spatial designers, while the graphic designer works collaboratively across all projects.

B. Concept Development and Project Selection: The global team collaboratively creates four gastronomic experiences. Subsequently, each multidisciplinary team selects one of these experiences to develop further.
C. Idea Generation for Project Elements: Students brainstorm ideas and concepts related to the specific elements of their chosen project, guided by professional experts in the relevant discipline.
D. Initiation of Individual Disciplinary Project Development: With guidance from the experts in their respective disciplines, students face the development of the individual components of their project.

Throughout this phase, the project undergoes two types of tutoring sessions:

Group Sessions: These involve all students, allowing them to engage in discussions regarding the creative process with experts from various disciplines.

Disciplinary Sessions: Here, students work within separate discipline-specific groups to advance the individual project proposals.

4. Delivery (M2.4). Developing ideas for solutions. During the "Evaluative phase," students collaborate within smaller, project-specific groups, intensifying their individual work. This phase focuses on fine-tuning the details of the proposed gastronomic services, facilitating the development of ideas and the creative process, and allowing for a comprehensive procedural evaluation. To support this evaluation, an international expert session is conducted online. This session involves experts who had previously led workshops during the exploratory phase, among other international professionals.

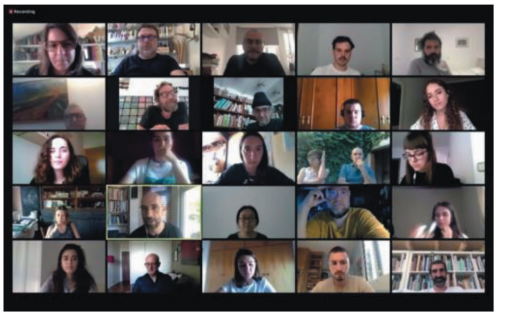

Figure 6. Online session with experts. From up left to down right: M. Eidler, S. Colli, X. Saguer, R. Martínez, L. Eslava, S. Maffei, L. Huber, M. Guixé, R. de la Torre, A. Grau, B. Jiménez, A. Ferre, B. Daina, T. Arbona, M.J. Maialen, L. Gispert, X. Llarch, Y. Fei, J. Butrón, C. Arbona, M. Torras, F. Parasecoli, J. Segura, G. Piera, A. Fuster, R. Martínez, A. Genestra.

It's worth noting that during this phase, the emergence of the Covid-19 pandemic necessitated adjustments to the teaching methods. Originally planned as a face-to-face session with expert participation, this session transitioned to an online format, which also facilitated the involvement of international consultants. The evaluations provided by the experts were unanimous, and students diligently recorded these insights for application to their projects

4- Evaluation (M3).

During this part of the study, the focus is identifying the key strengths of each project that must be effectively communicated to generate interest among the target audience. The students' efforts encompass the following:

1. Designing and preparing communication materials for each project, including both the overarching project and the specific disciplinary components.
2. Preparing presentations for experts from both schools: As part of their graduation requirements, students will individually present their projects to assessment experts from their respective universities. These presentations will cover discussions about the overall project (comprising all four projects) and their individual contributions.
3. Crafting presentations for the media: The entire student team collaborates in creating detailed presentations for each of the four projects, ensuring they can be effectively communicated to specialized media.
4. Selected projects will be presented to potential partner companies or institutions interested in project implementation.

Company and institution presentations are led by the teams that have been spearheading each project, and they remain confidential to safeguard intellectual property rights. The "Evolutive phase" assumes the role of evaluating the outcomes and their impact on various aspects, such as innovation, feasibility, and sustainability, to assess the projects' overall efficacy. This evaluation process encompasses both internal assessments and external feedback from industry experts, facilitating an assessment of the projects' potential for practical application and further development. Ultimately, this phase aims to provide a comprehensive and critical understanding of the projects' effectiveness, allowing for valuable insights that can contribute to their refinement and potential real-world implementation.

3 RESULTS

The projects emerging from this study offer solutions to a wide range of requirements, centering on diverse gastronomic experiences in different scenarios. After progressing through the Exploratory, Generative, Evaluative, and Evolutive phases and completing the comprehensive training and research process, four distinct projects have materialized, each targeting specific needs and catering to diverse gastronomic experiences. These projects encompass multiple domains of knowledge, such as Society, Human,

Education, and Technology, with their foundations firmly rooted in the fundamental principles collectively defined by the student team.

In the following lines, we'll delve into these Food Design projects brought to life by the collaborative efforts of transdisciplinary student teams.

1- Desserts: Conceived during the COVID-19 lockdown, this project addresses the challenges of bidding farewell to loved ones during a period of confinement. It envisions a gastronomic event catering to a diverse cross-section of society, offering an opportunity for collective reflection on these unprecedented times. Participants representing various sectors, including culture, politics, health, religion, industry, and gastronomy, will discuss how the pandemic has reshaped our reality and craft a manifesto that resonates with the broader public. The project encompasses contributions from the entire TFG Food Design team, covering service design, Anna Grau and Belén Jiménez in spatial design, and a menu crafted by restaurant pastry chef Clara Arbona from *EspaiSucre*.

Figure 7. Desserts: Space where Desserts will take place; Dish prepared for the Desserts gastronomic experience.
Source: Anna Grau, Belén Jiménez and Clara Arbona.

2 - SER: Food as a behavior in life. At its core, this project seeks to foster a profound sensory exploration of food, viewing it as a behavioral element in our lives. It aims to cultivate social awareness and encourage contemplation of the significance of the act of eating by stimulating our senses.

By challenging our conventional approach to dining, the project aims to rekindle an intimate and thoughtful connection with food, using elements like space, product design, communication, and the culinary arts as facilitators. The entire experience will be characterized by the ritualistic and performative roles assumed by various participants, including chefs, servers, and diners themselves.

The proposal introduces a graphic data visualization that interacts with individuals through a systematic digital platform. This novel language takes visual form in the SER space, serving as a demonstration and follow-up element for the sensory experience it accompanies. Data is projected within the room after using the application, offering a compelling perspective on "Food as a behavior of life," connected to the act of eating. The visual gastronomic system serves as a thought-provoking component, encouraging reflection on one's consumption.

Contributing to this project were the service design team, responsible for the overall service (TFG Food Design team); the identity and Gala (Marta Torras); the space design (Anna Grau); the product design (Rafael de la Torre); and a sample menu, representing what could be prepared, crafted by Andrea Ferre Albero, the restaurant pastry chef at *EspaiSucre.*

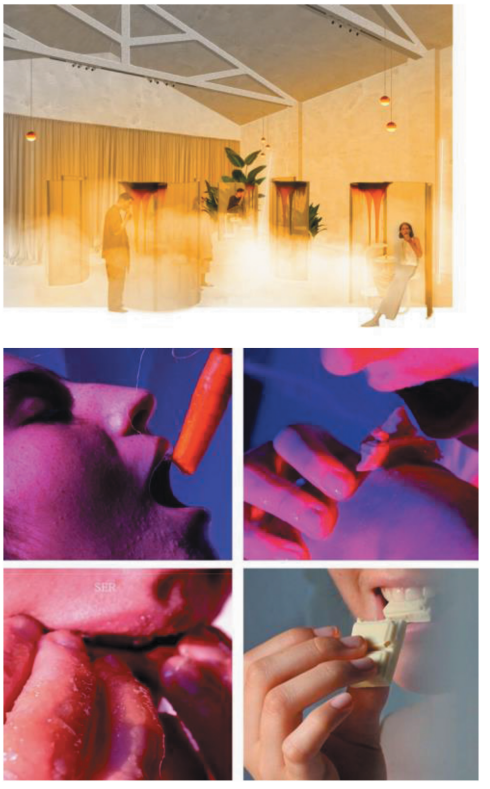

Figure 8.1 and 8.2. SER space and food experiences in Montoya space.
Source: Marta Torras, Rafael de la Torre, Anna Grau and Andrea Ferré.

3- Agro: This project offers a distinct and educational approach to delve into the realms of sustainability and haute cuisine. It provides an immersive process wherein users gain knowledge through culinary experiences at Barcelona's local markets. Falling under the domain of social design, it aims to invigorate market dynamics and emphasize the significance of responsible consumption of local, seasonal products. Moreover, it makes strides in sustainable design by repurposing products deemed unsuitable

Figure 9. Agro: workshops are held with organic waste from the market.
Source: Belén Jiménez, Berta Daina and Marta Torras.

for their commercial function into materials for crafting practical objects.

The service works as follows: This innovative service unfolds in a double-height market space where an interactive environment fosters engagement between attendees and organizing professionals. Through a dedicated application, the public can enroll in workshops conducted by a chef. These workshops teach participants how to prepare seasonal dishes using products that remain unsold due to ripeness or deformities. Often, though not marketable, these ripe or bruised items retain their taste and nutritional value and are perfectly suitable for culinary use.

The second segment of the workshop revolves around experimenting with materials derived from cooked food waste, highlighting sustainability and the principles of a circular economy. The overarching goal is to raise awareness among users, inspiring them to enhance their eating habits, become more conscientious buyers, and adopt a more sustainable approach to food consumption.

The collaborative effort behind this project includes contributions from the entire Food Design team, Marta Torras (for identity design), Belén Jiménez and Anna Grau (for market space design), Berta Daina (for material design based on residuals), and Maialen Etxeberria Lopez de Zubiria, the restaurant pastry chef at *EspaiSucre*, who provided a sample menu for the project.

4- Éclaire introduces an innovative gastronomic experience centered on the home delivery of haute cuisine. It's worth noting that the concept of Éclaire was conceived before the global COVID-19 pandemic and has emerged as a crucial solution for society, democratizing gastronomy and making it accessible on a global scale. The project aims to provide an inclusive mode of delivery that empowers all individuals, democratizing gastronomy, and focusing on the user, offering knowledge and culinary experiences to anyone interested.

The pandemic has led to the closure of many restaurants, while others have adapted by offering temporary food delivery services. As we transition into the new normal, it's apparent that numerous establishments aren't equipped to simultaneously provide dine-in and delivery services, and this is where *Éclaire* steps in, adding significant value.

Éclaire represents a shift from the traditional, closed-off kitchen (the *Dark Kitchen*) to a more transparent and open approach (the *Light Kitchen*). This transition involves the delocalization of haute cuisine production for home delivery, blurring the boundaries between workspace and leisure space. *Éclaire* serves as both a gastronomic and cultural platform, fostering gastronomy and design by bringing chefs closer to consumers. The participating chef plays a central role in this service, maintaining a close connection with their customers.

The service operates as follows: The chef is a key figure in the project, engaging with the audience directly and showcasing the culinary process and methodology. They host gastronomic sessions in the Light Kitchen, attended by a limited number of pre-registered individuals. These sessions are recorded and can be replayed in the homes of service users when they place an order.

Figure 10. Eclaire project. Food transport object to prepare the chef's recipe. Recyclable, sustainable. Object: Pínsula, spatula and tongs joined together.
Source: Judith Segura, Marta Torras, Yue Fei and Belén Jiménez.

The collaborative effort behind this project encompasses contributions from the entire Food Design team, identity design by Marta Torras, the creation of a *Mise en Place* object called *Pínsula*, packaging by Judith Segura, space design for the *Light Kitchen* by Belén Jiménez, and a sample menu of dishes created by the restaurant pastry chef at *EspaiSucre*, Yue Fei. These gastronomic experiences, which result from a unique collaboration between chefs and designers throughout the creative process, are of particular interest as they embody valuable research and innovation.

4 CONCLUSIONS

In conclusion, it is worthwhile to highlight various parameters that are instrumental for research and shed light on the distinctions and challenges of transdisciplinary collaboration, where culinary experts and designers work together. We conclude that:

- Students often find it more convenient to work individually, creating pieces specific to their disciplines, rather than actively engaging in collaborative efforts with designers from diverse fields of expertise and students from knowledge areas outside of design, as is the case with chefs.
- The projects proposed offer innovative elements for enhancing everyday societal actions and contribute to shaping future gastronomic landscapes.
- The resulting projects are compelling, and the students feel engaged and simultaneously responsible for the four shared concepts developed collectively.
- Notable disparities exist in the creative processes of distinct disciplines, particularly between culinary and design. These variances arise from the different foundations of knowledge. Challenges emerge during collaborative work between designers and chefs, and the key reasons behind the creative complexities include:

1. Vocabulary: It becomes evident that some homonymous terms used in gastronomy and design carry significantly different meanings. This can lead to misunderstandings during creative discussions when the same term is employed but holds distinct interpretations in each field.
2. Creative process: Design typically follows a sequence from concept to object or service, with both divergent and convergent phases. In contrast, gastronomy often begins with a dish, then transitions to a concept, reflecting a more convergent-to-divergent process. Students may feel as though they are navigating an inverse creative journey, but there is a converging point in the process.
3. Creative methodologies: Design and culinary arts employ distinct methods, making it challenging to reach a consensus. Students may initially feel uncomfortable when learning unfamiliar methodologies from a different area of expertise. However, once they become proficient in these methods, they experience enrichment and find it easier to create. It's important to acknowledge that students might experience frustration when initially confronted with unfamiliar methodologies.
4. Communication: Designers tend to approach projects through visual narratives, while chefs focus on describing gastronomic proposals, textures, and aromas. These differences in communication styles can pose challenges during collaborative discussions.

The table provided below offers a comprehensive overview of the various project parameters within this study. Each of the four projects is denoted by a specific number, as follows:

1. Desserts
2. SER
3. Agro
4. Éclaire

In terms of the study's predefined objectives, the table presents the outcomes in a detailed manner:

A. Prior Knowledge: Before starting the study, students had limited or no prior knowledge of Food Design, and its fundamental principles were relatively unfamiliar.
B. Understanding the Design-Gastronomy Nexus: Through the course of the study, students acquired a profound comprehension of the intrinsic relationship between design and gastronomy. They now view this connection as essential to the success of Food Design projects.
C. Transdisciplinary Creativity: Regarding the academic enhancement, the collaborative creative process within the study was genuinely transdisciplinary. The participating students hailed from various specializations within the design field, bridging both the design program and the master's program in restaurant pastry at *EspaiSucre*.
D. Necessity of Culinary Expertise: Students recognized the imperative need for the involvement of food or gastronomy experts in the development of Food Design projects. This expertise was considered indispensable in achieving the desired outcomes.
E. Collaboration with Culinary Students: The study facilitated extensive and continuous collaboration between design students and their culinary counterparts. This collaboration extended throughout the entire creative process, further cementing the integration of these two distinct domains.
F. Positive Reception of Food Design: The students responded very positively to the field of Food Design. Their active engagement with the subject matter underscored their enthusiastic interest in this dynamic and emerging discipline understanding the role of Food Design as an agent of change.

Moreover, the study relied on a range of tools and methodologies to facilitate effective learning and project development, including:

1. Guidance and Tutoring: Students benefited from close guidance and mentorship provided by their course instructors, enhancing their ability to navigate the multifaceted challenges within Food Design.
2. Creative Tools: The students utilized an array of creative tools, including project reports, mood boards, visual research techniques, and established

methodologies such as design thinking, "how might we," and brainstorming sessions.

3. Collaborative Team Structure: The study was structured around teamwork, with projects carried out by small groups consisting of 4 to 5 students. This collaborative approach encouraged diverse perspectives and insights.
4. Transdisciplinary Projects: Projects within the study were inherently cross-cutting and transdisciplinary in nature, capitalizing on the diverse expertise and knowledge of students from various academic backgrounds.
5. Acknowledging Food Expertise: The students prominently recognized the indispensable need for collaborating with food experts, ensuring that culinary wisdom was an integral component of their innovative projects. This acknowledgment reinforced the essential role of culinary professionals in the Food Design process.

In summary, the study successfully achieved its objectives, illuminating the transformative power of transdisciplinary cooperation between culinary arts and design, and opening exciting new possibilities within the burgeoning realm of Food Design.

The historical creative relationships between gastronomy and design have typically been characterized by a hierarchical dynamic. In most instances, either a chef commissions a design, or a designer commissions culinary creations from a chef. Such collaborations often entail one party giving orders or directives, while the other follows the instructions. Rarely do we witness situations where both professionals or students from these disciplines engage together in the exploratory and generative phases of a project. This study culminates with a profound understanding of the significance of this unique experience and a strong determination to further research in this domain.

The insights derived from this study underscore the importance of fostering collaborative, co-creative relationships between culinary and design experts, dispelling the traditional model of unilateral. directives. The potential for cross-pollination between these two fields is vast, offering innovative and holistic solutions that can transcend the boundaries of conventional design or gastronomy.

This study serves as a foundational steppingstone towards continued research in the field of Food Design. It emphasizes the need for data collection and analysis that will significantly contribute to the development of comprehensive educational programs and curricula dedicated to Food Design. By expanding the knowledge base and engaging in further explorations, we can unlock the full potential of this exciting and transdisciplinary discipline. The aspiration is to shape the future of higher education studies in Food Design, nurturing a new generation of professionals equipped with design and gastronomy skills and insights to address the evolving challenges and opportunities within this dynamic and innovative field in order to create innovative and concrete projects that impact society.

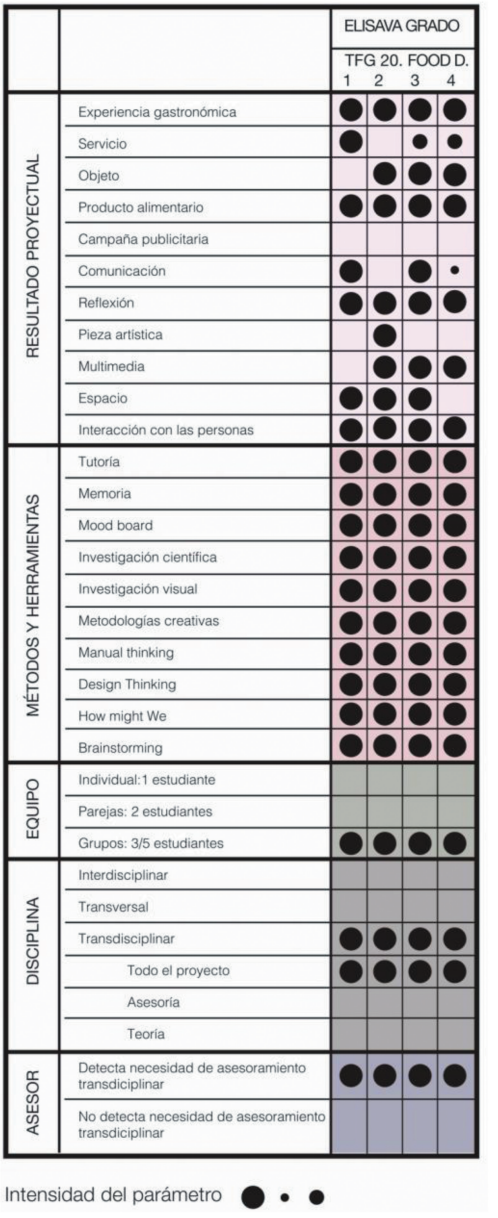

Figure 11. Visualization table of parameters assessed in the study showing the intensity worked according to each project.
Source: Author

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The contribution of gastronomy tourism to the branding strategy of a city

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ABSTRACT: In recent years, local cultural heritage has become an important source of identity formation for cities. This, in turn, increased the interest in cultural heritage and enabled local governments to include cultural heritage in their city branding strategies. Since gastronomy is one of the most distinctive cultural features of cities, gastronomy has been incorporated into city promotions by local stakeholders while creating destinations. The city promoting activities that include gastronomy tourism have increased in cities. In this study, Gaziantep, one of the cities that was selected for the 'Brand City Project' by official authorities and has been running branding strategies since the beginning of 2000s were analysed to discuss the relationship between gastronomy tourism and city branding strategies. In this study qualitative and quantitative research methods used to investigate city's culinary heritage, the implementation of gastronomy tourism and how the city positioned itself as a 'Brand City: Antep' in terms of gastronomy and how the it is perceived by the visitors. The research findings illustrate how a city can be repositioned with its cuisine heritage, what role stakeholders can take for implementing these branding strategies and how gastronomy tourism can be embraced not only for creating a tourism destination, but also for branding the city.

1 INTRODUCTION

In recent years, many countries have been highlighting certain cities and regions rather than promoting the country to stand out and attract attention (Balibrea, 2011). As applied in product marketing, identities are defined for cities and positioned to be promoted through these identities. These identity studies aim to help cities preserve their cultural heritage, make their heritage more recognizable and generate economic income through various projects.

Since the monuments, sites, historical buildings are not the only cultural heritages, the content of the term changed in last years and UNESCO included intangible cultural heritages such as oral traditions, performing arts, social practices, rituals, festive events, knowledge, and practices concerning nature and the universe or the knowledge and skills to produce traditional crafts to the cultural heritage in 2003 (UNESCO, 2022).

Now traditional Mexican cuisine, the Mediterranean diet, which goes back to socially incentivizing traditions and festivals and the gastronomic meals of the French are all classified as intangible cultural heritage. After the Mediterranean diet of Spain, Greece, Italy and Morocco was included in UNESCO's list of Intangible Cultural Heritage of Humanity in 2010, numerous cities began to apply UNESCO to have a place in cultural heritage classification with their original dishes and diets.

Cities became more recognizable through their dishes, and they succeeded at setting themselves apart from their rivals (other cities) with their cuisines. Gastronomy became one of the most distinctive cultural heritage of cities, and consequently gastronomy tourism emerged as a new subtype of cultural tourism. This new environment caused an increase on activities that focus on gastronomy tourism.

The idea that cultural heritage can be promoted through tourism became an issue for Turkish political agenda in the 2000s. In 2008, to invigorate cultural tourism, fifteen cities were selected for branding studies as part of The Brand City project conducted by the Ministry of Culture and Tourism (Ayvaz, 2009). Gaziantep, which was also selected for Brand City Project, has been carrying out activities to promote itself with its cultural heritage. With the selection of the 'Creative Gastronomy City' by UNESCO in 2015, the city made a great progress in the field of gastronomy tourism, and became a preferred destination for its meals by foreign and domestic tourists.

2 GASTRONOMY TOURISM

The word 'gastronomy' was formed by merging two Greek words 'gaster' and 'nomas' which mean 'stomach' and 'law' and used for representing art of food and drink (Katsoni & Spyriadis, 2020).

Gastronomy heritage is an intangible heritage that evolves and develops while the living culture around it changes. Its propensity to change and improvement via localization and globalization is the strength of

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gastronomy culture. That is the reason of emergence of gastronomy tourism as a cultural tourism, where tourists could learn more by creating culture instead of consuming it. They can learn to cook, taste new flavours, and understand the link between the culture and the culinary tradition of the local society (Richard, 2011).

Long (2004) defines, gastronomy tourism as the exploration of food as the purpose of tourism (Long, 2004). According to Wolf, president and CEO of the World Food Travel Association, gastronomy tourism was 'the pursuit of unique and memorable eating and drinking experiences' (Wolf, 2006). The preparation of meal, cooking techniques, the equipment used during the process, how it is served, stored, transported, choices of meals for specific rituals or events, traditions, etc. are all the unique cultural traits of the societies. Gastronomy, culture, society, and the approach of these studies to tourism became the subject of cultural tourism in recent years. Finally, with recent studies, gastronomy was positioned as part of culture and began to take part in cultural tourism activities (Prentice 1993).

Tourism is seen as a source of income for many countries and instrument for development and evolution of the society. Considering that one third of all tourism expenditures are made from food and beverages, the issue is also worth considering in terms of the development of cities (Mak, Lumbers and Eves, 2012) (Tikkannen, 2007). Having discovered the budget spent in this field, local governances began organizing various activities and campaigns that include culinary activities like gastronomy tours and cooking workshops.

Traditional gastronomy heritage is an advantage for some cities which do not have sun-sea resources, it creates destinations and adds value to tourists' experiences. Beside these benefits, it also helps the regional development and economic power of the cities via cultural tourism activities.

Studies on contribution of travel and tourism show that countries make a significant part of their revenue from tourism before the pandemic. Before the coronavirus (COVID-19) pandemic, the contribution of United States' travel and tourism industries was the largest amount to GDP out of any countries worldwide in 2020. In the same year, the number of jobs in the travel and tourism industry that incorporates many industries, including transport, accommodation, travel companies, food and drink services, and more, was 272 million in the worldwide (Statista Research Department, 2022).

Tikkanen (2007) states that in past studies food in tourism was seen as an attraction, experience, cultural value, but food could have a role that based on the needs of the tourist, and this could be the motivation of the tourism. She classifies sectors of food tourism in Finland by Maslow's hierarchy of need and says physiological needs, at the bottom of the pyramid, could be related to food itself and esteem needs, fourth level on the pyramid, could be visitor's experiences when they learnt new tastes in the new cultures (Tikkannen, 2007).

The most important aspect of gastronomy tourism is that it allows destinations to show their difference and authenticity as food and culinary culture varies among different regions. Albayrak and Gunes (2010) state that the diversity of local cuisines depends on the cultural richness of countries, and point out Turkey, located in an agriculturally rich area, has agricultural and local products in abundance and high quality (Albayrak and Gunes, 2010). Moreover, Turkey, having an old and deep-rooted history, has housed several civilizations, states, and societies throughout history thanks to its geopolitical position and developed sophisticated cuisines and authentic values in each of its regions (Orhan, 2010).

3 GASTRONOMY TOURISM IN TURKEY: GAZIANTEP CASE

3.1 *Background of the study*

Jean Anthelme Brillat-Savarin, a French politician who lived between 1755 and 1826, pointed out the relation between food and society by saying 'tell me what you eat, and I will tell you what you are', in his famous work, 'The Physiology of Taste', which was published in 1825. The book was emphasizing on culinary culture as data in acquiring information about a society (Brillat-Savarin, 2004).

Referring to another statement on food and society, '*if there is no society without language, nor is there any which does not cook in some manner at least some of its food'*, which is reflected by Franch anthropologist Claude Levi-Strauss's (1966), it can be assumed that food is one of the most important representatives of the unique identity of a society (Levi-Strauss, 1966; pp 937).

Although globalization makes destinations more and more similar, and it is even possible to find a local dish elsewhere in the world, the dominant factors that determine gastronomic identity, climate, geography and culture make it difficult to imitate gastronomic identities (Harrington and Ottenbacher, 2010). Association of regions with certain types of food and beverages benefit the culinary identity (Haven-tang and Jones, 2006).

Local foods and culinary activities that are named after the regions they are emerged in, like the Turkish cuisine, the French Cuisine, and the Italian Cuisine, also gain brand reputation to their region. When the Turkish cuisines are examined, it reveals that its dishes are a combination of the culinary culture Turks brought from the Central Asia and the one they gained after they settled in Anatolia. As the Ottoman Empire expanded, gastronomic richness of various lands was integrated into the Turkish cuisine. Fermented and dairy products brought from the

nomadic lifestyle, grains of Mesopotamia, vegetables and fruits of the Mediterranean region, and herbs of South Asia were blended into the rich Turkish culinary culture (Baysal, 1993).

One of the studies that conducted by Ankara Chamber of Commerce and Ankara Patent Office and published as 'The Taste Map of Turkey', covers the cuisines of all cities of Turkey. In the publication, the richest cuisine of Turkey is stated as the city of Gaziantep with 291 types of food, beverages, and desserts (Durlu-Ozkaya and Can, 2012). The city is also documented with its richness in the field of food by the geographical indication registration. The registrations, which started with the registration of pistachio in the city in 2000, now reached the registrations of 77 foods, including local flavours such as baklava and kebab. One of the most important milestones in the field of gastronomy in Gaziantep was that the selection of the city as 'Creative City of Gastronomy' by UNESCO in 2015.

UNESCO Creative Cities Network, which launched in 2004, promotes international collaboration between cities that share the goal of using creativity to promote sustainable urban development. There are seven creative areas covered in the network: handcrafts and folk arts, design, cinema, gastronomy, literature, media, and music (UCCN, n.d.). In its capacity as a Creative City of Gastronomy, Gaziantep envisions;

- fostering intercultural dialogue through the Kitchens in Districts initiative, which provides fully equipped kitchens for low-income residents to cook and share their skills with others,
- improving social inclusion through Atelier Without Obstacles project, in which vulnerable groups and disabled people receive training in creating and managing creative businesses;
- promoting multi-level cooperation with other Creative Cities of Gastronomy by conducting research and collecting data on ancient Silk Road food culture;
- organizing an International Festival of Gastronomy to exchange expertise and experience with other Creative Cities of Gastronomy (UNESCO, 2015).

The municipality cooperates with various stakeholders to implement these visions and to brand the city with its gastronomy.

3.2 *Research methodology of the study*

The city, Gaziantep, which was occupied by various civilizations throughout history, has always been a centre of culture and commerce, and consequently, had a rich culture (Marka Sehir Gaziantep, 2010).

While craftsmanship was a major means of income in Gaziantep, in recent years its gastronomy tourism became one of the most important driving forces of the local economy.

Since the city was centre of craftmanship and industry, at the beginning of 2000s the local authorities were mostly focusing on the motto of 'industrialization model that sets an example to Anatolian industrialization'. However, the surveys and the new approaches to the cities in the scope of cultural heritage changed the branding strategies of the authorities.

In this study, Gaziantep has been chosen to gain an understanding on the changes and development of the city with its historical background that shapes its cultural heritage, its versatile features and different branding approaches. Within this aim, the city has been visited in different times (2007, 2009, 2013), to observe how the branding strategies brought differences in the city's view and promotion. Apart from the documents collected during these visits and the photographs taken, interviews were held (2010) with the mayor of the city at that time. The publications were examined to delve into the city's food culture and gastronomic tourism and to collect data from archives and documents.

In addition to the qualitative research, an online survey was conducted; to understand how the city was perceived, to compare the results of previous surveys conducted by official institutions and other researchers, and to prove the theory of 'Gaziantep; city of gastronomy tourism'.

The online survey was participated by 283 people and each participants answered 5 multiple choice questions about their experience on visiting Gaziantep and how they perceived the city. According to the results of the survey, the city was visited by 149 participants and the main purpose of the visit was tasting the food and touring the city. The rest of the participants who have not been to the city answered the question by selecting among multiple choices and the most selected choice was 'tasting the food'.

Briefly, in this study, quantitative research methods were used to prove the validity of the data collected by qualitative methods and to verify the findings of previous researchers. Survey results and data collected from visits, interviews, visual data and literature review are part of the research that forms the basis of this case study.

3.3 *The city branding strategies of Gaziantep*

The branding activities in Gaziantep started long before it was selected as 'Creative Gastronomy City' by UNESCO in 2015. The city was one of the fifteen cities selected in 2008 as part of The Brand City project, which was conducted by the Ministry of Culture and Tourism to invigorate cultural tourism.

Occupied by various civilizations throughout history, Gaziantep has always been a centre of culture and commerce, and, consequently, had a rich culture (Marka Sehir Gaziantep, 2010). In the Ottoman era, the city was highly developed in manufacturing, commerce and handcrafts and well known with its mosques, madrasas, inns and bathhouses (Gaziantep Chamber of Industry, 2010). As an important cultural and industrial centre in the Ottoman era, Gaziantep was developed in leatherworking, bow making, dye working, oil making, weaving, and soap making, the

most famous products being carpets, rugs, motley and upholstery fabrics. Pistachio trees, which comprise 25 percent of Turkey's tree population, constitute one of the most important agricultural products of the city. Olive production recently increased in the city and olive oriented businesses multiplied in parallel. Diversity of grape types in the city helped the development of viticulture. Also, wheat, cotton (the most grown field crop), red lentil, red pepper, cumin, caper, and chickpea are the other crops that grow in the city. Craftsmanship was a major means of income in Gaziantep and several branches of craftsmanship were maintained. There are chalcographers, mother-of-pearl in layers, kutnu clothiers, rug makers, woollen clothiers, kerchief makers, woodcarvers, shrill pipe makers, silver manufacturers, embroiderers, tinsmiths, and saddle makers still operating in Antep (Gaziantep Valiligi, 2010; GAP, 2007).

Owing to its very well-known cuisines and its gastronomy which is one of the most important driving forces of the local economy, Gaziantep has been member of UNESCO Creative City of Gastronomy since 2015. However, the city took its place on the agenda of Gaziantep Chamber of Industry (GSO) in 2000 with 'Brand City: Antep' project.

The Municipality, the Chamber of Commerce, the Governorate, and district municipalities were the stakeholders of the project. Factors contributing to Gaziantep as a brand city were:

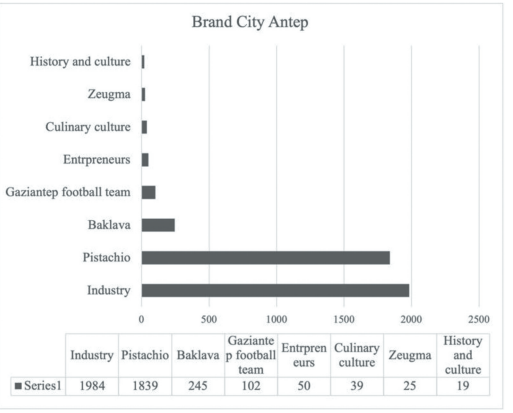
- 'The power of national struggle' stemming from the War of Independence,
- Unique 'historical heritage', including Yesemek, Tilmen, Rumkale and Zeugma,
- Internationally renowned and rich culinary culture, and
- An 'industrialization model' that sets an example to Anatolian industrialization.

The Gaziantep Chamber of Industry started an online survey on its webpage in 2004 and according to the results; industry, pistachio and baklava were the top 3 brand assets of the city (Table 1) (Marka Sehir Gaziantep, 2010).

Brand city project of the city has been planned on the industrial aspects of Gaziantep, but it was observed that the city is also renowned for cultural heritage, especially for its cuisine. According to the UNESCO creative city report (2015) 60% of the active population of the city was employed by the food sector, and 49% of the enterprises are dedicated to food, including spices, cereals, and dried fruits (UNESCO,2015).

The authorities discovered that development was not possible solely through industrialization and they began working towards cultivating cultural values between the years 2005 and 2007.

The idea that cultural heritage could be promoted through tourism became an issue for political agenda of Turkey in 2008. Within the scope of the Brand



	Industry	Pistachio	Baklava	Gaziantep football team	Entrpreneurs	Culinary culture	Zeugma	History and culture
Series1	1984	1839	245	102	50	39	25	19

Table 1. Results of the online survey conducted at the 'brand city' webpage since 2004 arranged by the The Gaziantep Chamber of Industry (Marka Sehir Gaziantep, 2010).

City project carried out by the Ministry of Culture and Tourism, 15 cities, including Gaziantep, were selected for branding activities to invigorate cultural tourism (Ayvaz, 2009).

The goals of 'City Branding Strategy for the year 2023' include declaration of one city as 'Cultural Tourism City' each year, restoration of historical, cultural and architecturally significant structures and sites, development of local events in compliance with international standards, construction of facilities and venues for cultural and artistic performances, raising public awareness of the importance and preservation of tangible and intangible cultural heritage, and implementation of national and international publicity and marketing campaigns to emphasize on the rich cultural heritages of the cities (Ministry of Culture and Tourism, 2011). To that end;

- Municipality of Anakent and the Foundation for the Protection and Promotion of the Environment and Cultural Heritage (CEKUL) initiated 'Sanitization of the Copper Bazaar Project',
- Historical inns Sire and Yemis were transformed into boutique hotels,
- Gaziantep Chamber of Commerce signed a protocol with the Ministry of Culture for the 'Cultural Heritage Development Project',
- A registration document was obtained from the Turkish Patent Institute for the Geographical Indication of 'Antep Pistachio',
- The Chamber of Commerce founded 'the Society for the Promotion of Antep Pistachio',
- It was decided to obtain another Geographical Indication document for 'baklava', which is a major means of income (Mortan and Arolat, 2009).

Indeed, geographical indications in gastronomy are particularly important for the protection of local products and tastes. They are also used in local economic development, invigoration of gastronomy

tourism, and preservation and sustainability of cultural heritage (Durlu-Ozkaya, Sunnetcioglu and Can, 2013).

Within the scope of this study, during the interview with Gaziantep Metropolitan Municipality Mayor in 2010, the Mayor stated that Gaziantep, which was branded as an industrial city in 2003, has started to become a brand with different values. In the previous years, when branding activities were carried out in Gaziantep, cultural values were not embraced in Gaziantep, so branding was mostly identified with the industry, in 2010, branding was designed as a modern industrial city that embraces its past and culture and looks to the future with confidence (Guzelbey, 2010).

In this context, the Metropolitan Municipality has conducted important museum studies, restored old Gaziantep houses, inns, neighbourhoods and several historical structures and used them in the publicity of the cultural heritage. Based on the motto 'the city of museums', Gaziantep attracts culinary tourists of the city, especially with 'Emine Gogus Gaziantep Culinary Museum'. Emine Gogus Gaziantep Culinary Museum exhibits the kitchenware used in Gaziantep's traditional cuisine and the dishes.

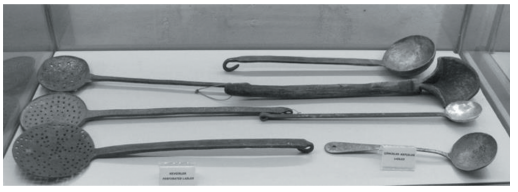


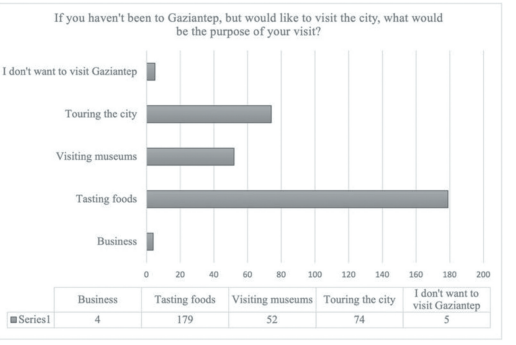
Figure 1. Emine Gogus Gaziantep Culinary Museum (Hocaoglu, 2007).

The museum building was built in 1905 and belonged to Kethuzade Gogus Ibrahim Efendi. The mansion was called 'Kethuzade Gogus Ibrahim Efendi Konagi'' at the time. It was donated to Gaziantep Metropolitan Municipality in 2005 by Ali Ihsan Gogus, Turkey's first Minister of Tourism who served as a minister and a member of the parliament for thirteen years. The museum was restored in 2007 and opened to public visits in 2008 by the Municipality.

3.4 *The gastronomy tourism in Gaziantep*

Gastronomy tourism allows the city to distinguish itself from its competitors with its cuisine, which is one of its unique features, and constitutes one of the main reasons for visitors to visit the city. In parallel with this idea, the aim of the online 'city branding' survey, that conducted for this study and completed in 2022, was to examine whether the city Gaziantep could be mentioned as a gastronomy tourism city and whether the studies conducted in this context were consistent.

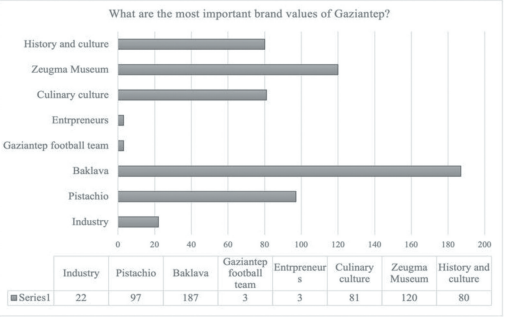
According to the results of the survey, it was determined that Gaziantep is famous for its cuisine. The main purpose of the visit of the participants was tasting the food and touring the city. The rest of the participants who have not been to the city was also planning to visit the city to taste the foods (Table 2).



	Business	Tasting foods	Visiting museums	Touring the city	I don't want to visit Gaziantep
Series1	4	179	52	74	5

Table 2. Results of the online survey question 'If you have not been to Gaziantep, but would like to visit the city, what would be the purpose of your visit?' (Hocaoglu, 2022).

The survey results also shows that when the values of cities asked, the participants again selected 'Baklava' which is related with a very well-known Turkish desert made in Gaziantep (Table 3).



	Industry	Pistachio	Baklava	Gaziantep football team	Entrpreneurs	Culinary culture	Zeugma Museum	History and culture
Series1	22	97	187	3	3	81	120	80

Table 3. Results of the online survey question 'What are the most important brand values of Gaziantep? (Hocaoglu, 2022).

As it is seen on the survey results, Gaziantep cuisine has a major place in city's culinary culture. Therefore, Gaziantep Chamber of Commerce initiated the 'Gastronomy World's Discovery of Gaziantep Cuisine' project as part of the Silk Road Development Agency Financial Support of Tourism Program to promote Gaziantep cuisine and to make the city a tourism destination with its rich culinary culture.

Project activities included:

- the book 'A Taste of Sun and Fire: Gaziantep Cookery' prepared by Gaziantep Chamber of Commerce,
- a 12-minute-long publicity video of the Gaziantep cuisine was filmed in English-Turkish with recipes from the book,

- a webpage was prepared to promote the Gaziantep cuisine in all aspects, including the book and the video, to reach large masses (Gaziantep Mutfagi, 2015).
- it was planned to organize culinary tours to Gaziantep and extend the staying periods of tourists in the long term. (Gaziantep Mutfagi, 2015).

Objectives of the 'Gastronomy World's Discovery of Gaziantep Cuisine' project were;

- development of gastronomy tourism as an alternative model of tourism in Gaziantep and diversification of regional tourism,
- branding Gaziantep through the city's brand value of gastronomy tourism,
- increasing the number of culinary tourists visiting Gaziantep along with the number of overnight stays in the city, and, as a result, the added value contributed by the tourism sector in the city and the region, and
- contribution to transformation of the region into a touristic centre of attraction (Gaziantep Mutfagi, 2015).

Within the project, various original dishes of Gaziantep were promoted at 'Oxford Symposium on Food & Cookery' in London and the cookbook of local recipes was introduced at another international event, Torino - Salone Internazionale del Gusto - Terra Madre in 2012 (Hurriyet Daily News, 2012).

Moreover, businesses in Gaziantep organize events to promote the culinary heritage. Gaziantep, the first city to represent Turkey in the Creative Cities Network (UCCN) in the field of gastronomy, organized the GastroAntep – International Gaziantep Gastronomy Festival, where local flavours from the sun, soil and history were introduced to the world for the first time in 2018. While 250 thousand people visited the festival in 2018 in the first year, this number quadrupled in 2019 and 1 million people visited the festival in its second year (Hurriyet, 2019). Visitors from various cities learnt how to prepare original dishes from Gaziantep, what materials to use and their quantities, specific kebabs to be prepared in each season, what dishes made from each season's vegetables, and the important of and how to use grains in Gaziantep cuisine and practice what they learn during three-day-long events.

Beside the program to promote Gaziantep cuisine, another project in line with the national and regional economic development strategies of the city, was conducted to contribute local entrepreneurship. The project, named as 'Gaziantep Food & Gastronomy Entrepreneurship Hub', was aimed to create an entrepreneurship hub and community centre in which entrepreneurs would access to services they needed on gastronomy and food entrepreneurship. Within the scope of the project, the food and gastronomy entrepreneurship hub would have a mentor pool that comprises food-business mentors. Entrepreneurs would receive mentorship, people would attend 7 specific informative activities on food and gastronomy and 2 demo-days would be organized (Gaziantep Chamber of Commerce, nd).

The project of boosting the quality of gastronomy tourism in the city, which was launched by Gaziantep Chamber of Commerce in 2019 with the participation of local government and non-governmental organizations such as Silk Road Development Agency, Tourism Development and Education Foundation, Gastronomy Society of Turkey, and Gaziantep Metropolitan Municipality, focused on the service quality of businesses operating in the field of gastronomy tourism and to develop innovation capacity in gastronomy. Activities to be carried out within the scope of the project were:

- establishment of Gastronomy Centre (Kitchen)
- organizing panels, conferences, and workshops to raise awareness of employers about innovations in the field of gastronomy,
- providing consultancy services to companies operating in the field of gastronomy,
- ensuring sector employees to get professional competence certificate (Gaziantep Chamber of Commerce, nd).

Although the city was initially positioned as a brand to become an industrial city and attract investments, the strategies changed direction in following years to incorporate the cultural tourism. Projects conducted in recent years were aimed for the same objective.

The city has a very special position not only with its industry but also with its culture and cuisine, which are one of the most important parts of its identity. Surveys show that Antep pistachio and baklava are prominent items in association with the city's culinary culture; even, Gaziantep Pistachio Culture and Art Festival which is combination of gastronomy, music, literature, and folk art, is one of the most attractive events that happens in the city. Beside events, pistachio and baklava were emphasized upon in the city's logo (Figure 2), which, naturally, determines the image of the city, perceived as the identity and shaping people's perception.

However, the logo of the city changed in 2016, with the letter 'G' which is based on a grid structure consisting of hexagons and triangles, just like all the other letters in the Gaziantep font (Figure 3). The centre of the letter used as a placeholder to add icons for co-branding. The new logo designed by USA

Figure 2. The previous logo of Gaziantep (Gaziantep Metropolitan Municipality, nd).

based design consultancy which was experienced in destination marketing campaigns and city branding projects.

Figure 3. New logo and font of Gaziantep (Gaziantep Metropolitan Municipality, 2020).

Within the scope of the project, the agency aimed to create a more liveable, more creative and more visited city, and to achieve this the agency first created the touristic values map of the city and prioritized four categories: culture and history, gastronomy, family and children, and fair and congress tourism (Kocasu, 2016). During the city branding process, the experts from the agency interviewed with the key policy makers and notables of the city. The photographs were taken and outdoor, magazine and newspaper advertisements were designed using these sources. The agency gained an understanding on how masterly people build the spirit of the city and then tagged the city as 'Turkey's masterly people'. An extensive advertising campaign was prepared, a mini-documentary series was created. A commercial film was prepared that captures the concept of 'productivity', explains the roots of mastery and reflects the skills of the local people (I Mean It, n.d.).

The new logo has started to be used in all local businesses and public organizations in the city, and a common identity perception has been created. The promotional films were prepared in details such as the images and music used in the films, and the message that the city intended to give to the local people and visitors was conveyed by creating a language based on the city-culture-brand combination.

4 CONCLUSION

In recent years, intangible cultural heritage has been considered and deeply studied by researchers and authorities in context of gastronomy tourism. Since the expansion of the content of cultural heritage and the inclusion of intangible values to preservation by UNESCO, the cultural heritage took its place on the local governments' agendas. Local authorities and the non-governmental organisations created attractive touristic destinations to generate revenue from tourism and therefore they conducted projects that would emphasize indigenous qualities and values of their cities, establish and promote their identity.

Culinary culture, as an intangible cultural heritage, plays a key role in tourists' destination preferences. Due to its availability all year round, difficulty of imitating original culinary identity, having a big share in tourist expenditures, the culinary heritage is a prominent tourism value for cities. When the contribution of tourists' travel and tourism expenditures to the GDP of countries is examined, it will be clearly seen that gastronomic tourism is an indispensable income for many countries such as the USA.

Gaziantep, the city where various civilizations lived throughout history, has always been a cultural and commercial center and therefore has a rich culture. The city has been the subject of this study due to its tangible values such as its industrial and historical buildings, and its intangible values such as the culinary heritage, which is more dominant in its new identity. However, the city branding projects built on the industrial identity of the city in the past, the visitors of the city and new policies in recent years have supported the gastronomic identity of the city and triggered tourism activities. With workshops, culinary museum, cookbooks, specially designed restaurants, restored old inns, Gaziantep's local cuisines were introduced, and the city's culture and identity were reinforced with its culinary heritage. Thanks to the culinary heritage and the associated development of gastronomic tourism, this identity has become consolidated and popular.

The activities carried out in the city and the collaboration of all stakeholder, boosted the cultural assets of the city beside its industry. In fact, the city's culinary heritage has become more visible than the city's industrial activities. Gaziantep is an example for cities which have deep-rooted culinary cultures and are working on strategies for branding and differentiating themselves from other cities. This case study also shows how a city can become a brand by collaborating with different stakeholders and incorporating gastronomy tourism into its strategies.

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Experiencing and Envisioning Food: Designing for Change – Bonacho et al. (Eds)

Co-creating commensality

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ABSTRACT: Commensality is the feeling of fellowship when eating at the table with others. In a research context, commensality unveils dimensions of social relations between people, as well as human and non-human actors. We present an example of co-creating commensality, enacted with members of a local sustainable market association around their Annual General Meeting (AGM). We devised a suite of activities that we believed would generate social and cultural significance for the association members, as a pathway to fostering change. These activities used food as a design material, as well as research concern, and included: an inspirational talk by the CEO of a local vegan business; a mapping, envisioning and backcasting exercise; and a co-created dinner following the AGM. A driving intention in designing these activities was to support participants to leverage comensality as a way of infrastructure their development as agents of change.

1 INTRODUCTION

Eating is a complex practice that entangles nutrition, culture, societal norms and, in many cases, experimentation (Warde 2016). Certainly, people eat to survive physically. They also eat to express who they are, connect to others, learn and express their social and cultural alliances, and stimulate the gustatory system and the senses (Douglas 1972; Warde 2016; Warde and Martens 2000; Ochs and Shohet 2006). Eating can be articulated in diverse formats and approached in myriad ways. These rich and varied underlying aspects of eating make food a powerful material for design research. In particular, for co-creative design research, which brings people together around challenging or intriguing subjects.

In addition to being personally and culturally resonant, the human food system is responsible for 20-40% of greenhouse gas emissions in every country in the world, making it globally impactful (Rosenzweig et al. 2020). The food system thus brings people together and is a site for urgently needed change.

In our research, we bring people together around food, to engage with the challenges of food system transformation through co-creative means, drawing on the possibilities of commensality as a pathway to foster change. Commensality is commonly understood as a feeling of fellowship that emerges from the practice of eating at the same table. As a research topic, commensality serves as an entry point to unveil different dimensions of social relations between people, as well as between human and non-human actors. Recent research argues for the "deep social and cultural significance of commensality through time and space" and the need for further research into its impact (Jönsson, Michaud, and Neuman 2021).

In the research we present here, we leverage commensality to bring together members of a local market association, around their Annual General Meeting (AGM). The market association has as its purpose to inspire and promote sustainable living and consumption, including by providing a sustainable market in the town square every Saturday, hosting stallholders with businesses that are local, unique and sustainable. Members of the market association are small business holders who are often occasional, rather than regular, stallholders. The reason for this intermittency is that many struggle with having a market presence which is economically sustainable. Because of this, the people of Kolding don't know which stallholders will be present each week, so many do not come to the market on a regular basis. This lack of assured customers, in turn, makes it difficult for the smaller businesses to be present, and translates into a constant struggle for the market to establish robust social and economic sustainability.

At the Market Association's AGM, our role was to design an event that would support the members to reflect on the sustainable futures of their businesses, as well as of the market itself. To this end, we designed

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Figure 1. The AGM had five parts: a) learning through a guest presentation; b-c) solo and shared guided reflection within a workshop; the Annual General Meeting (AGM) of the Market Association; d) constructing commensality by co-creating a dinner, and e) dining together.

a number of activities with the aim of fostering an increasing feeling of commensality, or fellowship, over the course of the event; thereby making it convivial for association members to gather around the table and grapple with the interdependent challenges of economic and social sustainability from a range of perspectives.

The event consisted of a short welcome and five acts: i) an inspirational talk and discussion by a local, successful sustainable food business; ii) an envisioning workshop for stallholders; iii) the AGM itself; iv) co-creating a dinner; and v) dining together (Figure 1). Over the course of the event, attendees gradually took over responsibility for fostering feelings of fellowship, supported by our careful design of the proceedings.

We unpack the impacts of co-creative imagining with, through and about food. We consider how designing events with food and co-creation, using participatory research through [food and eating] design, enables us to support this particular public to foster commensality. Our considerations take into account the meal and its enjoyment, as well as the participants ongoing commitment to the future of their businesses; the market; and their ability to play a role in local society as agents of change.

2 BACKGROUND

2.1 *Supporting the local market*

This research takes place within the context of the H2020 FOOD2030 FUSILLI project,[1] which has as its aim to Foster Urban food System transformation through Innovative Living Labs Implementation. FUSILLI began in January 2021, and from the outset, we have been working with the Kolding Green Streets Market Association,[2] to assist them in grappling with the challenge of becoming robustly economically sustainable.

This effort has included a number of actions. To begin, we paired the market board with the sustainability arm of the COOP supermarket: COOP Crowdfunding. The team from COOP provided training and support to enable the stallholders to create individual shops, and the market to create an online store that gathered the stallholders' shops in one place. The intention was that people would order food and pick it up at the market. They could also see at a glance if they had met their minimum financial threshold to be able to come to the market. Through this effort, the stallholders would have increased security around their income, and once at the market, the people who came to pick up their goods could browse and perhaps spend more money. By minimising the financial risk for stallholders, the system affords more consistency in market offerings. Because of COVID, the full impact of this action is still unclear. However, a number of businesses have been able to increase their income, using home delivery when the market has been closed.

In another effort to strengthen the social sustainability of the market, we invited four local chefs to develop recipes featuring in-season produce and stallholder products. The recipes were launched at the first market each month, with free tasting samples, recipe cards, and the possibility to buy the ingredients for the featured recipe on the COOP market store (Figure 2 (a)). The intention of this action was to expand people's thinking around how to eat local, sustainable, in-season produce, and in doing so, raise their excitement about what they could buy at the market.

Overall, reception has been positive, though we discovered a mismatch between what chefs think is easy to make at home and what people find reasonable in terms of effort. We are currently pivoting this idea to feature recipes by locals who are not necessarily professional chefs. We hope to encourage people to provide their favourite recipes with the featured vegetables and produce, to better involve them in thinking about how we can eat sustainably.

Building on this work, the Green Streets Market Association invited us to host their Annual General Meeting (AGM) at the FUSILLI Food Lab.[3] In discussion, we decided to design a commensal event, using participatory research through [food and

1 https://fusilli-project.eu
2 https://www.greenstreets.dk
3 https://koldingfood2030.dk/index.php/food-lab-2/

Figure 2. The AGM had five parts: a) learning through a guest presentation; b-c) solo and shared guided reflection within a workshop; the Annual General Meeting (AGM) of the Market Association; d) constructing commensality by co-creating a dinner, and e) dining together.

eating] design (Dolejšová* et al. 2020, Wilde 2022) to bring enriching feelings of fellowship to the challenge of growing the economic and social sustainability of the market and its stallholders.

3 THE ANNUAL GENERAL MEETING

Green Streets Market 2021 AGM was held at Food Lab, which is a centre for experimentation, collaboration, community building and learning about our food systems, situated in the centre of the city, set up as part of the FUSILLI project. At Food Lab, we aim to understand what it takes to transform all aspects of Kolding's food system to become more sustainable. As part of this growing experiment, we bring together like-minded people with personal and professional interests in food, nature and sustainability, to join us in experimenting towards local food system change.

Our objective for the AGM, was to make an engaging event that would build directly on the market association's commitment to being 'a modern unifying marketplace that 'support[s] similar projects and activities in the local area, provides opportunities and inspiration to act and live more sustainably, and create more life in Kolding city centre for the benefit of citizens, visitors, stallholders and local merchants.'[4]

The event was split into five parts. It began with an inspirational talk by a local vegan food producer whose successful sustainable business has gone through a number of transitions since its formation in 1989. The talk focused on the importance of 'finding your position in the food value chain'. Following, the FUSILLI FoodLab team led a one-hour backcasting workshop; Green Streets held their AGM; then we co-created adn enjoyed the dinner. We briefly describe the workshop, then focus on the dinner, which is the centrepiece of our efforts to co-create commensality, and support members of the Green Streets Market Association to be agents of change in their businesses, and the market.

3.1 *Mapping, envisioning, backcasting*

The backcasting workshop had as its aim to support the association members to develop a roadmap towards a sustainable future of their businesses. It had three stages: mapping, envisioning and then backcasting. The roadmap development was undertaken by each individual in the weeks following the AGM. To begin the process, we built directly on the talk by inviting everyone to position their business on the food value chain. This was a physical activity that required everyone to come to the front of the room and add their business to a shared poster, which was laid on a table, with a wooden scale indicating the different parts of the value chain (Figure 2(b)). We used the FUSILLI project's food value chain for this purpose, including: Production and Processing; Distribution; Consumption; and – touching all aspects, Waste. Governance is also critical in food system transformation, and a focus of FUSILLI. However we did not include it on the scale for the market stallholders.

In the second step of the workshop, we invited them to envision their business in a fictional 2035 – five years after all of the governments in the world, including Kolding, have achieved the United Nations 2030 Agenda (UN General Assembly 2015; Kolding Municipality n.d.). To help them thicken their vision, they were asked to select a vegetable from their table, and use it as a tangible ticket-to-talk (Figure 2(c)). Vegetables included beetroot, turnip, onion, jerusalem artichoke, carrots and more. Using these in-season vegetables as a guide to reflect on and describe their business, prompted them to find novel ways of describing, and their businesses, which led to new insights. For the backcasting process, they worked in pairs to assist each other to arrive at a truly exciting vision for

4 https://www.greenstreets.dk

Figure 3. A) cutting the vegetables collectively in different configurations; b) a table set for the meal.

their business' sustainable future, unimpeded by personal modesty or shyness (common traits in Denmark, where a key element of standing out is frowned up (Cappelen and Dahlberg 2017), and to step-by.step, cast back from this vision to work out what they needed to do to day to make it more likely. After a small break, during which time the vegetables were returned to the kitchen, they then held their AGM.

3.2 *Co-creating commensality*

Following the AGM, we invited the participants to help us prepare dinner (Figure 3(a)). The dinner was inspired by the concept of a hot pot – a cooking method that originated in China, and is common in Korea, which involves cooking vegetables and meats in a simmering pot of soup stock, which sits on the dining table. We adjusted the concept to the Danish culture, using seasonal ingredients from local producers, and tastes that are closer to Danish food culture. We had prepared three broths in advance, one pork, one lamb and one vegetarian so that we could focus on last-minute preparations with our event participants. We asked for volunteers to slice the vegetables we had been using in the earlier workshop – vegetables that can be eaten raw or cooked. Everyone else assist us in reconfiguring the room where the AGM was held, and to transform it from workshop and meeting space to magical dining venue. While this work was being undertaken, we grilled kalettes[5], with a balsamic dressing, to serve as both table decoration and side dish, and prepared spiced, oven-baked flatbreads, using sourdough starter, of which there was ample at Food Lab.

In the dining area, tables were arranged to seat 4. Each table held fine cut vegetables, spiced flatbreads, small bowls and other tableware, and were decorated with the grilled kalettes and wine provided by an association member (Figure 3(b)). An additional table held the hotpots, keeping warm on electric hotplates, as well as fresh herbs and a dish called Hot Lightning, which was prepared by a local regenerative farmer and his wife (Figure 4). Hot Lightning is a Dutch recipe that combines onions, potatoes and old apples in a mash. The potato makes it familiar for Danes, but having apples and onions mixed in with t he potatoes is considered very unusual. As a regenerative farmer of Dutch origin, Lolke, and his Danish wife and farm co-owner, Lena, enjoy sharing this dish which reframes apples that might otherwise be though of as waste, to have new value.

The overall set-up of small tables and a common cooking station that acted as a kind of fireplace around which people could gather, ensured that people could have intimate discussions, but also mix with others, as they took their small bowls of vegetables to the hotpot station, to construct and cook their meals. The small bowls ensured that they served themselves small portions, and went back to the hotpot table several times, thus keeping the dynamic of the room in motion.

To conclude the dinner, the tables were pulled together into one large setting and we shared a dessert of yoghurt and local honey, with small shards of the remaining spiced flatbreads, and enjoyed a dessert wine from an association member as we reflected on the event.

It was generally agreed that this was the most successful AGM they had held, because it embodied the values of the market in their entirety and richness. It not only allowed them to achieve the formal actions legally required by the association but assisted them in strengthening their sense of community, and their place in that community, moving forward. It did this in ways that were constructive, for them as individual

5 a kale-broccoli hybrid

business owners, as association members, committed to strengthening the market, and as people, who live and laugh and love together in the small Danish city of Kolding.

The evening ended with everyone chipping in to clean up. Sharing this action was also important. The space was cleared, the dishes washed and put away and the leftovers distributed amongst the association members and taken home.

4 DISCUSSION AND CONCLUSION

The four parts of the event that we constructed around the AGM moved through learning; mapping, envisioning and backcasting; constructing, and then enjoying, commensality. Each act was important. However, two elements were fundamental to our intention of fostering commensality. The first was inviting the association members to cut the vegetables for us and arrange the dining area with us. This activity put people a little out of their comfort zone, but not too far; and implicated them explicitly in the success of the dinner. It also shifted our role within the event from host, facilitator, to co-creator. The second critical element was the hot-pot concept, which brought people together in ways that were organic and well rooted in culture. The small tables in the room afforded intimate discussion; having the hotpots, herbs and Hot Lightening on a separate station enabled us to organically implement the 'fireplace concept' for chatting across the divide.

To reflect further on the impact of working in this way, we consider the relationship between co-creation and food preparation, as a performative act. The way we planned the involvement of the association members in the preparation of the dinner had performative aspects. In the workshop. they physically positioned their business in the food value chain, and chose a vegetable and used it as a starting point for describing their future business; participating in food preparation; cooking together over hotpots made with food from a local farm; drinking locally brewed alcohol—the fruits of their labour, and enjoying unexpected dishes crafted together for the first time.

Over the course of these activities, they became part of a play without noticing. During the AGM, we prepared six stations for them to cut vegetables. Each person wore an apron and they cut the food together. As they did so, we observed moments of silence where we could hear only the sounds of the knives on the cutting mats. The task thus was almost a meditative process. At times, the silence was filled with questions in which they negotiated how the vegetables should be cut. In a way, we might consider that 'the scene' was ready for them to enact, andonce they took their places they proceeded with the task of cutting, as well as the task of performing cutting. Our set-up aligns with aspects of co-creation such as discussed by Sanders and Stappers (2008) who claim that co-creation is "*any act of collective creativity.*" It was clear during the AGM meeting that set-up for 'creating' the food elevated the tasks to the performative.

Figure 4. People cooking at the hotpot station, which acted as a kind of social fireplace.

Furthermore, having a strong shared theme – that of sustainable food – helped people to contribute. Key in facilitating their contribution was that the food was an integral part of the event – it was not simply served to them at the end of the event, but was at the centre of the AGM, in different ways, throughout.

The talk by the local producer enabled passive reception of exciting evidence that a sustainable food business is, indeed, possible in Kolding – Hanegal, the business presented, has been thriving for over 30 years.[6] Critical to Hanegal's success has been recognising, and sometimes changing, its place in the food value chain. Moving form this talk to an active reflection of the position of their businesses on the value chain enabled the association members to bring the learnings from the talk into their own businesses directly. They then engaged in self-reflection, and shared reflection. Finally, they prepared the food together, through an embodied process, and ate it together in a fluid process that afforded different kinds of reflection and discussion.

Broadly we find three levels of engagement during the event moving from: i) passive to active participation; ii) self-reflective to shared reflection; and finally iii) engaging through tasting the food in an individual but also collective way.

In terms of ownership, this was constantly shifting over the course of the event, from the Food Lab team to the participants, to the market. Finally, inviting people into the preparation of the dinner – requiring them to cut the vegetables they would eat (the same vegetables used in the workshop earlier); to help set up the tables and bring food and drinks from the kitchen to the dining area (which was previously the talk, workshop and AGM area) – pulling the tables together for dessert; clearing the tables (food, plates and more) back to the kitchen; cleaning up at the end, listening to music, laughing and reflecting; and finally

6 https://hanegal.dk

taking leftovers home, as an obligation to ensure nothing was wasted. These shifts helped the participants to not only engage but to continually re-engage with the event, each other, the market, and sustainable food.

Overall, the event was rich and enjoyable. It was productive, informative and layed a foundation for each association member to contribute to the shared vision of the market. For the next AGM, we will continue the backcasting workshops, helping the association members better define their vision of the sustainable future of their food business and to construct their roadmap. We will also bring focus, more strongly, to the sustainable future of the market itself. In doing so, we will recognise the role of the association members as one that is fundamentally invested in the market's social and economic sustainability.

Co-creating commensality will continue to be an important element in our design research toolkit. The FUSILLI project aims to support sustainable transformation of the food systems in European cities. As one of the test-bed cities, Kolding will continue to be a living lab in which we conduct in-situ, at-scale experiments with food. Our work recognises that food is far more than nutrition, it is social, cultural and also experimental.

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Experiencing and Envisioning Food: Designing for Change – Bonacho et al. (Eds)

Transformative Times – Rethinking Food
The case for looking at extremes when researching food-related systems

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ABSTRACT: Current food systems face a massive challenge in the upcoming decades. From the need to increase production to how consumption can have a positive impact, we are now facing the need to take a deeper look into how the food supply chain works. This paper explores the possibility of a new approach within System Thinking to look at, analyze and recreate more sustainable food systems. The practice focuses on a new principle where we should not look at a system as a whole but by its extremes—finding equilibrium points between elements that will then direct its development and mechanics. From our past experience on related projects and methodologies we've been identifying limited results when following frameworks and models of systemic thinking. Therefore this pilot focuses on the possibility of extracting alternative routes to global food problems when looking from extremes perspectives and the benefits. When researching with this approach, it allowed different results, than current methods of cross-culture analysis, when different food cultures are at stake. This paper contributes to the ongoing research on how systemic thinking can address current food challenges to create new innovative methods and solutions for existing food chains.

Keywords: Future of Food, Systemic Thinking, Innovation Methodologies, Transformative Design, Food Systems

1 INTRODUCTION

The research is a foundation for a new approach that looks at systemic problems from their extremes. In a traditional systemic study, maps comprise all functions and elements of a system to analyze what factors can be changed to create new dynamics for a given system. In our proposed methodology, we map the features by looking for the extremes. To understand how these elements can move towards a more sustainable relationship with other elements, something that we call "points of equilibrium" in a given system. Through this perspective, we aim to shift the traditional way of looking at systemic food problems on the planet. The methodology then moves to new clustering tools and exercises, to understand how these extremes can get closer together and influence each other, ultimately contributing to a better and fairer system.

2 METHODOLOGY

2.1 *Framing the system*

In the first moment, we will map all the elements of a given system we want to explore; here, we are nothing different from a typical framing within systems thinking methodology. (see Figure1)

We start by identifying the pivotal or core component of our research. To then try to correlate how

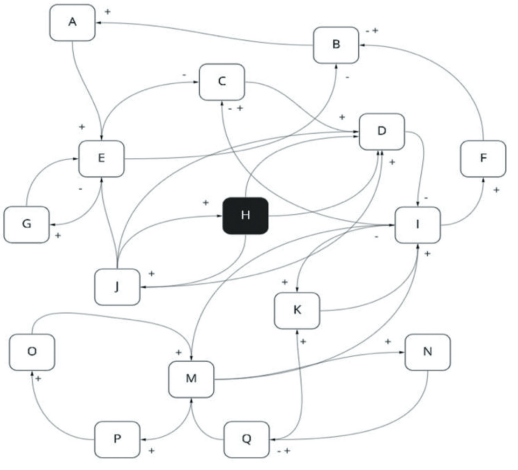

Figure 1. A typical systemic map.

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these elements influence each other by looking for loop forces or relations that create a positive, negative, or neutral effect among all the elements in the system.

2.2 *The second ring*

We now look at the map and analyze it from the elements that define its borders. We then create a second ring where we try to push the boundaries forward by linking it to even more far examples from the center, outermost the elements. This double-ring will be the primary material for developing our project. (see Figure 2)

To do so, we pick up the elements far from the center and create two new links with two extreme perspectives. The research team is free to define what mindset to adopt in each case, as the nature of the topic might imply more detailed or generic extremes to have a higher impact. At this moment, and after the extremes are defined, it reveals the ones who are more and less relevant for the research.

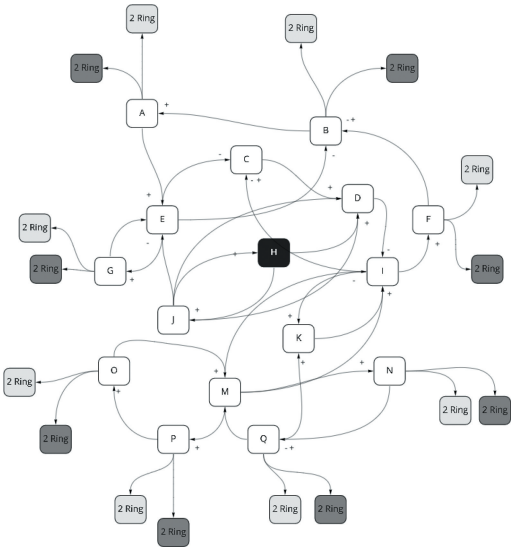

Figure 2. A systemic map with an extended second ring.

2.3 *Connecting the extremes at play*

After the second ring is complete, we will look for what are the elements that continue the development; the team might decide to follow just one, or select a few, as shown in Figure 3

At this moment, these relations are antagonistic and should represent two different worlds that, at first sight, seem to have no possible connection. The focus should then be on forming links between these elements by creating a list of extended characteristics for each extreme. Each extreme gets framed within context, technology, culture, and legislation to be fully understood. Other design thinking methods of mapping could also be applied if necessary. From our experience, this depends on the food topic and the level of complexity a team wants to reach. Here we might find relations like Religious Diets vs. Super Foods, Cellular Agriculture vs. Indigenous Agriculture, etc.

This moment should end once these characteristics create a big picture of the element.

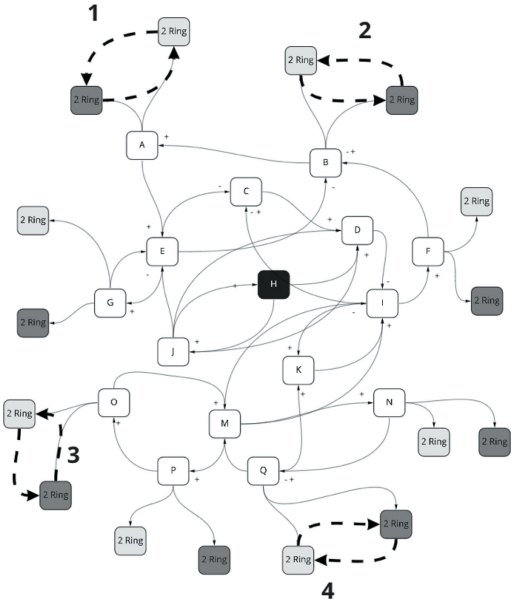

Figure 3. Elements on the second ring connect.

2.4 *Map healing factors*

Once the links between elements exist, it's time for the research team to discuss the big questions that arise from each connection. Naturally, two outcomes become visible, the positive and negative elements present in the relation just formed. Furthermore, many of the discussions in this phase also end in cultural biases that are inherently present. Therefore the group must acknowledge this openly and informally.

After the initial thoughts regarding this connection, the team should focus on the healing elements that each extreme brings. Healing elements are unique characteristics that contribute to regenerating or improving the pivot or core point of the map. For example, a healing element of a Super Food might be its reduced water consumption. At the same time, a Religious Diet might create a sense of belonging and meaning towards a particular food.

Here a two-axis matrix can help place the factors side by side for easier comparison and debate support(Figure 4).

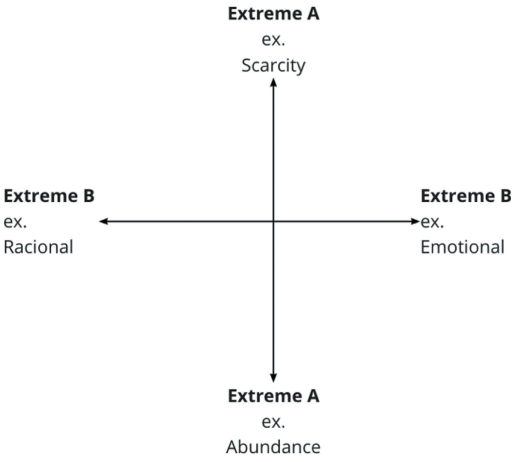

Figure 4. Example of a two-axis matrix.

2.5 *Points of equilibrium to opportunities*

Here the team focuses on creating a positive reinforcing loop between the two connected extremes. The objective is to understand what each extreme (list of healing factors) offers or teach each other to form healing energy between them.

Each connection now needs what we call "points of equilibrium." Actions that mutually support and bring value to each other. These actions need to map how to bend two extremes into collaborative opportunities. For this moment in the process, we develop a canvas to help teams move step by step until they arrive at an opportunity list. (Figure 5) Once completed, all the connections on the map become completed, and a new map emerges that, besides the original systemic construction, now draws lines of healing possibilities between extreme elements of a given system. The method can also be made from "extremes of extremes" by linking two similar extremes that have different origins but belong to the same original extreme. This variation might be helpful for very contextual projects where a particular food region needs an extended map. This variation forms several perspectives inside the same particular one. (see Figure 6)

From this moment on, and depending on the type of project addressed, systemic thinking processes should continue using these points of equilibrium as design drivers.

3 RESULTS

So far, we have been testing this model in small and controlled workshops; therefore, all results should be taken as early stages of a final model. We plan to launch a pilot project to test the method by September 2022, where we will work with a multidisciplinary team for several weeks to explore it.

So far, the method has proved that alternative results arise when we map extremes and wire them to their opposite perspective on a given system. We do believe that opting for extremes offers a more comprehensive oversight and provides answers quickly on possible solutions. Within this approach, the connection of extreme perspectives of a system steers the alteration of a system dynamic.

Therefore, it speeds up a common bottleneck in the traditional systemic mapping of interpreting and selecting the elements we want to change as they naturally arise. We also recognize that this approach might become limited when focusing on particular problems, as the objective is to pursue global-scale issues with multicultural proof solutions. Nevertheless, we see this as a complementary tool that initiates a new dynamic oversight of global problems.

Furthermore, this method also addresses the necessity to create tools for cross-cultural collaboration methods and tools. As results depend on

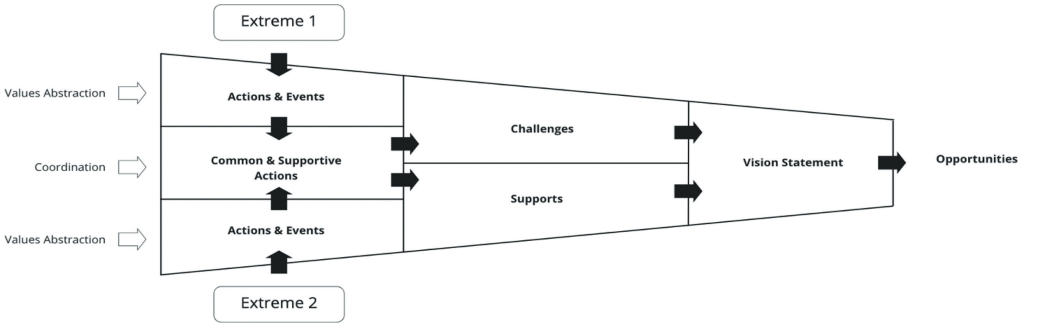

Figure 5. Points of equilibrium canvas.

extremes, more than integrating other cultures, different cultural perspectives become a cornerstone for the method's outcome. An example might be: what we would generally consider unbalanced food systems, as a country with an abundance of food vs. a country with food scarcity, are not only liked as they become equally important to generate innovative products and systems for each other.

4 DISCUSSION & CONCLUSION

Thinking about food on a global scale is inherently systemic. The Transformative Times research methodology allows new eyes on decades-long problems, finding us at a turning point of change to address all agricultural, food consumption, and climate change challenges. This approach to systems mapping allows us to explore interconnected, entangled contexts of innovation that generally would not be associated together. Each researcher can spot connections and opportunities that reveal new global perspectives of a given system. And within that, the creation of new products, services, and policies based on the new framework. Currently, we keep exploring all the research possibilities on innovation projects with a high degree of focus on improving the analytical and creative tools that follow the construction of the points of equilibrium map. Furthermore, the methodology not only can integrate typical research methodologies. As it provides a complementary understanding of how harsh realities offer innovative links to planetary solutions.

5 COMMENTS

This research is part of Transformative Times, an ongoing research project that aims to create alternative methodologies for collaborative R/D projects. These early results represent the end of the development phase focusing on methods and tools. The project will now continue to evolve and grow.

6 ANEXES

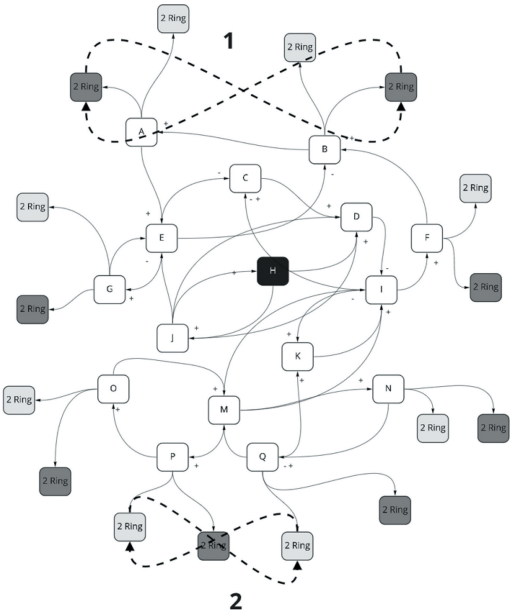

Figure 6. Extremes of extremes map variation.

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Experiencing and Envisioning Food: Designing for Change – Bonacho et al. (Eds)

Hunger challenges in the land of plenty: How design can change the paradox of food waste

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ABSTRACT: An approach to social innovation based on everyday food waste and latent possibilities to change the food systems' paradox of surplus and scarcity. Based on literature review and analysis of social initiatives, concentrating on contexts where lack and abundance of food can be matched to minimize famine, improve eating habits, and increase consciousness of food use, loss, and waste. It addresses how Design can contribute to fight hunger within a systemic perspective, redistributing surpluses in a hunger-fighting network, with changing agents from within the community. The study discusses how Design can articulate different needs, understand local potentialities and join common objectives and players. It focuses on tackling food abundance and scarcity, in exploratory research of relevant initiatives, social change, and transformations within the community. Designers play the role of researchers, capability builders, and transformative tools, stimulating the development of the social fabric where government agencies are absent or inefficient.

Keywords: food design, social innovation, food waste, hunger, system

1 INTRODUCTION

The article brings a systemic approach to the paradoxical lack and waste of food during the pandemic of COVID-19, exemplified by how some restaurants and chefs have dealt with it, seeing opportunities to mitigate hunger within their environment. The focus is to register relevant actions taken throughout the peak of the Brazilian sanitary and economic crisis and understand what design can do to transform parts of the food systems from this action review.

One of the targeted groups of individuals in this research has been students, especially those from the public system fundamental education, directly affected by the changes imposed by the restraints of the pandemics, leaving kids and young adults alike undernourished.

Using the projects developed in Brazil as examples, design professionals can observe how to better connect and take advantage of idle kitchen structures, staff, and food to fight hunger, promote food security and jobs and improve the local economy. By understanding the network, designers may propose more holistic projects, encompassing cultural, economic, and environmental aspects of food consumption and waste.

After brief literature review, recent and ongoing hunger mitigation actions are showcased, reinforcing the tight relation of the systemic approach of food and design in providing solutions for wicked problems.

Initiatives from NGOs, restaurants, and food-related communities described in this article showcase a range of players involved in an urgent and neglected cause, displaying efforts from the private sector and individuals to mitigate one of the harshest side effects of COVID-19 in Brazil. These initiatives rise particularly where government action is absent or insufficient. It also unveils how codesigned efforts may be effective and result in replicable actions, always bearing the cultural aspects of food consumption habits.

The venues and projects have been chosen by their relevance in providing nourishing and culturally adequate meals, but also initiatives empowering local businesses, sustainable agriculture, and promoting inclusion, connecting scarcity and abundance. They ´ve been broadcast in specific and general media, particularly upon the rise of famine in the country.

Working on their own, designers cannot solve the hunger problems, but they may be able to tackle the current food system, rebuilding it to

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reshape connections within the network of producers, retailers, and consumers.

2 LAND OF PLENTY, LAND OF SCARCITY

For the Eating Designer Marije Vogelzang, what mainly differs food design from the other fields of design is the political aspect of food. When we´re faced with such big food variety and availability, the consequences are intriguing: the world is populated by 2.5 times more obese people than underfed ones, but at the same time, a relevant number of those obese individuals are also malnourished, meaning there´s a lack of nutrients on their food intake. Adding to that, food deserts are growing rapidly, especially in big cities, where supermarket shelves are loaded with industrialized, fat and sugar-loaded cheap food, and fresh produce is becoming increasingly scarce. An ever-growing number of people have lost or have never been acquainted with the habit of cooking, leading to grownups dependent on ready-to-eat meals, totally disconnected from their sources and cultivating processes, animal welfare, and other ethical issues (Vogelzang 2010).

During the years of 2020 and 2021, the ongoing social and economic crisis was aggravated by COVID, leading to the rise of unemployment, poverty and consequent hunger. In Brazil, as in many emerging countries, it was no different. News started showcasing crescent food insecurity figures, scaling up from 57 million people living without full food access before the pandemics to 116.8 million. Amongst this population, around 19 million were starving in 2021, and more than 33 million are food deprived in 2022 (PENSSAN 2022).

In the land of plenty, food is lost and wasted in massive quantities, and its people paradoxically go hungry. Alarming amounts of food are carelessly lost or wasted in Brazil, reaching close to 9 million tons, or up to one Maracanã Stadium full of food, every year.. Every Brazilian wastes approximately 41kg of food yearly, coming mostly from inappropriate preparation/storage, which could feed more than 20 million people. Grains (mostly rice), are top one wasted food, and added up, the daily 25g per capta rice waste could feed over 40 million people (Piauí 2022).

Other food types widely wasted in the country are fruits and vegetables, and surprisingly, meat. The greens from street markets of São Paulo alone add up to 33 thousand tons, enough to feed 18 million people. The amount of meat wasted daily accounts for enough food to over 90 million Brazilians.

The trigger for this study has come from the increasing news on hunger spread throughout Brazil, along with the visible rise in people begging for food across the country. While more and more people grew into famine, food waste and growth figures did not drop (FIOCRUZ 2022).

Amongst the highly affected people were students from public schools, who depend significantly on school-provided meals for their basic sustenance. As of the suspension of in-site classes, all children felt the immediate effect on their empty stomachs. Many families relied on school meals to lighten the economic burden of feeding their children; without it, hunger struck heavily. According to the National Survey on Food Insecurity in the Context of the Covid-19 Pandemic (2021), with schools closed, kids were left without the main meals provided by the National School Feeding Program (PNAE), the only guaranteed feed of the day (Prato Cheio 2021a,d).

Statements from public universities and scholarship-funded undergraduates have shown that a share of the young Brazilian population was left without essential nourishment. To some less privileged students, not having the institution provide a meal meant going hungry. Many cities and state governments offered money aid for the enrolled students, but the sum was never even close enough to cover the feeding budget. To many families, that meant a considerable increase in family expenses, leading to food insecurity and hunger ((Prato Cheio 2021a, b; Prato Cheio 2022).

Amidst the controversial food scarcity and abundance scenario, some individuals, NGOs, and public and private sector members have shed light on the hunger mitigation process. Combined efforts, networking, and engagement are presented as enabling platforms and agents, according to Manzini (2008, 2017). This article explores how codesign can raise awareness, empathy, support, and guide projects aimed at cultural innovation, within a systemic pers-pective, redesigning how people eat and relate to food. The agents of change from all society sectors work together through a product-service system that understands the different levels of value for these players and merges idle structures, idle workforce, and idle food with a hungry community.

By seeing things differently, design can boost ecosystems and promising cases (Manzini, 2015) of partnerships between NGOs, chefs, producers, communities, and solidary kitchens in general as enabling proto-solutions, focusing on taking advantage of idle structures to increment food awareness and school meals. The cases work as benchmarks, and have been chosen based on their media repercussion, impact on eradicating hunger, and inclusiveness of players. They contemplate the duality of food scarcity and abundance, looking at despised foods from a different perspective, sharing resources, reducing food waste while rescuing food relationships, and changing habits to alter culture further.

Founded on the studied cases, distinct courses of action may be drawn, replicating the processes in different scenarios for compelling and urgent results.

3 METHODOLOGY

3.1 *Literature review*

Such a contemporary subject required a very up-to-date literature review, following snowball method. The information was primarily based on the news over hunger and hunger-fighting measures taken during 2021, the first year of the COVID-19 pandemics. News on general media was vital for the updated facts and numbers on ongoing food waste and hunger mitigation actions. The content was deepened with specific publications from journalism, NGOs, and public/private campaigns followed through social media (websites, Facebook and Instagram). Next, data on hunger was gathered, focusing on schools and the impact of the absence of school meals on children, young adults, and their families.

Mapping out benchmarks on food waste and hunger fighting actions was the first step, followed by updates on their projects and partners. The start point were hashtags used from Gastromotiva´s website and Instagram, serving as a basepoint to engage on campaigns, which formed a thread of other actions to be followed: comidaquetransforma, gastronomiasocial, marmitaço, genteéprabrilhar, pratouniversal, diadaalimentação, porumbrasillivredafome, semdesperdicio, xepa, mesasolidaria, diadorefugiado,

Official data and statistics have come from government and non-government agencies reports, collected from Brazilian and international sources from 2021 to 2022. Specialized journalism was also crucial for in-depth learning of the food crisis in the country.

To complete the theoretical background, papers and publications framed the academic reference authors on bottom-up initiatives, comprising keywords such as community, society, hunger, food, food security, shared economy, collaborative services, and social innovation.

3.2 *Interviews with specialists*

To gather data on school and meal-related situations and complement the literature review mentioned above, a series of semi-structured interviews and generative sessions were conducted in November 2021 with schoolteachers, university teachers, and school nutritionists. The players have been chosen to input experience-based knowledge on basic education and gastronomy university education, as much as learn about the food served by the non-private educational system in Brazil, tackling glimpses of the purchase and distribution phases to the students' plate. The sessions took about 2 hours each and have been held online through digital conference platforms (Google Meet and Zoom) and provided a deeper understanding of the mesh behind the scholar catering system.

During the sessions, online interactive tools have been used to take notes, build a research canvas, add reference notes, and provide a space for discussing and comparing ongoing huger-related projects. The participants have been picked based on sampling from the researcher´s immediate network, of professionals directly or indirectly connected to the school meal system.

4 FOOD AND EDUCATION

The first stage of this research has produced a map of players, which guided desk research and interviews

On the first session, the guiding question was "how to transform food waste back into food?", and the professionals debated about the integral use of food sources and the value of feeding. This first event had both a primary teacher and a gastronomy bachelor´s program teacher, along with a cook, two nutritionists, and a small-scale food producer.

On the second session, the debate focused on government initiatives towards a healthier school meal, and the cultural, financial, and bureaucratic barriers faced by professionals to implement those actions.

Overall impression show a lack of knowledge and cultural impediments in preparing new foods, or even looking at well-known resources through the lenses of whole use of ingredients. In the land of plenty, people grew used to sparing or disposing of parts, selecting specific ones to use, as well as having a wide variety of fresh fruits and vegetables year-round, and aren´t familiar with conservation methods like fermenting or pickling. Not knowing how to make the most of an ingredient reflects in waste or low use of seasonal crops, which means buying fresh foods at its best quality and lowest price, reducing agricultural and food losses while increasing the intake of nutritious produce (Olhe para a Fome, 2021).

Despite being experienced culinary professionals, school cooks aren´t normally capable of making full use of ingredients and rely on a small repertory of recipes and preparations. Still on training issues, most gastronomy courses focus only on developing students´ techniques, replicating old-fashioned recipes without questioning the purpose of doing so. They mostly follow the idea of dominating nature, and putting it into technique service, and not the other way around.

As people eat and learn to cook only a restricted range of food types, they are afraid of or unprepared to explore, even when resources are scarce. Schools can teach more about food and eating from an early age, so kids grow more food-culturally aware. They should not only feed but teach how to eat, about the importance of good, nutritious food, spreading to parents the opportunity to learn more about this basic asset. But when faced by such food crisis in the school system, there´s even more homework to be done (O Joio e o Trigo 2021).

5 SCARCITY AND ABUNDANCE: HUNGER, IDLE FOOD AND PROFESSIONALS

5.1 *The general huger scenario, schools, and the lack of meals*

As the economic lockdown consequences and health scenario intensified, poverty and famine have risen in the country.

Daily news reported the growth of families struggling to attend to basic needs, and hunger obliging people to change their consumption habits, craving for something closer to a nutritious meal. As educational institutions kept classes suspended or online, students who depended on the school/university offered meals started to go hungry.

Primary schools supplied by family agriculture suspended contracts, and if, on one side, more industrialized food started to be sent out to school children, on the other, farmers had their crops perishing without buyers. Statements reporting alarming hunger situations were broadcast frequently, from younger students fainting from hunger to university scholars having to choose between attending to classes or eating (BBC 2021)

Many controverse outcomes resulted from providing food for students and their families. If processed food was a good option in terms of logistics and distribution, they have been responsible for increasing salt, sugar and fat intake, leading to obese and undernourished infants and younger adults (PENSSAN 2021). Another effect decurrent from the suspension of small producers' suppliers for school meal has been impoverishment of farmers, who had no customers to sell their crops, leading to another boom of economic crisis in the agricultural sector.

5.2 *NGOs and organized communities*

Gastromotiva is a social gastronomy NGO in Rio de Janeiro, and sees food as a social transformation tool, through education, inclusion, and food waste mitigation. Offering short technical courses, the organization aims at creating new food culture, empower young people from less privileged backgrounds and transform them into changing agents within they territories. Apart from hosting a food bank, Gastromotiva believes in fighting hunger with education (Gastromotiva, 2022).

With students and alumnae widely spread in vulnerable territories, Gastromotiva started the Solidary Kitchens project, combining a well-trained group of cooks and the food bank resources to provide meals for those in need. The project started in March 2021, and within the first year provided food for over 1.3 million people. Amongst the Solidary Kitchens project partners were many schools, offering their cooking and serving facilities to provide meals for children and their families, offering extended benefits (Gastromotiva, 2022).

Junta Local is a community of small-scale food producers from Rio de Janeiro and foresees social transformation by joining those who make and those who buy food. Approximating two separate ends of the food supply chain, Junta Local trusts culture and education will lead to a more balanced food system. One of their strong projects Chega Junto ("Come together") joins refugees from different countries, who cook and sell their traditional dishes in open street markets. During the constraints of COVID-19 the fairs got suspended, and the refugees saw a main income source disappear (Junta Local, 2022).

Combining idle workforce and feeding necessities, a joint campaign from Gastromotiva and Chega Junto has raised funds and ingredients to cook and distribute meals for vulnerable individuals, specially focused on refugee communities. The actions provided a minimum income for the refugees, and made sure beneficiaries had a cultural appropriate meal to eat (Junta Local, 2022)

5.3 *Restaurants and food producers*

During the first semester of 2021, the restaurant industry was gravely affected by the restraints of the lockdowns needed to minimize COVID spread, and many have not recovered. While shut down for sanitary measures, restaurants and hotels had to dispose of food supplies, and either let go of their workforce, or make different agreements to support their employees. Having kitchen spaces and qualified workforce willing and able to produce meals, but lacking customers, have become the answer to many hunger-fighting actions.

Brazilian law enforces part of the school fruits and vegetables should come from small farming, and with schools closing because of COVID, they lost a representative market share. Food farmers have also been greatly affected by the restaurant's shutdown, with businesses buying minimum or suspending supply altogether. What was left on the fields either went to waste or got donated to food banks or other hunger mitigation actions. During a period when so many people went hungry, including food producers, crops were left to rotten due to the lack of buyers.

Slowly returning to food markets, farmers still have considerable food waste, with fruits and vegetables being discarded for esthetics or abundance-based eating habits and other external influences, and food being lost or wasted in every step of the food chain.

6 DESIGNERS AND THE CHALLENGE

Designers can look at things differently, enabling ecosystems and promising cases (Manzini, 2015) of partnerships between NGOs, restaurants, producers, communities, and solidary kitchens in general as enabling proto solutions. When facing urgent situations like hunger, communities work together to

fight the emerging risks, in bottom-up initiatives, especially when government actions lack.

The codesign process promotes empathy and awareness, driving social innovation from local networks. The food waste and hunger paradox require culturally sensitive approach, as much as a sense of urgency.

The challenge, thus, is to transform scarcity into abundance, by sharing resources, reducing food waste, rescuing food relationships, and modifying habits to change culture. Connecting agents of change: NGOs and organized communities, food producers, nutritionists, cooks, and designers in codesigned actions can lead to social innovation and transformation.

When weaving a network of specialists from the education and food service sector, supported by NGOs and the community, the examples aforementioned show there are incipient possibilities of social innovation, connecting abundance and scarcity, fomenting a more inclusive food system. Facilities, professionals, and ingredients can be more readily available than they seem, and by reallocating food and workforce,

7 RESULTS

The research shows confronting food waste and food scarcity in school scenarios can reduce food insecurity and promote longer lasting social response and engagement.

When more aware of such emergent situations, designers can lead groups of stakeholders, and connect them to make ideas tangible, always bearing cultural aspects. It´s the community acting together to change their surroundings, promoting social innovation from within.

To shift from scarcity to abundance, the community needs to understand the way food is perceived, valued and shared, and modify its habits towards a more inclusive society.

The outcome of this research intends to expose the possibilities of combined resources to combat hunger and food waste. Solidary kitchen models are proto solutions, matching needs, and resources. They minimize food waste while addressing hunger and behavior change, and can work as learning and empowering venues, multiplying agents of change.

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Experiencing and Envisioning Food: Designing for Change – Bonacho et al. (Eds)

Food and celebrations: The *fanid* as a food heritage

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ABSTRACT: The fanid is a type of confectionery, a pulled sugar, that has been widely used since the Middle Ages. Crossing spaces and times, fanid remains as a candy, serving as a devotional confection and used as a gift in celebrations of popular religiosity. This delicate confection is a food heritage of several communities that materialize devotion in sugar pieces. This paper presents some connections of the ritualized uses of fanid in religious celebrations: the Feast of the Holy Spirit (Portugal and Brazil) and the Day of the Dead (Mexico). The ritual praxis of fanid builds, from the traditions of its uses and consumption, a food heritage in these locations. In moments of celebration, eating food also means consuming a memory, a tradition and an identity. The fanid constitutes a food heritage in these localities and the moments of celebration safeguard the savoir-faire: knowledges, techniques and gestures of making this artifact.

1 INTRODUCTION

During festivities food is an essential element to celebrate, socialize and strengthen the ties of belonging to a group. In this way, food brings together and constantly expands on identity references that define social groups, who narrate their histories, memories and traditions through their foods. Normal daily time is distinguished from the time of celebrations, and although food is inherently present as a physiological need in all times of human life, in times of celebration it carries an emblematic role of sociability: it is the moment of sharing and unity, as in celebratory rites everyone is equal before food. The feast table, which can be understood as a symbolic table, celebrates the sociability and unity of a group through food.

Eating together denotes forms of sociability, defines the identity and builds ties for groups and communities. For the food historian Massimo Montanari (2013) "on all social levels sharing a table is the first sign of membership in a group". Thus, food is a fundamental element in all the festive moments and many celebrations involve specific preparations for the time of the festivity.

The fanid is a type of confectionery, a pulled sugar that has been widely used since the Middle Ages and has acquired various functions and meanings beyond its relevant pharmacological function - as sugar was seen as a medicine at that time. In contemporary times we understand the fanid as confectionery, but sources point out that in its origin it was categorized as a type of purified and refined sugar. Crossing spaces and times, fanid remains as a candy, operating as a devotional confection and is used as a gift in popular religious celebrations.

This delicate confection is a heritage food of several communities that materialize devotion in sugar pieces with high aesthetic appeal. The ritual praxis of fanid builds, from the traditions of its uses and consumption, a food heritage in these locations. In moments of celebration, eating food also means consuming a memory, a tradition and an identity. The fanid constitutes a food heritage in these localities and the moments of celebration safeguard the savoir-faire: knowledges, techniques and gestures of making this artifact.

This paper presents three celebrations in which fanid occupies a place of food-artifact-ritual: the Day of the Dead in Mexico, the festivities of Pentecost, known as the Feast of the Holy Spirit, in Portugal and Brazil, specifically the «*Impérios*» (Empires) - shrines to the Holy Spirit - in honor of the Holy Spirit in Terceira Island in the Azores, and the Feast of the Holy Spirit of Pirenópolis, in the State of Goiás in Brazil. Therefore, we understand that fanid transgresses boundaries and has different uses and functions - even in environments, cultures and different bodies - but such functions are still connected via a memory construction that is rooted in the healing powers, spirituality and festivity.

The choice for these three festivities comes from the importance that they have in their communities, based on the elaboration of narratives and memories, resulting in their recognition by heritage policies at different levels. Hence, these festivities ritualize the fanid with its particularities, by building distinct nomenclatures, uses and functions for the same confection.

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The term fanid is *alfenim* in portuguese and *alfeñique* in spanish. In Pirenópolis, in Brazil, the «*verônica de alfenim*» has a circular medallion shape with symbols of the Holy Spirit and is an offering to the devotees of the Pentecost celebration. On Terceira Island, in the Azores, also for the Holy Spirit festivities, the fanid has a place as an ex-voto - which is a votive offering to a saint or to a divinity, given in fulfillment of a vow. The Azorean «*ex-voto de alfenim*» is produced in various shapes, such as parts of the human body, in gratitude and devotion to the Holy Spirit for the healing received. In Mexico, «*las calaveras de alfeñique*», the famous sugar skulls, are placed on altars all over the country as an offering to the dead.

In these three cases, the understanding of heritage stems from the construction of their own local narratives of memories to the construction of identity references. Through this process the social groups define their traditions and heritage. Heritage is an asset that communicates and locates such a group within an identity and tradition. The *verônica* identifies the Feast of the Divine Holy Spirit in Pirenópolis, in the same way as the *calaveras* identify the Day of the Dead in Mexico, and the *ex-votos* identify the Empires of the Holy Spirit in Terceira Island.

In this way, different levels of heritage policies have been applied to the three festivities. In 2003 the Day of the Dead in Mexico was awarded the title of Intangible Cultural Heritage of Humanity by the United Nations Educational, Scientific and Cultural Organization (UNESCO). In 2010, the Feast of the Divine Holy Spirit in Pirenópolis received, at the national level, the title of Intangible Cultural Heritage by the Brazilian National Historic and Artistic Heritage Institute (IPHAN), through the entry made in the Registry Book of Celebrations. In the case of Terceira Island, it was not the festivity that obtained any type of heritage recognition, but the fanid itself that was certified in 2013 by the Regional Centre for the Support of Handicrafts (CRAA) of the Azores government, now known as the Crafts and Design Center of the Azores (CADA). It became part of the collective brand of origin «*Artesanato dos Açores*» (Azores' Handicrafts), which certifies the origin and quality of different artisanal products such as Azorean confectionary, which includes the fanid.

The long history of the fanid runs through Medieval, Modern, and Contemporary times. From a pharmaceutical ingredient to an item of confectionary, the fanid has come a long way and has transformed itself through time. In the Middle Ages, it was a type of refined and purified sugar used by apothecaries; in the Modern Age it transitioned from its medicinal uses to an item of food consumption, becoming a confection, which category it still occupies in the Contemporary Age.

The fanid spread in the Iberian Peninsula during the Islamic expansion (711-1492) since the Arabs were principally responsible for the techniques of sugar refinement and the expansion of sugar cane cultivation. The terms *phani* and *phanita*, that referred to the sugar cane juice concentrate in India, shifted to *pānīḏ* in Persian, and became *al-fānīḏ*, *alfānīḏh*, *fānīḏ* in Arabic. The nomenclature is varied and has undergone changes over time. Some examples are *alfenide*, *alfenim*, in Portuguese; alfenyque, alfeñique in Spanish; *penidum*, *penidium*, *penitidis* in Latin; *penito* in Italian; *pénide*, *penyde*, *alphénic* in French, and *pennet* in English.

2 THE FANID CELEBRATIONS

In the Feast of the Divine Holy Spirit in Pirenópolis, the *verônicas* of fanid are given out free of charge to the devotees and all present at the festivity. The *verônicas* symbolize the purity and plenty of the awaited time of the Holy Spirit and are offered as a gift from the Emperor of the Divine to the devotees as a memento of, and gratitude for, the feast. The Emperor is the «*festeiro*», the person responsible for the administration and promotion of the festivity.

The verônica has a circular medallion shape handmolded from the fanid's sugar mixture, with symbols of the Holy Spirit. In Pirenópolis, the fanid is stamped with a mold that has the designs in low relief which, when pressed against the sugar mixture, leaves the mark of the drawings in high relief (Figure 1).

Figure 1. *Verônica de alfenim* and lead mold. Artisans: Terezinha de Arruda (*verônica*) and Sebastião Abrantes (mold). Pirenópolis, Brazil, 2013.

Photo: Amanda Geraldes.

Usually, female artisans produce the *verônicas* and male artisans make the shapes sculpted in lead molds. However, during the time of the celebration, the production of *verônicas* become a community and voluntary task, involving both women and men. The Emperor's house is where the production takes place, and for two weeks the community collectively participates in the making of the confection. Usually, the work is coordinated by women, but it is shared between the men who do the work of "pulling" the

sugar mixture, and the women who shape the fanid with the molds.

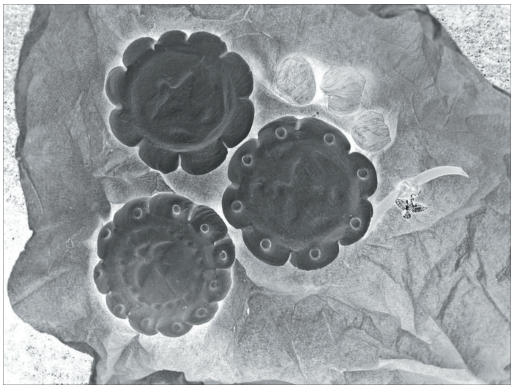

Figure 2. Verônicas given by the Emperor. Pirenópolis, Brazil, 2012.

Photo: Amanda Geraldes.

The Sunday of Pentecost is the height of the festivity. After the mass, a procession takes place – the imperial pageant – from the church to the Emperor's house. Everyone who has participated in the procession is organized in a line in order to greet the Emperor and receive the awaited *verônicas* of fanid – which have been blessed by the priest, conferring them the status of a sacred and religious relic confection (Figure 2).

The *verônica* affords the Emperor and the devotee exchange relationships and practices. These symbolic exchanges, of gratitude from the part of the *festeiro*, and devotion on the part of the participants in the feast, mean inclusion, in which all are equal irrespective of their social position, be it in daily life or in times of celebration.

In Portugal, during the festivities of the Empires of the Holy Spirit in Angra do Heroísmo, Terceira Island in the Azores, the fanid serve as offerings of fulfilling vows to the Holy Spirit in the form of *ex-votos*, in gratitude to a grace obtained. The fanid pieces are also offered in the festivals of Saint John and Saint Amaro. The fanid *ex-voto* constitutes an artifact-ritual and is characterized as a register of memory and devotion.

The anthropologist Teresa Perdigão (2016) explains that currently in the Azores Islands, the fanid is understood as sugar-molded figures that come in many shapes: doves, animals, flowers, boys and girls, heads, throats, crowns and many others. The fanid is the sugar paste, but in Azorean speech the small figures have taken the name of the confection: they are fanid made of fanid (Figures 3-4).

The fanid, a candy that is indispensable in the altars of the Empires of the Holy Spirit, is worked into different figures, shapes and sizes; as parts of the human body in the case of the *ex-votos*, or in any other shape in case they do not fulfill the function of a vow. Sousa (2018) clarifies that "the fanid adopts the most varied configurations, according to the situation that is at the origin of the vow, but the intention is always the same: to materialize in a piece of fanid the grace or miracle received and fulfill the vow made in a time of great affliction". The pieces laid on the altars are later put up for auction, and the proceedings are used by the responsible brotherhood to cover the costs of the festivity.

The practice of the auction encourages the production of pieces that are bigger in size and are more detailed. Perdigão (2016) affirms that the fanid reveals a feeling of belonging to the islands and evokes memories of festive moments such as the celebrations of the Holy Spirit, birthdays, weddings, and New Year celebrations, in sum, memories of the good days of festivities.

Figure 3. *Ex-votos de alfenim*. Artisan: Manuela Cardoso. Ilha Terceira, Açores, Portugal.

Photo: Álvaro Saraiva for the Crafts and Design Center of the Azores (CADA).

The production of fanid pieces is seasonal, that is, it is made especially for the celebration. Nevertheless, the artisans may receive orders for private celebrations such as weddings and baptisms – a practice that also takes place in Pirenópolis in Brazil. In Terceira Island, the fanid can also be found in some confectionaries, that exhibit them in their windows.

Figure 4. Azorean *alfenim*. Artisan: Olívia Pereira. Angra do Heroísmo, Ilha Terceira, Açores, Portugal, 2022.
Photo: Amanda Geraldes.

The celebration of the *Día de Muertos*, one of the most important cultural expressions in Mexico, encompasses a festive moment in which families remember their dead. Altars are prepared in public and private spaces, where photos in memory of the dead are displayed and several foods are offered, in order to share with the dead the plenty of life: the eating and drinking. Foods and drinks such as salt, water, tequila, breads, fruits, and the favorite dishes of the dead who are being remembered, are offered.

One of the food items that is considered typical, and which identifies the festivity in this ritual process is the fanid, which is molded into various shapes, even though the «*calavera de azúcar*» (sugar skull) is the most popular shape and considered traditional (Figure 5).

Integral to the festivities of the Muertos, the *Feria del Alfeñique* (the fanid market) has taken place in the city of Toluca since 1989 and is today considered one of the most important events of the celebrations. The fair starts in mid-October and lasts until the Day of the Dead. Apart from its ritualized use as a festive food, the fanid skull serves aesthetic and decorative purposes, as a memento of the celebration. The artwork in the pieces of fanid display an aesthetic appeal through the colors and details of the decoration of the skulls, which many times are identified with the names of the dead (Figure 6).

The production of the pieces of *alfeñique* for the *Día de Muertos* takes place throughout the year. The artisans start the work around mid-February and continue until October so that the pieces can be exhibited and traded in the *Feria del Alfeñique*. The fair is a cluster of individual stalls in which each artisan exhibits their work. Therefore, the alfeñique's production is individual, or in other words, there is no collectivity involved in the making of the fanid. However, it is possible that some artisans may have a private production hub, which normally involves their own families as it encompasses a family tradition that is passed from parents to children.

Figure 5. *Calavera del alfeñique*. Toluca, Mexico, 2019.
Photo: Amanda Geraldes.

Figure 6. *Feria del Alfeñique*. Toluca, Mexico, 2019.
Photo: Amanda Geraldes.

We understand that these three cultural expressions, albeit with distinct nomenclatures, shapes and uses, have converging points related to the ritualization of the confection in its celebratory practice, in

the elaboration of memories, the construction of tradition and of an identity mark unique to the festivities.

In this manner, considering the ritual dynamics of the three cultural expressions, it is possible to comprehend a spiritual relationship between plenty/prosperity in the Feast of the Divine Holy Spirit in Pirenópolis; the miracle/grace in the Empires of the Holy Spirit in Terceira Island, and the celebration of death/presence in the Day of the Dead in Mexico. Hence, plenty-miracle-death are celebrated and offer the fanid as a ritual object-food.

The fanid acquires this artifact-food-ritual status in the exchange relationships. According to Mauss' (2003) gift theory – in which the symbolic exchanges take place in a system of reciprocity, and in the triple collective obligation of give-receive-repay of material or symbolic goods – we understand that the fanid is a gift conceded and collectively exchanged by the Emperor with the devotee; from the devotee with the saint; and from the living with the dead. These symbolic exchanges are mutual, established in reciprocity and confer a ritualistic property to the performances in the festivities.

The food serves as a relevant identity reference that is used by the group as a symbol of an identity that has been built, affirmed and reclaimed for itself. According to the anthropologist Maria Eunice Maciel (2004), the elaborations and constant re-elaborations of foods passes through a historic process that is referenced in tradition and the concept of creating something unique, emblematic, a landmark or symbol of the identity of such group. Therefore, the verônica of fanid, the pieces and ex-votos of fanid, and the calaveras de alfeñique, also assume the unifying sense of identity of the celebrations that they are part of and serve as a symbol of such identity.

3 CONCLUSIONS

Food artifacts are part of the universe of material culture studies, a field that seeks to understand human experience from the tangibility of things: its objects and artifacts. Thus, material culture is the collection of things produced by mankind. The artifacts support the knowledge and memories, and their tangibility identifies culture from their morphology, their uses, signs and functions serve the historian as historical sources by localizing time and space and documenting the experiences of human life.

The fanid is a material artifact of culture, and a support of memories, languages and symbols. Artifacts acquire senses and meanings in their process of social interactions and journeys. In other words, it is in practice, from their uses and in the gestures of men that these meanings are constructed. Therefore, it is in this relational function that we need to seek to understand them, by locating these cultural material elements in their practices, functions, and their uses and consumption.

Studies of Food History and Culture are fundamental to consider heritages and cultural identities, as they carry out mappings, inventories, records of practices and know-how, and understand the elaboration of traditions, memories and identity references. To consider food as a material element of culture, artifact-heritage, and ritual object that marks identities and collective imaginaries is to think of the social construction of cultural processes, the invention of traditions, the choices of a people or social group, of its symbolic system and its language.

Elaborating a theory about a food heritage, the fanid, that connects the Mediterranean and the Americas, is a relevant proposal for the studies of heritage. The sugar route, in its migration from the Mediterranean to the Atlantic begins in Madeira Island. To consider sugar and the fanid is to consider a heritage built throughout the history of sugar expansion, which by the technical primacy of the Arabs, was refined and spread across Europe, and was later taken overseas across the Atlantic in an initiative of the Portuguese.

Despite the imperial violence and the harsh methods of conquest, colonization and slavery, it founded and built a world economy around a product that transformed humanity's history with new social and cultural structures, techniques and technologies, commerce and consumption, behaviors and practices. It is to consider the construction of identities from a sugar memory that permeates, still today and almost invisibly, the daily lives of cultures that celebrate the sacred in small pieces of sugar: the fanid.

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Experiencing and Envisioning Food: Designing for Change – Bonacho et al. (Eds)

The "Matchmaker": From food & literary studies to reception & memory studies

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ABSTRACT: The "Matchmaker" was a mini-individual wedding cake produced by the MSc in Innovation in Culinary Arts and Sciences (ESHTE), class of 2017-2018. This experimental culinary object was anchored in the students' literary analysis of Mr. Woodhouse, a central character of Austen's novel *Emma* (1816), and seemed to privilege his narcissistic traits of valetudinarian and whiner about marriage and food. As an object designed by the students the "Matchmaker" upholds their reading of Mr. Woodhouse's temperance under a scientific concern about food choices and what these imply. By combining literary analysis, archival research, and a nutrition's approach to foodways and food systems, the students were able to produce an act of reception which amplified the boundaries of conventional food genres - namely, recipe books. The fact is that, through Mr. Woodhouse, Austen seems to be engaged in remembering the rhetoric of gluttony and temperance.

Figure 1. MSc in Innovation in Culinary Arts (ESHTE), "Matchmaker" (2017-2018). Photograph and design by Ricardo Bonacho.

1 THE MATCHMAKER WAS

– according to Willis' definition of "acts of reception" – an integral part of the multisensory gastronomic experience '"A little tea if you please" 2.00′, i.e. a performative "interpretation or reading" of Jane Austen's novel *Emma* (1816) that took place at ESHTE (Escola Superior de Hotelaria e Turismo do Estoril, Portugal) on 7th April 2018 (Figure 1). Furthermore, the "Matchmaker" was – if we continue to use that same definition – a "most visible", and a *most edible* (we should add) part of that "interpretation or reading" of *Emma*, "in the form of" an experimental mini-individual wedding cake created by Mariana Carraro, a Brazilian student of the MSc in Innovation in Culinary Arts and Sciences (MIACC, 2017-2018). Such a culinary form of interpretation was conditioned, firstly, "by historically and culturally specific systems of reading […] learned and practiced by" that student as an individual reader "in complex relations to other readers" (Willis 2018: 33), and, secondly, by the multiple and diverse interactions among the various readers participating in "Receiving|Perceiving Jane Austen" (2017-2019), a sub-project of the University of Lisbon Centre for English Studies (ULICES) master project Receiving|Perceiving English Literature in the Digital Age (2016-).[1]

In 2017, Austen's death was being commemorated in Britain and all around the world, and our transdisciplinary research project Receiving|Perceiving English

1 On the "Matchmaker" as part of the multisensory gastronomic experience '"A little tea if you please" 2.00′, a performative "interpretation or reading" of a literary text, consider Chef Crenn's explanation of the meaning of her restaurant subtitle: "I had given the restaurant the subtitle Poetic Culinaria, meaning that the experience of dining there could be regarded as somewhat akin to reading poetry, as a series of expressions by which one might feel one's way toward meaning" (Crenn 2020: 179).

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Literature in the Digital Age joined in the celebrations by focusing on her writings, with very special emphasis on *Emma*. Thus, '"A little tea if you please" 2.00′ was the task assigned to the students and supervised by the researchers, members of the academic staff of MIACC, in collaboration with Escola Superior de Comunicação Social (School of Communication and Media Studies), Faculdade de Artes e Letras da Universidade da Beira Interior (Faculty of Arts and Letters, University of Beira Interior), and Faculdade de Arquitectura and Faculdade de Letras da Universidade de Lisboa (Faculty of Architecture and School of Arts and Humanities, University of Lisbon). The premise from which we started was similar to that of Raviv's "Food and Art: Changing Perspectives on Food as a Creative Medium", included in *The Bloomsbury Handbook of Food and Popular Culture* (2018): "This chapter will focus on exploring *food as a medium for art* (rather than a subject) and will examine the role of chefs at the intersection of food and art, within the larger narrative of food as a creative medium" (Raviv 2018: 197. Our emphasis).[2]

The title of the gastronomic reading of *Emma* performed by the MIACC team, in 2018 – '"A little tea if you please" 2.00′– is a quotation taken from Miss Bates' never ending prattle, in the episode of the Crown Inn ball: "Upon my word, this is charming to be standing about among such friends! And such a noble fire! – I am quite roasted. No coffee, I thank you, for me – never take coffee. – *A little tea if you please*, by and bye, – no hurry – Oh! here it comes. Everything so good!" (Austen 2005: 350). Our emphasis). Thus, chosen as a key to reading the novel, Miss Bates is a rather complex secondary character, in a lower social position, playing a major role in Emma's progress. Moreover, her characterisation as an enthusiastic consumer of tea, not coffee, implies a gendered postcolonial, intricate reading that posits "the tea-table as the seat of female power" (to borrow Volz's words (2017, n.p.) relating to *Pride and Prejudice*, although an elitist and imperial power.

Similarly, the "Matchmaker" "was deeply anchored in the analysis of Mr. Woodhouse's narcissistic traits of valetudinarian and whiner about marriage and food, even though its title pointed to Emma's central trait of relentless meddler in other people's private lives", as explained in 'Reception: "Jane Austen 2.00"' (Sousa, Coelho & Pires 2020: 117-138). Hence, "the ambivalent relation between the mini-individual wedding cake and its title apparently reproduced the traditional interpretation that the close, systematic interaction between the two characters [father and daughter] is decisive for Emma's coming of age" (*ibidem* 134). But is that all there is to it, or can the "Matchmaker" lead us to re-read Mr. Woodhouse in the light of the memory of "a rhetoric of dietary virtue" (Tigner & Carruth 2017: 4)?[3]

2 THE "MATCHMAKER" WAS A CULINARY OBJECT

innovatively created at a crossroads between arts and sciences, as part of '"A little tea if you please" 2.00′, the challenging multisensory gastronomic reading of Emma. Such a ground breaking experiment matched the spirit of MIACC, via its cross-sectional project assignment based on the Design Thinking method. First, the researchers in English literature (M.J. Pires, A. Coelho and A. Sousa) actively encouraged the students to understand some key concepts of literary criticism, and some fundamental information about the historical contexts in which the novel was written, and had been received until 2017; the selections of concepts, and of historical information were made ac-cording to those researchers' criteria, and the students were also actively encouraged to learn to apply the selected concepts and information to their re-creative readings of *Emma*.[4]

The research team at ESHTE (M.J. Pires and R. Bonacho) worked mostly on the curricular units of "Menus and Wines", and "Food Design", in order to provide tools which would allow for the students' culinary reading of the novel. Therefore, the emphasis was on the understanding and use of artistic forms of expression and visual communication as vehicles that relate to the perception and representation of food (from dish to space). These researchers then worked with other members of the academic staff in the following curricular units: "Culinary use of food products", "Food Safety & Nutritional Approach", and "Advanced Culinary Techniques" (Sousa, Coelho & Pires 2019: 44-47). Hence, the close dialogue among the research team, the academic staff (mainly C. Viegas and Chefs A. Lins, N. Félix, and T. Santos), and the students during the several tastings that followed (Figure 2) – "a domain much more versatile that goes beyond the flavours themselves [from the] first tasting, which has to do with the matching of flavours, how they are

2 For further details on the collaborations among the different teams from the Schools involved in "Receiving|Perceiving Jane Austen", see Sousa, Coelho & Pires 2019.

Concerning food as a medium for art, Raviv had already declared: "Although there is no lack of discussions of food in art, they focus on food as subject of the work and not on *food as a medium, as a vehicle for meaning independent of the subject of the piece.*" (Raviv 2010: 29. Our emphasis)

3 In relation to the tea-table as the seat of imperial power, and to sugar playing a crucial role at the tea-table too, see Rappaport, *A Thirst for Empire: How Tea Shaped the Modern World*, namely its first part, "Anxious Relations", on "how Chinese tea was absorbed into British imperial culture and its economy between the seventeenth and nineteenth centuries." (2017: 18)

4 For more information on these experimental readings of the novel, see Sousa, Coelho & Pires 2020: 130-132.

Figure 2. Screenshot from *Literatura Aqui* Episode 4, season IV (6 Feb 2018).

presented, their validation in terms of techniques, and the narrative created throughout the construction of such interpretations [of Mr. Woodhouse in particular]" (T. Santos in Lamares & Leal 2018).

In addition, the MIACC 2017-2018 cross-sectional project assignment, which combined the arts and sciences, brought to light the problems of sustainability and food waste. Thus, these current areas of interest clearly affected the students' readings as they would simultaneously be developing other food products – such as Paulo Vicente's work on biological yeast based on fruits and leaves of autochthonous plants in Portugal. Along with such food concerns, and the appropriate food choices and techniques (which implied an historical accuracy and the need to still innovate) there was undoubtedly an advantage from working as a team rather than following the kitchen brigade system (even though Chefs Santos and Lins surveyed the students' work). Bearing in mind, and balancing the historical and cultural distinctiveness of the past, and of the design of their present-day selections, the challenge consisted in creating a cohesive menu to materialize their "taste of the novel" (Looser 2017: 20).

Our transdisciplinary experiment convinced us that because they were producing their culinary objects in the 21st century, the students shifted their focus main-ly onto Mr. Woodhouse, and his extreme concerns about diet. This character, which had been conceived by Austen more than 200 years before their present re-reading of the novel, led to "the boldest interpretations [of Mr. Woodhouse]", again in Chef Santos' words (Lamares & Leal 2018). Accordingly, and to give just one example, the students created their culinary objects as finger food to better represent Mr. Woodhouse's anxieties about portion sizes (Figure 3).

2.1 *The experimental process*

Even if it may just be described as a mini wedding cake with caramel sugar, a filling of compote of red fruits and the simple coating of butter icing, the "Matchmaker" showcases more than just a recreation of elements reminiscent of the British culture. In terms of the historical research, the Brazilian student Mariana

Figure 3. Photo from the gastronomic experience '"A little tea if you please" 2.00′ (https://receivingperceiving.wordpress.com/).

Carraro started by following a sponge cake recipe from the beginning of the 19th century, included in Household Recipe Book (1830/2021), by Martha Lloyd, Austen's long-term friend who lived with Jane, her sister Cassandra, and their mother at the cottage in Chawton:

> Take a lb of fine flour well dried. Then take a lb of butter and work it very well with your hands till it is soft. Then work into it half a pound of sugar. Then take 12 eggs putting away half the whites, then work them also into your butter and sugar. Then strew your flour into your butter, sugar and eggs, by little and little, till all be in, then strew in 2 oz of caraway seeds. Butter your pan and bake it in a quick oven - an hour and a half will bake it. (Vogler 2016: 28)

Next, Carraro investigated the use of fruits and sugar, as well as the structure and shape of cakes in Austen's time; thus, she managed to balance the techniques, and food selections of those days with our contemporary health concerns, like the other students.

2.1.1 *Baking powder*

The industrial baking powder was carefully avoided in the "Matchmaker", since the food manufacturer and chemist Alfred Bird invented a modern variant of it as sodium hydrogencarbonate (NaHCO3) only in 1843, after Austen created Mr. Woodhouse. Until that year, the old flour raised yeast dough was just a fanciful sideline of breadmaking, adding "sugar, fruit, spice and caraway seeds", and being later "lighter and more spongy with eggs, which have their own raising power" (Grigson 1993: 297). In The Art of Cookery Made Plain and Easy (1805), Hannah Glasse had already explained the startling innovation from the 1720s of using eggs rather than yeast to make cakes rise, the method used in the sponge cake layers of the "Matchmaker" (Figure 1).[5]

5 For further information on how a dawning industry raised, see Civitello 2017.

2.1.2 *Fruits and fruit filling*

The choice of using fruit filling in this same culinary object would not be unusual at the beginning of the nineteenth century. From the Stuart master cooks onwards, we can already find fruit and sugar in cakes: "saffron, caraway seeds, orange- or rose-flower water, sack earthy musk and quantities of dried fruit […] glazed with a solution of grated sugar and rose-water spooned over the top [of cakes]" (Colquhoun 2008: 135). Apples, so acclaimed by Mr Woodhouse, were often used in tarts: "Miss Bates, let Emma help you to a little bit of tart–a very little bit. Ours are all apple tarts. You need not be afraid of unwholesome pre-serves here. I do not advise the custard" (Austen 2005: 24). Fruit was really very common and used in many ways at the time, as horticultural catalogues boasted more than a thousand types of apples, and seventy varieties of gooseberry, along with pears, and these fruits were typically used to either decorate the table or be baked in a tart (Colquhoun 2008)

However, it was not fruit that people looked for when the gap between breakfast and dinner widened and they began to feel pangs of hunger; it was rather common for them to turn to "cold meats, pickles, cakes and jellies [which] were laid out on the side-board" (Spencer 2003: 256). Also, by the end of the nineteenth century, food habits would have altered radically, considering that "those families that were not struggling on subsistence began to eat fruit in the form of jam and the imported banana, which supple-mented or replaced apples as the only fresh fruit eaten by the urban poor" (*ibidem* 267-8). As such, the im-portance of using fruit compote in the "Matchmaker" implied, not only that fresh fruit was more easily ac-cessible for those with a higher income, like Mr. Woodhouse (still true now that global food prices have been rapidly rising), but also that there was then a way of reducing fruit waste through the use of whole fruit or large pieces of fruit preserved in sugar syrup (food waste reduction being once again an urgent problem to be addressed by food systems).

Street pastries included "meat and fruit pies, boiled meat and kidney puddings, plum duff or pud-ding, and an almost infinite variety of tarts, cakes, buns and bis-cuits" (Spencer 2003: 263). Thus, fruit was very of-ten incorporated in pastries, as plum dough, the popular Yorkshire pudding with raisins, raspberry biscuits, bowlas, and jams or open tarts with a little pre-serve in their center. Mr. Woodhouse even recommends apples to be baked three times, not so much with the aim of taking advantage of the residual heat of the ovens which had been working all day, but to better reduce them to the pulpy state preferred by him – Miss Bates comments "only we do not have them baked more than twice, and Mr. Woodhouse made us promise to have them done three times—but Miss Woodhouse will be so good as not to mention it" (Austen 2005: 256). In reality, "there was a great deal of prejudice against eating fruit in its raw state throughout the eighteenth century, which Mr. Wood-house retains. Raw fruit was believed to cause not merely indigestion, but all manner of ills, including the plague" (Lane 1995: 67). Old recipes advise them to be peeled and halved, with a little water and sugar, and that was the case with the "Matchmaker".

2.1.3 *Sugar and the Wedding-cake*

The option of using caramel in the "Matchmaker" arose from the English being big consumers of sugar (Flandrin & Montanari 2000: 446) unlike other Europeans, for whom it only became truly popular in the nineteenth century, even if the upper classes were confirmed consumers from the sixteenth century onwards. As mentioned, Mr. Woodhouse boasts of having "no unwholesome preserves" at Hartfield; also, the students' attention was drawn to "the pride of an English country gentleman in living off his own produce" (Mennell 1996: 132). They were further stimulated by other culinary objects represented in *Emma* – sweet puddings with a pastry case, mostly apple and apricot tarts, mince pies and apple dumplings.

In relation to the "Matchmaker", Carraro was in-spired by the traditional Brazilian "Bem-casados" (literally "happily-married") – a variation of the Portuguese "Casadinho" (literally "sweetly married") – that is nowadays best known and indispensable at wedding parties in Brazil, although very important too, under different names, in other celebrations, like christening and birthday parties. Its conventional soft and smooth texture is given by the two halves of a sponge cake, with a filling based on condensed milk and a slightly crunchy topping. However, bearing in mind Mr. Woodhouse's food anxieties and his contemporaries' worries about the diseases caused by sugar overconsumption, the students had to research about the preparation of the fatless sponge-cake at the time of Austen's *Emma*. In those days, the cake was indeed made only with flour, eggs and sugar, and, as raising powder was not available before the 1850s, its lightness had to come from the amount of air that would be beaten into the mixture; previously, in 1747, Hannah Glasse had already pointed out that the mixture should be beaten for an hour.

Also requiring a great deal of labour, according to Lane, was the eighteenth-century "bride-cake" recipe, recorded in the Townswomen Guild's collection *Good things in England* (1954), and including the following ingredients: fine flour, well dried; fresh butter; loaf sugar, pounded and sifted fine; mace; nutmeg; eggs; currants, picked over and dried well; sweet almonds, blanched and cut lengthwise very thin; shredded orange and lemon peel; and brandy. An important detail of its preparation consisted in beating the whites and yolks of the eggs separately, the latter for half an hour. Regarding this bride-cake decoration, Lane adds: "The recipe includes a marzi-pan, or 'almond icing', and a white of 'sugar icing'. It appears that in the eighteenth century wedding cakes were not decorated, but were left plain white"

(Lane 1995: 68). Although this would agree with the simplicity of weddings before the Victorian era, Carraro and the other students decided that she would do differently – she used caramel sugar sifted fine, and butter cream in a reference to the ingredients of the "bride-cake", but coloured it with natural fruit ex-tracts, as a technique also reminiscent of that period in history.

A wedding-cake is actually the very first food to be mentioned in the novel (apropos of Mrs Taylor's wedding, a character also central to the development of Emma) announcing one of its motifs: "weddings, the match-making that leads up to them, and the changes that come in their wake. (…) Wedding-cake is surely the ultimate in a foodstuff designed to be hand-ed round among friends and eaten not for its own sake only but in celebration of a joyful development in the life of a community" (Lane 1995: 154). But the Westons' wedding-cake appears to be a great distress to Mr. Woodhouse, since we are told his "own stomach could bear nothing rich" (Austen 2005: 18), and he assumes it will be unfit for everyone else, i.e. any-thing unwholesome to him would be a reason for him to earnestly try to dissuade them from having any wedding-cake at all, in this case. But he is not well succeeded, nor are his efforts to foist his own favourite foodstuff, gruel, upon everybody.

2.2 *Mr. Woodhouse – valetudinarian or virtuous eater?*

Made by a "faddy, anxious eater" (Mennel 1996: 295), Mr. Woodhouse's recommendations do not appropriately find much favour in his Highbury world. That was not the case with the "Matchmaker", and the other culinary objects produced by the students, because they were able to understand our contemporary uneasiness in the presence of nutritional problems, such as the overconsumption of sugar and sweets, and the correlative, imperious need to burn calories. Furthermore, these 21st century students (doing the MIAC curricular unit "Food safety & Nutritional Approach") were being trained to become good communicators, and were already able to understand that the perception of the amount of energy we need to balance the intake of those calories is generally still not very clear for us nowadays; so, along with the "Matchmaker", and all the other culinary objects, guests were offered a tag suggesting everyday physical activities which better illustrated the equivalence between food calories, energy, and time. It was up to the guest to take one of those tags, along with any of the culinary objects presented on a tray, and to try to understand that equivalence, deciding on his/her lifestyle choices for the rest of the day (Figure 3).

3 THE "MATCHMAKER", AS AN INTEGRAL PART OF

The multisensory gastronomic experience '"A little tea if you please" 2.00′, has led us to re-read Mr. Woodhouse in the light the memory of "a rhetoric of dietary virtue within transatlantic literary culture", which can be traced, at least, "from Sir Thomas More's sixteenth-century prose work Utopia to modern manifestos on vegetarianism" (Tigner & Carruth 2018: 4). More does indeed declare that "the pleasure of eating and drinking […] should be sought, but only for the sake of health, for such activities are not enjoyable in themselves but only insofar as they counter the unnoticed encroachments of ill health" (Wegemer & Smith 2020: 192). However, a few lines down in Utopia, it is also stated that it is "quite mad for someone to despise a beautiful figure, to deplete his strength, to turn agility into torpor, to wear out his body with fasting, to ruin his health, and to scorn the other favours bestowed by nature, unless he neglects his own good so as to work more avidly for the good of others or the public welfare, and in return for his effort he expects greater pleasure from God" (*Ibidem*: 193). The fact that neither of More's hypotheses seems to apply to Mr. Woodhouse might even appear to confirm the general reception of this character as a valetudinarian and a whiner about food; nevertheless, it needs to be further researched whether Mr. Woodhouse can indeed be re-read in light of a certain memory of a literary rhetoric of dietary virtue, as we have suggested through our interpretation of the "Matchmaker", thus turning him into a more complex, controversial character than he is already considered to be.

For the moment, let us evoke the premise, presented in Törnquist-Plewa's, Andersen's and Erll's "On Transcultural Memory and Reception", that 'no mediation of memory can have an impact on memory culture if it is not "received" – seen, heard, used, appropriated, made sense of, taken as an inspiration – by a group of people' (Andersen & Törnquist-Plewa eds 2017: 3); on our part, at least "tasted" should, of course, be added to their list of forms of reception. In consequence, they also declare that "the analysis of a specific memory representation" – in our case, the analysis of the "Matchmaker" – "will often turn out to be simultaneously a study of the reception of an older memory by the producers of this new representation." (*Ibidem*: 6) – i.e., our analysis of the "Matchmaker" has been simultaneously a study of Carraro's 2018 reception of Mr Woodhouse, produced in interaction with all the other members of the MSc in Innovation in Culinary Arts and Sciences team.

A new stage in our research was hence prompted by the "Matchmaker" as an act of reception. Sitting at the crossroads of food, memory and literary studies, we will start by examining A. Assmann's especially fruitful distinction between the concepts of memory as ars (i.e. a process of storage) and memory as vis (i.e. a process of remembering). According to her, the former aims "to provide safe storage and identical reproduction of the relevant historical information" (2011: 17), whereas the latter "is basically a reconstructive process of remembering", and "always starts in the present", thus becoming inevitable that "at the time when the memory is recalled, there will be shifting, distortion, revaluation and reshaping" (19). As such, memory as vis is an "immanent power", based on the "unavoidable interplay between remembering and forgetting" (20). In Assmann's view, therefore, "new forms of memory […] open up an access to the past […] distinct from and complementary to that which is provided by historical scholarship." (6) Will one of those accesses to the past be opened by our analysis of Mariana Carraro's "Matchmaker" as an act of remembrance of "a rhetoric of dietary virtue within transatlantic literary culture", traced by Tigner and Carruth, but only "from Sir Thomas More's […] Utopia to modern manifestos on vegetarianism" (2018: 4)?

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Feeding the metropolis. Exploring ways to map food procurement in Barcelona

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UPC Barcelona TECH, Barcelona, Spain

ABSTRACT: This article presents some graphic explorations to represent urban food procurement in Barcelona, a metropolis characterised by a unique system based on 90 public market halls and 76 weekly open-air markets that allow access to groceries and catalyse retail and proximity services around them. The research is part of a larger investigation that sustains the hypothesis that urban form is closely related to food supply systems so that the way in which a city feeds its citizens constitutes a unique 'foodprint', related to its compactness, density, diversity and equity.

1 INTRODUCTION

1.1 *On mapping*

The disciplines of architecture and urban design have representation as their main communication tool. However, in recent years, the possibilities of access to information – digital archives, open cartographic sources – and the emergence of geographic information systems have shaken the way of representing and explaining issues that were until recently linked to the physical condition of places (Gheysen et al., 2022).

This research is based on exploring ways of representing as a tool for understanding metropolitan phenomena. Open databases and fieldwork are the main sources of information to develop the hypotheses. GIS geographic information systems and two- and three-dimensional CAD drawings are the fundamental tool used for the elaboration of a multi-scalar atlas that documents the urbanism of food systems in Barcelona metropolis.

1.2 *On food systems*

The research starts from the hypothesis that the way in which each household is supplied with food – the type of edibles, the architecture of the places where they are purchased, the distances that must be travelled to reach them, or the type of transport that must be used – determines the shape of the city and is different for each metropolis (Gómez-Escoda & Fuertes, 2022).

The distribution of suppliers in a metropolis is one of the indicators that measure the quality of life of its citizens, since their location in the territory guarantees equality of access to food. In addition, by offering fresh food, providers make it possible the access to a daily healthy diet. The investigation refers to an urban reality in which food security – understood in terms of the accepted definition, when 'all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life' (Food and Agriculture Organisation, 1996) – is guaranteed.

The discussion is international in scope, although the research is based on a specific case study and, consequently, the data presented has a local character: the exemplary nature of the case and the approach methodology allow comparisons to be made with other metropolitan realities in the international north.

1.3 *A case study: Metropolitan Barcelona*

The Barcelonan food procurement system is composed of 90 public market halls and 76 weekly open-air markets, and complemented by a scattered constellation of private grocery shops and supermarkets, so that food suppliers, in a number of 12,108 represent a 13.5% of the metropolitan commercial fabric.

Due to the compact condition of Barcelona, a quadruple reading at different scales is proposed to explain the food system and is developed in the paragraphs below: that of detail, in the ecotones in which vendors and customers interact; that of neighbourhoods, in which markets catalyse service centres; the urban one, in which synergies between nodes are established; and the metropolitan, in which the system is deployed making visible the superposition of elements of different scales and conditions of ownership.

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2 MAPPING FOOD PROCUREMENT ECOTONES

Ecotones are places where different ecosystems interact (Forman, 1986). According to this definition, grocery stores can be understood, as a contact point between two flows: on the one hand, the logistics chain of edibles, and on the other hand, the domestic routine of food procurement. In the case of market places, this interface materialises in the specific shape of a counter that relates customers and vendors.

In there, while customers stroll along strips of stalls to select the most convenient product; vendors start earlier in the morning their working hours to unbox food and display it in the most appealing way. This ecotone separates two universes with different functional requirements that involve an asymmetrical layout. Customers stop by a stall to get what they need and carry their purchases in a basket or a shopping cart; vendors, on their side, optimise the time needed for preparing, serving, restocking, or cleaning. These activities have a spatial translation in counters, scales, waste disposals, storage or refrigerators.

The addition of stalls, all with similar needs, produces a node with an impact that overflows towards the neighbouring fabric. Historically, these conglomerates of tables full of edibles were located on the public space, along streets or extended on squares. Given the conflicts between this functional activity of food procurement and the rest of ordinary urban activities, markets were covered and converted into market halls (Fuertes & Gomez-Escoda, 2020) with a more controlled exchange of flows with the city. Nevertheless, the contemporary market system has recovered this idea and combines both covered and open-air markets – in a permanent or temporary condition – sometimes establishing synergies with each other.

Figure 1 shows the close relation between Boqueria market hall – bottom down – and the farmers' market on Sant Galdric square – top left. A close up to the image shows how, despite the differences in organisation between them, the logics of front-and-rear structure define both food procurement spaces.

At this drawing scale, the representation of both food and the people who interact selling and buying are essential to explain food procurement systems, despite the fact that the image captures an ephemeral daily act that, no matter how much it is repeated day after day, will always do so in different ways.

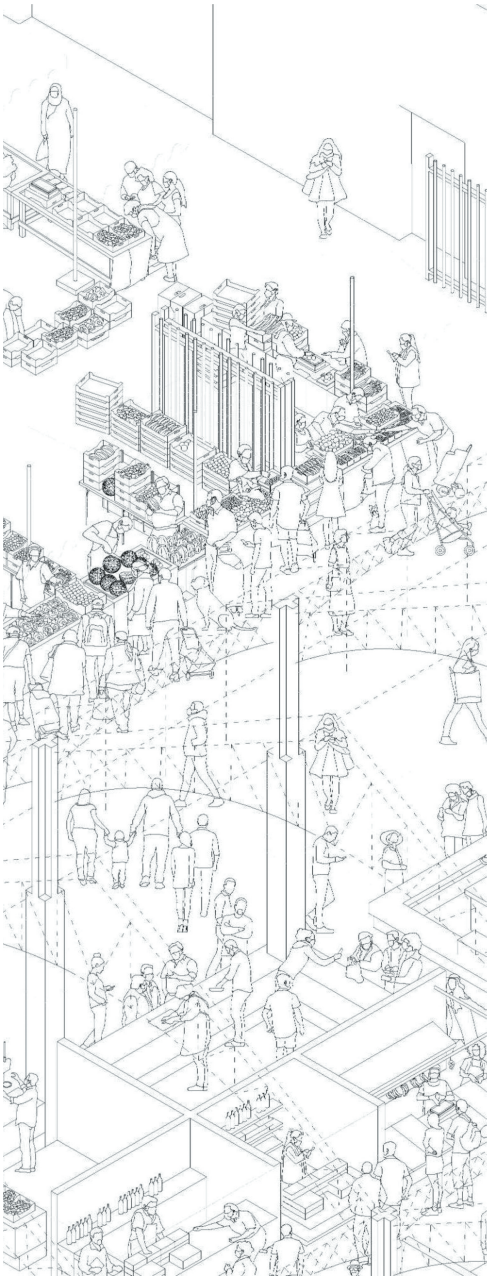

Figure 1. A daily scene in Sant Galdric square and Boqueria market hall (fragment). Source: Authors' elaboration.

3 MAPPING NEIGHBOURHOOD NODES

Market halls can be observed as the core element of a neighbourhood node with the ability to activate a commercial constellation of related and complementary stores around them .A wide diversity of building typologies allow their integration into a variety of urban fabrics: the first halls were erected in more compact and dense urban fragments, but they have also adapted to regular grids of blocks, massive housing estates or open low-density fabrics.

Market halls built between 1840 and 1940 defined a canonical architectural model. Their height and openings wove a link with the urban environment inherited from the former street markets and offered

a quality of light that kept their condition of open public space and protected goods and people from the adverse atmosphere conditions.

Later markets, built in the second half of the 20th century, were characterised by a shift towards a progressive artificial interior environment. Although designed to generate a new contemporary image – based on distinctive roofs of moulded reinforced concrete membranes – these buildings largely disregarded the metabolic nature of the old markets.

Since the 1990s, a small group of new buildings were designed to integrate in a puzzle of varied facilities – along with a library, a community centre, a health centre, an elderly home or a nursery – and contribute to a more complex urban node that increases the time slots of use and thus the intensity of activity in the surrounding public space.

In other metropolises, these structures were deemed obsolete and dismantled after the 1970s. Markets no longer fitted in with the nature of public space and economic activity that planners, architects and politicians had in mind for reshaping modern city centres. However, the very persistence of this model in Barcelona allowed the new urban policies initiated at the turn of the century to consider markets as a tool for revitalising small neighbourhood nuclei.

Today, various formats of weekly markets complement the food procurement system on an intermittent basis. They operate in public spaces and their number is almost as significant as that of permanent halls, although the grocery offer rarely includes meat and fish. Temporary markets have become a tactical instrument to complete the metropolitan food system, standing alone in areas without permanent structures, but also close to market halls or in squares originally occupied by them.

The capacity to integrate markets into almost any type of fabric suggests a strategy that not only addresses the parameters that make for a healthier city, but also provides wealth to the market hall system, so that nodes can cluster and complement each other.

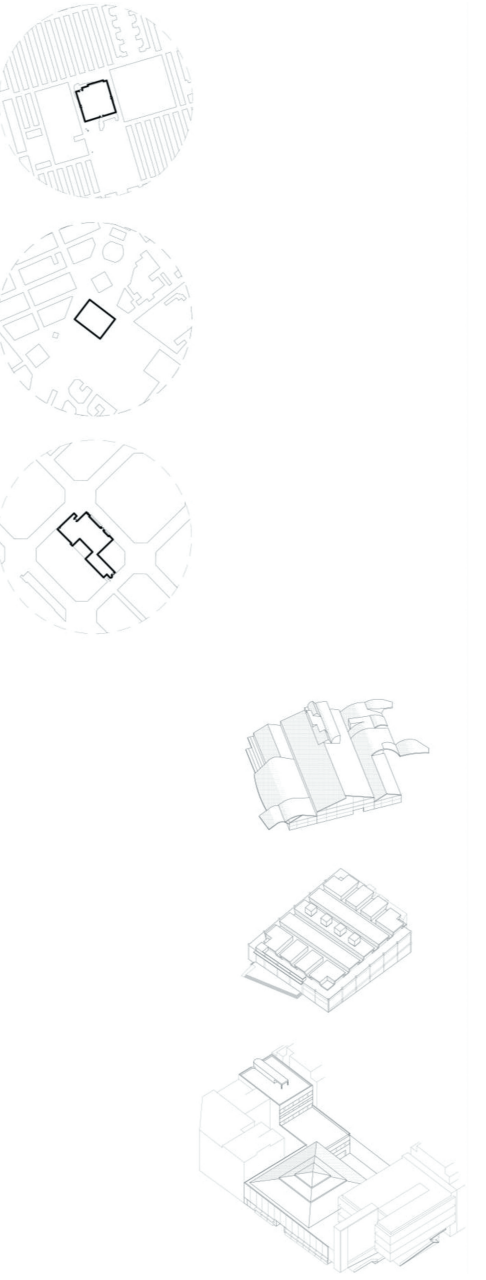

Figure 2. Three nodes and three market halls corresponding to the three aforementioned periods. Barceloneta (Barcelona, 1884, renovated in 2007), Les Planes (1974, Cerdanyola del Vallès), and Sagrada Família (Barcelona, 1993). Source: Authors' elaboration.

4 MAPPING URBAN SYNERGIES

The two-dimensional multi-scalar reading of the metropolitan food system shows that while the distribution of food stores can respond to a logic of clustering (Sevtsuk, 2020) around market halls, the distribution of the markets themselves responds to central-place reasons (Christaller, 1933) and are placed at relative distances establishing a network of competing facilities.

According to official data, groceries are mostly bought on trips originating in the place of residence: 77.4% of purchases of fresh food are made in the home neighbourhood (Diputació de Barcelona, 2019). As a consequence, the way to or from the markets are made on foot, which allows establishing a very direct link between the geography of the food providers and households, and turns market halls into nodes that catalyse daily journeys.

Given the compactness of the metropolis, directly translated into the food system, the synergies between market halls can be examined to consider

Figure 3. Hypothesis of 'foodpaths' between metropolitan market halls (fragment). Source: Authors' elaboration.

them as triggers for the use of urban space. The integration capacity of market halls in almost any type of fabric makes it possible to imagine a strategy to endow the system with greater richness, so that the nodes can be grouped together and complemented by soft mobility networks that connect them and allow pedestrian synergies.

On the one hand, the distance between each market and its closest pair has been mapped and measured neutrally, disregarding topological conditions that would make it preferable to move to a more distant market than to a closer one. The resulting drawing (Figure 3) makes it possible to think of a system of nodes that goes beyond the limits of the market buildings, turning the places of food trade into the triggers of a higher quality public space. From this reading of the city based on the connections between markets, the greatest distances are presented as an opportunity to house an open-air market that allows the system to be better interwoven.

On the other hand, 6% of the commercial premises on the ground floor of the city of Barcelona are empty. Although the figure varies on a metropolitan scale, this fact would allow thinking that those which are located in the new found food paths could work as satellites of the market halls to strengthen the synergies of local microcentralities.

Figure 3 represents a fragment of the metropolis in which clusters of two, three, or four markets are drawn in a hypothesis that the minimum paths that join them would be the ideal places to strengthen the system and convert these small neighbourhood nuclei in larger metropolitan centres.

5 MAPPING THE METROPOLITAN SYSTEM

Food providers are one of the essential services whose distribution in the metropolitan space determines local transport models (Moreno et al., 2021).

The 90 market halls, the 76 weekly open-air markets and the 12,108 grocery shops constitute an intense and extended robust system in the metropolitan territory of Barcelona.

The latest available data obtained in a multi-response survey (Diputació de Barcelona, 2019) shows how fresh food purchases are distributed among supermarkets (62.3%), food shops (58.5%) and market halls (27.0%). The public nature of the latter makes them exceptional nodes that, due to their position and scope and despite the figures, have the potential to sustain the metropolitan food system.

The figures also show an increase in purchases in weekly open-air markets (10.1%) and direct from producers (9.3%), explained by a desire to obtain local food that the markets are in a better position to offer than private providers, whose distribution depends on large-scale logics and is less linked to the nearby territory. Despite occupying the third position in surveys on consumption habits, market halls are activity attractors in neighbourhoods and municipalities, bringing together around them the proliferation of other food retail establishments and making food supply a catalyst for urban life (Fuertes & Gomez-Escoda, 2018).

A key fact to understand the potential of the markets is their close relationship with households: by looking at the distribution of the population of each

Figure 4. Complementarities, tangencies and overlaps between public and private food suppliers (fragment). Source: Authors' elaboration.

metropolitan city according to its proximity to a market hall, it is possible to observe that an average of 32.21% of metropolitan citizens have a municipal market building within a 5-minute walk; 45.83% have it at a distance between 5 and 10 minutes; 13.9 almost 14% have it within 15 minutes and only 8.06% of metropolitan citizens must travel a distance greater than 15 minutes to go shopping at the market hall. That is, 78.04% of the population (2,568,682 people over 3.2 M) can buy their fresh food in a market hall less than 10 minutes away from their place of residence, which makes the dense and compact Barcelona metropolis an example of proximity in the supply of the most essential of goods: food.

These figures together can lead to a synthetic image of metropolitan food distribution (Figure 4) that presents complementarities, tangencies and overlaps between one system and the other. It represents embedded in the urban fabric all the food providers and the proximity catchment areas at 5, 10 and 15 minutes from each public market – whether covered or open – so that the 'underserved' places and the 'hyperfed' are revealed.

6 FINAL CONSIDERATIONS

Food supply elements guarantee access to fresh food and, in the first instance, qualify a territory as self-sufficient, or well supplied, as a food oasis, one could say. The design and territorial distribution of the elements that make up the system – grocery stores, supermarkets and market halls – determine the good behaviour and the optimization of these essential premises.

To draw attention to this crucial question, the research is based on the exploration of ways of representing in a comprehensive manner both to ordinary citizens and to the specialised scientific community, as food systems appeal both to a daily activity and logistics chains with a great impact on the health of the metropolis.

Research on urban food systems can only be coherent and complete if it draws together food, people, interactions, flows, routes, architectures and city fragments. This ongoing work tries to do so based on an exploration at different scales – from the stall to the market to the urban fabric of the neighbourhood to the metropolis – and with different techniques – isometrics, plans, route diagrams, isochrones graphs – of the case of Barcelona, with the aim of developing a universal language that can be used to explain other case studies.

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Experiencing and Envisioning Food: Designing for Change – Bonacho et al. (Eds)

Making data digestible

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ABSTRACT: Physicalising data affords new kinds of interaction that open opportunities for meaning making. In our research, we consider how using food as the material for data physicalisation might expand the impact of this emerging field of practice in relation to Food System transformation. Food is sensorially rich, culturally and politically potent, and environmentally impactful; its resonance may be felt keenly at a range of scales from the personal and situated, to the systemic and global. To examine the impact of using food to construct data, we discuss three examples: i) the launch of a public Food Lab; ii) a temporary installation focused on food waste and sustainability; and iii) a short design research masters project on food and sustainable futures. Across these cases food acts as icebreaker, prompt for new thinking and sustenance, as well as a potent vehicle for design experimentation. In examining them, we unfold the ways that using food as data may make data more digestible, and thus more impactful, for different contexts and actors.

1 GENERAL INTRODUCTION

1.1 *Food system data*

Data is an inseparable part of people's lives. Every day, large amounts of data are produced, captured, transferred, transformed, and stored by individuals, institutions, organisations and nations the world over. Our research is concerned with the Human Food System, and the challenge of raising awareness about its social and environmental impacts, towards systemic change. The human food system is responsible for 20-40% of greenhouse gas emissions in every country and worldwide (Rosenzweig et al. 2020). Adding to this impact, by 2050 the world's food demand is expected to increase by 60% due to urbanization and continuous population growth (Alexandratos & Bruinsma 2012). Furthermore, food insecurity is a growing concern – in 2021, around 2,3 billion people were moderately or severely food insecure (FAO et al. 2022). These numbers indicate significant environmental and societal challenges that must be addressed if we are to have a fair and just food system for all.

Food System data is readily accessible on the internet, including through social media, where NGOs use social marketing to expand their reach (Wisetsri et al. 2021). The impact of these, often ephemeral, information encounters is, however, unclear.

Data must be accessible and understandable if it is to be impactful (Huron et al. 2014) – if it is to resonate with people, so that they take note and, from there, take action. This move from knowledge to action is key to societal change and, like food system transformation, must unfold individually and systemically.

To open up thinking about how to expand the impact of food system data, we turn to the emerging practice of data edibilization (Wang et al. 2016) – constructing physical manifestations of data using food. We consider if making food system data edible might make it more digestible, such that it prompts critical reflection on food system transformation and, from there, prompts people to be in action.

We use three contexts to explore these ideas: i) the launch of a Food Living Lab; ii) a temporary installation about food waste and sustainability; and iii) a three-week design research master's project on food and sustainable futures. Through this work, we make tentative steps towards expanding the impact of data edibilization towards being a tool for societal change-making. The research is part of FUSILLI[1], a four-year Horizon 2020 project whose aim is to foster the transformation of the food system in 12 European cities.

1 https://fusilli-project.eu

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Kolding, Denmark, where this research takes place, is one of the twelve cities.

2 EDIBLE MEANING-MAKING

2.1 *From physicalisation to edibilisation*

It is almost a decade since Jansen et al., (2015) coined the term data physicalisation for the practice of constructing physical manifestations of data. Data physicalisation has since been explored through artistic representatiions using environmental data (Pigott et al. 2022); for novel engagement with highly personal data (Panagiotidou et al. 2020); and to serve as instruments to be applied to everyday problem solving (Jansen et al. 2015). These explorations, and others, demonstrate many advantages of making data tangible. For instance, when experienced in 3D forms, graphs become more memorable for people and lead to greater impact of their experience of the data. Adding interactivity to physicalisations has been shown to further enhance people's capacities for reflection and meaning-making (Karyda et al. 2021).

A wide range of materials are used for physicalisations. Examples include using sound to sonify data (Barrass 2016); developing 3D graphs (Jansen et al. 2015) and interactive and static data sculptures (Kosminsky & de Oliveira 2021) using everyday materials such as beads and iron wires; creating living physicalisations, using plants (Botros et al. 2016) and more. Only recently, food has been use in systematic and intentional ways for physicalising data, with the results described as data edibilisations (Wang et al. 2016; Mueller et al. 2021).

2.2 *The potential of edible data*

Using food as a medium for physicalising data shows great potential. Food affords new kinds of interaction with data that open up new opportunities for meaning making. Data cuisine[2] is an early example of data edibilisations that was developed outside of research. Curator, Susanne Jaschko and data visualisation expert, Moritz Stefaner, developed a series of workshops that bring together chefs and communities to create edible physicalisations of data that is important to them. The project specifically focuses on exploring the language of food for communicating information. The range of approaches they use vary from representational graphs in tangible form, to more abstract representations such as a dish cooked from ingredients gathered within a specific time frame.

In other examples technology can be core to data edibilization. "Cyber Wagashi" uses wasabi to represent weather data ('CYBER WAGASHI | OPEN MEALS' n.d.), bridging two kinds of technology – a satellite data platform and a 3D food printer – to physicalise the data. The aim of yber Wagashi is to make people "feel" the climate of the day by tasting it. Similarly, Tasty Beats (Khot et al. 2015) physicalises heartbeat data through consumable drinks, allowing participants to combine data and exercise in a pleasurable experience.

Despite these rich and intriguing examples, food remains an underexplored medium for physicalising data as an inseparable part of everyday life practices. We hope to expand this area of concern. Wang et al., (2016) describe data edibilizations as affective, rich, memorable and social. Mueller et al., (2021) identify four themes that guide design engagements with food: form, commensality, ephemerality and emotional response. They describe engagement with data-food as a multisensory affective experience with great potential. We build on their work to take data edibilisation into the realm of food system transformation.

3 THE THREE CASES

We explore data edibilisation in three contexts: i) the launch of a public Food Lab; ii) a temporary public installation focused on food waste and sustainability; and iii) a short (three-week) design research masters project on food and sustainable futures. Each context affords new ways of understanding data due to the ways that food was used to represent the data, as well as the kinds of interactions the physicalisations afforded. We now describe the three cases.

3.1 *Food lab launch*

Food Lab is a food living lab for community-based experimentation and co-creation of sustainable food futures[3]. Food Lab is based in Kolding, Denmark, and was launched November 2021. For the launch, we invited local food stakeholders, including politicians, municipal representatives, educators, entrepreneurs, farmers, representatives of the water and energy companies, a rewilding consultancy, a poet and more.

Any good launch involves food. Food Lab launch was no exception. It included a buffet of edible data, prepared using rescued surplus foods (Figure 1). Both the data and the foods were provided by Food ReFormers – a local NGO who focus on food waste and surplus[4].

Food Reformers run a community fridge from the front garden of the building where Food Lab is situated. The fridge is refilled daily with surplus foods rescued from local supermarkets before it is thrown into dumpsters. The food is within its use-by date, but does not have enough time left

2 https://data-cuisine.net/

3 https://koldingfood2030.dk/index.php/food-lab-2/

4 https://www.facebook.com/foodreformerhttps://www.facebook.com/foodreformer

Figure 1. Four data edibilisations prepared for the food lab launch.

to make it suitable for sale. At the community fridge, people can help themselves to this food any time of day or night. Within six months of its use, the community fridge saved 6,3 tons of surplus food that was being disposed of by local supermarkets.

Our buffet represented four datasets. The aim was to prompt discussion around the local food system:

a) ***more-than-food*** was a pile of pastries and bread (Figure 1a). In Denmark, these foods serve for social rather than nutritional needs.
b) ***don't forget your roots*** was a beetroot and carrot soup made from foods of unknown origin, collected from supermarkets without packaging (Figure 1b). According to the community fridge, around 40% of the food that they collect is without packaging, and thus lacks information on product nutrition and origin.
c) ***food survivors*** represented the amount of food saved by donations in Denmark yearly (Figure 1c).
d) ***travel distance*** physicalised the country of origin of each ingredient of a guacamole and the distance travelled to arrive at our table, with labelling and strings that expand out from the bowl of food. The distances the ingredients travelled was physically scaled and took up significant space on the table (Figure 1d).

Compared to the corpus of data edibilisation (see for example (Mueller et al. 2021)), the food was consumed by individuals who had a stake in the data, and who were at the event to reflect on how food is treated locally. The physicalisation, therefore, aims to not only prompt discussion but to also influence decision making. While we have no evidence that it contributed directly to decision-making, on the night it prompted vibrant discussions among key decision-makers about food waste, food practices, sustainability, and food system transformation challenges.

3.2 *International Park(ing) Day*

Our second case took place during Park(ing) Day, an annual "global, public, participatory art project" in which "people across the world temporarily repurpose street parking spaces and convert them into tiny parks and places for art, play, and activism."[5]

On Park(ing) Day 2021 in Kolding, FoodReFormers installed a dining table for five, across two parking spots outside Food Lab. Similar to the Food Lab launch, the installation used rescued surplus food to physicalise data related to this food. The set-up included a dining table with five "dishes" (Figure 2). A menu card next to each dish introduced relevant statistics.

The physicalisations were in most cases quite literal, so as to be easy to digest by a broad, self-selecting audience. The aim was to foster discussion with random passersby.

Dishes included:

a) A selection of cold cuts in a tall vase, representing the number of animals slaughtered every year – the diversity represented through different coloured packaging (Figure 3a). This dish highlighted that 20% of global meat production is wasted annually (Karwowska et al. 2021).
b) A kilo of bread (Figure 3b). The accompanying menu card complemented the representation by showing that a kilo of wasted bread equals 1600 L of wasted water.
c) an empty dish to communicate food waste reduction (Figure 3c).
d) five small spice containers, three on the plate, two off (Figure 3d). This dish was meant to physicalise a 68% decline in global vertebrate species populations between 1970 and 2016. (WWF 2020).
e) three packs of crackers, one sitting outside the dish to indicate that 1/3 of food is being wasted worldwide[6] (Figure 3e).

5 https://www.myparkingday.org/
6 https://www.saveonethird.org/

Figure 2. Food Reformers installation on Park(ing) Day.

classes of approximately twenty students have undertaken the project since 2019. We describe the class then discuss two examples.

The class takes inspiration from an article by The Centre for Genomic Gastronomy[7] (2015), and uses unrelated statistics as the basis for experiments. Students form small groups and imagine a desirable future world, in 2050 – not too far from today, but far enough to combine imaginaries of things from the present and things from the future. Reimagining the social is critical in this process, and is done from a range of perspectives. As explained by Jasanoff & Kim (2015), social imaginaries – collective beliefs about how society functions – can enable or disable societal transformation and are critical to its realisation. Their

Figure 3. a) Five data edibilisations prepared by Food ReFormers for Park(ing) Day.

This small intervention was part of an ongoing discussion that Food ReFormers is having with different publics in Kolding. On the day, representatives from FoodReFormers and FUSILLI (author 3 & 2, respectively) stayed with the table for several hours inviting locals to join them in discussion. In general, people seemed curious: interested to see what was on the table and to listen to the reasonings behind each dish, though responses were mixed. Clearly, more sophisticated data edibilisations that invited embodied engagement may have been more successful. However, that may not have been the only factor at play.

Food System change is not straightforward. Food is culture and identity. We eat to express who we are, connect to others, learn and express our social and cultural alliances, and stimulate the gustatory system and the senses, as well as for nutrition (Douglas 1972; Warde 2016; Warde & Martens 2000; Ochs & Shohet 2006). Changing the food system therefore may require that people change their understanding of who they are, their culture, habits and practices.

3.3 *Food and sustainable futures*

Our third case relates to a three-week Design Masters project on Food and Sustainable Futures. Six world-making is conducted from the perspectives of: a human from the present; a human from 2050 (who could not be alive today); a living non-human; and a human-made thing. Students employ tools, symbols and processes of food preparation to experimentally expand their thinking.

The Centre for Genomic Gastronomy article (2015) explains that artists working with food can ask *what if* in three ways: *diegetic, figurative* and *realistic*. We provide their description, reframed towards the students:

a) Following the *diegetic* approach the students could create props and images of food that cannot be eaten. The aim is to express something about food or the future without being constrained by material reality, the laws of physics or biology.
b) Following the *figurative* approach, students develop metaphors using food that can be eaten, but that does not have to taste good or be nutritious. This approach positions the audience as active participants, and confronts them with the reality of consuming something.
c) In the *realistic* approach, foods from the future can be served for human consumption today. Such foods use novel ingredients, (bio)technologies, and cooking processes to implicate the

7 https://genomicgastronomy.com

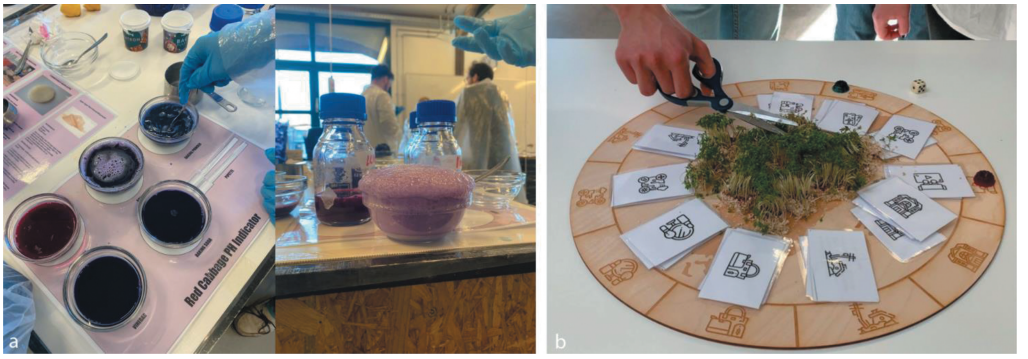

Figure 4. a) material experiments for 'Edible Immigration Levels'; b) cutting an alfalfa sprout forest in 'True Cost'.

eater directly in the culture of the imagined alternative food culture.

We ask the students to experiment with these possibilities as designers, and in the process to consider what art might bring to design, as well as what design might bring to this particular kind of artistic thinking and working. To exemplify the students' experiments we unpack two examples that demonstrate how changes in material properties or framing may prompt meaning-making.

Edible Immigration levels (Figure 4a): During material experiments, a group of students combined bicarbonate soda with lemon juice and purple cabbage extract. The combination resulted in a surprisingly explosive material event that prompted all who saw it to pay close attention. Inspired by the dynamic materiality of the event, the students paired this with their data to tell a story about the explosive dynamic of immigration which will be triggered by rising sea levels. They used the materials – the food – while telling their story to trigger the frothy explosion. The food was then served to their classmates and the taste of it triggered nuanced reflections about the narrated story. Intriguingly, the food tasted slightly different for each person and thus prompted different associations.

True Cost (Figure 4b): In our second example, students created a two-player board game that was presented 'during a break in the 2050 World Sustainability Conference'. As the class entered the room where the presentation took place, they were welcomed to the break and thus immediately understood their role. The game includes a round board, a dice and two counters, a small forest of alfalfa sprouts in the centre of the board, a pile of cards corresponding to each square on the board, and a pair of scissors. Players role the die. When they land on a square, they select the corresponding card and read out a dilemma – a choice between something perhaps prosaic and something intriguing or desirable that has a significant carbon cost. Depending on their choice the corresponding amount of alfalfa sprouts is cut from the small forest on the table. We thus literally see the true carbon cost of their choice.

Despite only two students playing the game, the set-up of the conference break was convincing, and everyone was engaged from the outset, cheering on the players, howling with dismay when they made an unsustainable choice, and lamenting the loss of the forest. From the perspective of data edibilisation, the food made the narrative tangible and thereby shifted the way that the audience related to what was at stake.

4 DISCUSSION & CONCLUSION

Our cases use food in a variety of ways. In social contexts the food acts an *ice-breaker*, helping people to find focus for the social encounter. By supporting casual engagement with data, the representations literally become food for thought, engaging the sensory to become a richly loaded prompt for discussion: *a prompt for new thinking*. Where the food is edible, it may also serve as *sustenance*, as in the Food Lab launch. When the representation is in the form of an edible sculpture, or reframed as a forest, it defamiliarises assumptions around the data and thereby becomes *a ticket-to talk*. Beyond these possibilities, when designers experiment with food as a bio-design material, it may serve as *a potent vehicle for design experimentation,* and the properties and interactions as inspiration for both representation and storytelling.

The two first cases provide the reader with real life scenarios of using data edibilisation to prompt critical thinking about food practices. At the food lab launch, physicalising the data prompted people to reflect on their practices while they were eating the food. A number of participants at the event have since requested data edibilisations for future events focused on food system transformation.

At the Park(ing) day installation, the recontextualised dining table prompted reflection through looking, rather than engaging in an embodied way. The data was not edible, but if we look to the three ways of asking what if provided by the Centre for Genomic Gastronomy (2015), the food does not need to be edible to be impactful.

Our third case offers two examples that bring focus to the material properties of food and how this might be leveraged to prompt critical reflection on challenging issues, such as forced immigration, or the environmental impact of our practices. Both cases involved embodied engagement with the food – the first through watching an explosive event then eating the result; the second by cutting it back, as if killing a forest. Both cases connect to powerful data which is rendered potent through its transformation into data edibilisations.

We argue that foregrounding food as culture when designing edible data physicalisations is significant. The highly personal, socio-cultural resonances of the food influences how people understand the physicalisations and may thereby prompt new kinds of reflection. The mouth feel and taste of the food, literally influences the thinking process. Storytelling through food-based data physicalisations affords unique understandings because taste is a highly personal, idiosyncratic process. And while not explored in depth in this article, we propose that embodied engagement is fundamental to edibilisations having lasting impact. On these grounds, we suggest that developing physicalisations with food, in particular when cultural considerations ar leveraged, expands the possibilities of meaning-making in rich, impactful, and heretofore unforeseen ways.

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Experiencing and Envisioning Food: Designing for Change – Bonacho et al. (Eds)

Depicting the Setúbal Peninsula cuisine. Influences from the sea, mountains, and river in the regional food and restaurant models

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ABSTRACT: The gastronomy of the Setúbal Peninsula reflects the landscape diversity of the region. The Sado River, the Atlantic Ocean and the Arrábida mountain range are the main landmarks for the availability of raw materials in the local diet. This study aimed to collect the recipes from the Setúbal Peninsula, centralized in the geographic area of Azeitão, Setúbal and Tróia, and to analyze how this recipe is made available in regional restaurants. Starting from restaurant selection and classification platforms (Zomato, Tripadvisor, Boa Cama Boa Mesa) a survey was carried out of the restaurant models distributed in the field of study. From the survey carried out, all 52 restaurants selected for the study practiced an illustrative cuisine of the region. The sample responded to a questionnaire consisting of 33 questions. Restaurant professionals mentioned that regional food is distinguished by its connection to the sea and the estuary. This connection is expressed in the menus through traditional dishes. Regarding the agricultural practices of the regions, the restaurants surveyed highlighted the production of oranges, used for baking and confectionery, and the vineyards behind the variety of wines from the Setúbal region. The cheese protected designation of origin (PDO) DOP of Azeitão is the result of the pastoral farming practices in the region.

Keywords: Setúbal Peninsula, Gastronomy, Arrábida Mountain, Sado River, Atlantic Ocean

1 INTRODUCTION

Gastronomy can be understood as the art of cooking, which provides greater pleasure to populations through the basic need for food. On the other hand, gastronomy is considered a dynamic art, supported by factors that make it different depending on the region and societies (Guerrero *et al.*, 2009). Being influenced by culinary techniques, raw materials, and food beliefs, that is, the intrinsic characteristics of each society, for example: religion, financial availability, climate, soil type and geography (Savarin, 2010). When it comes to changing mentalities and attitudes, gastronomy can play a fundamental role, for example by valuing practices, raw materials typical of the regions, both in a traditional aspect, as in another more adapted to current times. Each region of the world has an "identity card" through its gastronomy. The Portuguese food culture is identified by the principles of a Mediterranean Diet, well known for its benefits in health and in the promotion and sustainable practices in terms of the production of the base ingredients. This diet is distinguished by the regular preparation of soups, stews and stews and the use of raw materials such as bread, fruits and vegetables, nuts, herbs as a condiment and, to the detriment of salt, the consumption of olive oil as a main fat in recipes (Queirós, 2014).

1.1 *Purpose of the research*

The present study focused on the analysis of the gastronomy of the Setúbal Peninsula region, Portugal, had as main objective the collection of recipes from the Setúbal Peninsula, centralized in the geographic area of Azeitão, Setúbal and Troia, and the analysis of the raw materials regional. More specifically, this study aimed to analyze the restaurants present in the region, considering the type of cuisine practiced in each model. At the same time, it was intended to identify the local dishes that restaurants offer to customers and understand how current restaurant concepts interpret traditional recipes and which regional products are offered on restaurant menus.

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2 METHODOLOGY

The research started by selecting a group of regional restaurants through rating platforms (i.e., Zomato, Tripadvisor, Boa Cama Boa Mesa) in the geographical area of the study, which took place between the 15th and 30th of May 2018. A questionnaire was applied *a posteriori* to the restaurants that were selected with the digital platforms and that at the same time, participated in gastronomic events in the municipality of Setúbal: Festival do Choco Frito, Festival da Ostra, Festival da Sardinha, Festival do Salmonete, Festival da Caldeirada or Festival do Mackerel butter. The questionnaire (consisting of 32 items, containing open response questions and multiple option questions) was created to understand the regional cuisine and raw materials used by the restaurants.

Data collection took place in person in the localities of Setúbal, Azeitão and Tróia from 15 to 25 July 2018.

3 RESULTS & DISCUSSION

3.1 *Sample characterization*

From an initial sample of 285 restaurant models (Table 1), 39 restaurants were selected that specifically practiced a regional cuisine that represents the traditional flavors of Setúbal, and 13 restaurants that reflected a contemporary vision of local products and that had participated in gastronomy festivals in 2017 in the studied region.

Table 1. Survey of restaurants associated with digital platforms.

Restaurant models	Number
Traditional Portuguese Cuisine	217
Macrobiotic Cuisine	13
Chinese cuisine	1
Japanese cuisine	4
Brazilian cuisine	8
African cuisine	6
Italian cuisine	5
Vegetarian Cuisine/Healthy	18
Spanish cuisine	5
Mexican/Italian Cuisine	1
Mexican/Italian Cuisine	1
French cuisine	1
Mozambique cuisine	1

3.2 *Regional products from the Setúbal Peninsula identified in the questionnaire*

What makes gastronomy unique in a locality is its regional products, which allow the knowledge of production techniques and knowledge of the connection of these products with the natural resources available in the geographic areas where they are manifested (Guerrero *et al.*, 2009).

The surveyed restaurant professionals (N=52) mostly highlight the following Azeitão products: Azeitão PDO sheep's milk cheese (90%) (Photo 1); local wines (86%) (Photo 2).

Photo 1. Azeitão PDO cheese.
(https://coalho.pt/azeitao/)

Photo 2. Local wines brand Bacalhoa.
(https://bacalhoa.pt/)

On the other hand, with smaller percentages, honey from the Arrábida mountain range and sheep's butter were highlighted. Honey from the Serra da Arrábida is a product that is not very popular due to the reduced levels of production, which leads to less knowledge of this product on the part of the consumer (Carvalho, 2005). Regarding the products that identify the city of Setúbal, two groups stand out above all: fishery products and products from agricultural practices. Respondents indicate that fish is undoubtedly the main product that gives value and traditions to the city of Setúbal. This city is sometimes described as a showcase of what is on the Sado river and the ocean that bathes these lands, through the windows of the restaurants that proudly display fresh fish products for the customer to choose (Ramos, 2000). Among the products obtained in the river Sado is the Portuguese oyster, which was extinct in this river for years. There are currently several rehabilitation projects for this resource to reinforce the measures taken by the entity The Navigator Company Setúbal (2017), in the preservation of this species in its natural growth habitat, in which the city restoration models represent themselves as the great engine. external promotion by including it in their menus (Gaspar, 2015). Traditional products carry a high symbolic and cultural

content associated with rurality, nature, tradition, local history, nostalgia for past times, and belonging to a demarcated region (Bernat, 1996). This justifies the emphasis that 25% (13 of the professionals surveyed) gave canned food as a traditional product, because the history of Setúbal is linked to the canning industry (Lopes, 2015). In the field of agricultural products, orange is highlighted by 27 of the respondents (52%) and muscatel grapes by 36 of the respondents (69%) which give rise to culinary preparations of excellence such as orange-based sweets. The muscatel grape is present in the production of most regional wines. Another product that also comes from this grape is a liqueur wine produced exclusively in this study area, the Moscatel de Setúbal (CVRPS, 2008). The region of Tróia, from the point of view of local restaurant professionals, does not present its own unique regional products, being an extension of what is found in the city in front of its peninsula, with 50 of the 52 respondents that make up the total study sample indicating that do not have any knowledge of regional products in this area. These results demonstrate the experience of this locality, which in historical terms was only explored for tourist purposes from the 1960s onwards, without large population settlements that led to the exploitation of local resources (Pinhos *et al.*, 1992).

3.3 *Regional gastronomy*

From the perspective of the region, the typical dishes identified as constantly available in restaurants are fish dishes, as opposed to meat-based recipes. The most important recipes on offer in the restaurant menus are grilled fish (mackerel, sardines), as well as Caldeiradas and Choco Frito (Photo 3-4).

Photo 3. Caldeiradas.
(https://visitsetubal.com/)

Respondents were unable to associate typical recipes from the Azeitão and Tróia regions, referring that these two regions do not have a distinct character in the transversal gastronomy of the Setúbal Peninsula. The results presented are of special importance, in view of the proposed objectives, since local restaurants are considered as a demonstration of the reality practiced in a geographically controlled space inherent to the local traditions experienced there, when thinking about regional gastronomy (Chota, 2013).

Photo 4. Choco Frito.
(https://newinsetubal.nit.pt/comida/)

Within the regional sweets, respondents highlighted for the region of Azeitão: Tortas de Azeitão (100%) (Photo 5) and Esses de Azeitão (65%) (Photo 6). These two recipes are very simple in their preparation and composition, being composed of eggs, flour, and cinnamon.

Photo 5. Tortas de Azeitão.
(https://www.tortasdeazeitao.com/)

The sweets that mark the identity of the city of Setúbal are based on oranges (Cortes, 1994), a fruit that was once cultivated in these lands, before real estate exploration (Soares et al., 1985). The professionals surveyed mentioned that orange is the main ingredient used in various recipes such as: cheesecakes, pies, puddings, and candied preparations. Out of the 52 inquiries, 50 (96%) indicated that the regional sweets from Setúbal are not centered on a single recipe, but rather on the use of a fruit, the orange. Therefore, orange-based sweets are the most common sweets found in the surveyed restaurants, thus revealing a raw material whose cultivation was widespread in the Setúbal Peninsula and which today is still rooted in the menus of regional restaurants. From the data collected, Tortas de Azeitão are present in 15 (29%) restaurants out of the 52 that are part of this study, and Esses de Azeitão in 4 (8%) restaurants in the sample.

Regarding the area of Tróia, restaurant professionals were not able to list any regional sweets that are specific to this territory.

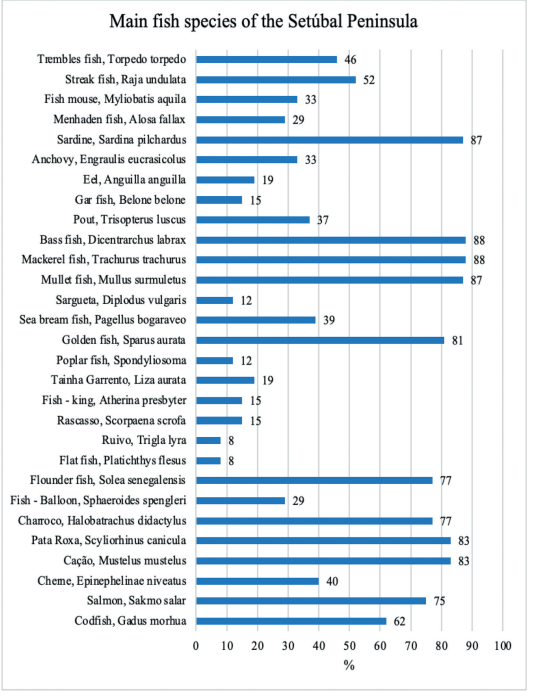
3.4 *Main fish products present in the restaurant Menus of the Setúbal Península*

When asked about the offer of fish products in restaurants, restaurant professionals (N=52) mentioned

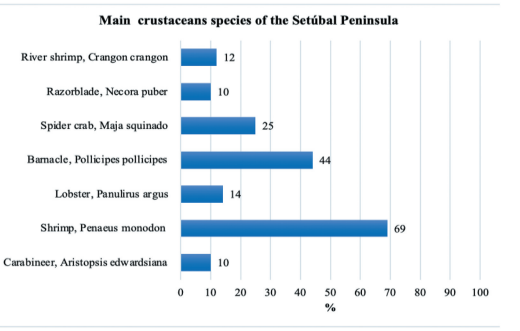
Photo 6. Esses de Azeitão.
(https://arrabidadigital.pt/)

the products from the fishing gear, due to the geographical location of this territory. In Graph nº1, the main fish species used in the typical recipes of the field of study is highlighted. The most mentioned fish are dogfish, purple duck, sea bream, red mullet, horse mackerel, sea bass and sardines. The recipes highlighted with a regional character are, for the most part, made with the fish mentioned above, such as, for example, Caldeirada and Salmonete à Setúbalense.

Regarding the identification of the main crustaceans of the Setúbal Peninsula, used in the menus of the analyzed restaurants (Graph 2), the most mentioned species was shrimp, indicated by 36 respondents (69%), demonstrating its use, even though it is not one of the main species from the waters of Setúbal.

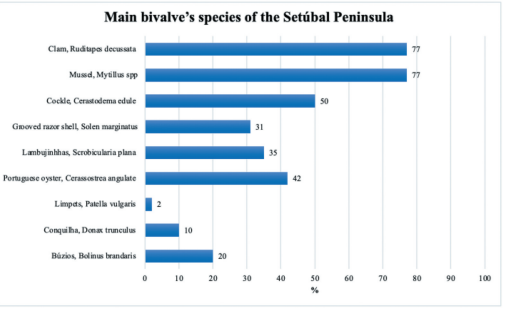


Graph 1. Identification by the 52 surveyed restaurant professionals of the main fish species from the Setúbal Peninsula that are on the menus of their restaurants.



Graph 2. Identification by the 52 surveyed catering professionals of the main species of crustaceans from the Setúbal Peninsula that are on the menus of their restaurants.

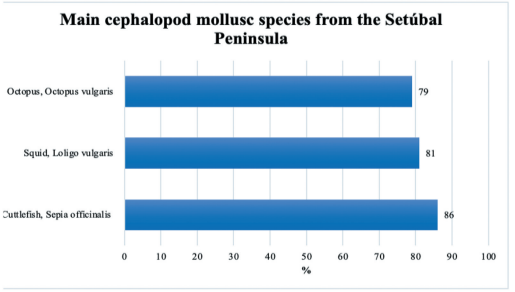
Regarding bivalves, mussels and clams are the species that stand out on offer from the surveyed restaurants. Both species were mentioned by 40 respondents (77%), indicating that these species are part of the menus where these professionals work (Graph 3).



Graph 3. Identification by the 52 surveyed catering professionals of the main bivalve's species of the Setúbal Peninsula that are on the menus of their restaurants.

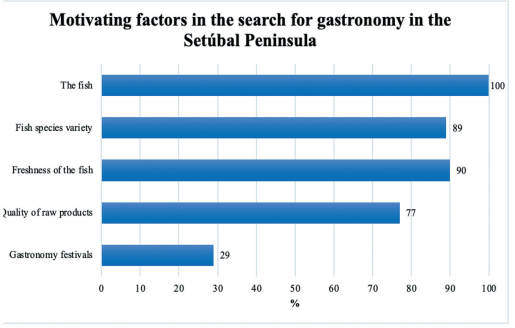
The main cephalopod mollusks that the selected restaurants offer are the common cuttlefish species, indicated by 45 respondents and which is present on the menus of their places of work (86%) (Graph 4). The fact that it was the most listed species by restaurants comes from the fact that this species is the raw material of a regional dish, Choco Frito.

The great offer of fish products on the restaurant menus and their quality is one of the great pillars of the regional gastronomy of the Península of Setúbal. This aspect can be observed in Graph 5 where the main factors that catering professionals indicate when looking for their restaurants and the region are indicated. The external demand for local gastronomy is stimulated when gastronomy festivals are developed that stimulate curiosity about the secrets and teachings of the Mediterranean diet practiced in this territory. The appreciation of local products, by restaurants and festivals, are factors of differentiation and stimulation of the gastronomic experience for



Graph 4. Identification by the 52 surveyed catering professionals of the main cephalopod mollusc species from the Setúbal Peninsula that are on the menus of their restaurants.

those looking for them, the customers (Björk et al, 2016). This report is experienced by the restaurants belonging to the study by practical experience, when they adhere to the gastronomic festivals, indicated by 15 (29%) respondents.



Graph 5. Main reasons that lead to external demand for local gastronomy - opinion of the 52 surveyed catering professionals.

These results are aligned with the geographic evidence. Serra da Arrábida develops a microclimate conducive to agricultural activities, namely the vineyard, which develops in calcareous and clayey soils beneficial for this crop. In the heart of this mountain range, agro-pastoral activities are also developed, in which the pastures influence the organoleptic character of the Azeitão cheese. The river Sado, namely its estuary, as it is a crossing area of salty and fresh waters, assumes itself as a reservoir of nutrients, thus allowing the growth of numerous marine animals. These products associated with fishing in these waters are presented as a mastery by the restaurants, with the cuttlefish from its estuary being highlighted in the menus as the most charismatic species present in the local food. The location in the heart of the Atlantic Ocean that bathes this peninsula allows deep sea fishing up to 12 miles, Exclusive Economic Zone in a maritime area, revealing species such as horse mackerel and sardines that have always been part of the inhabitants of Azeitão, Setúbal and Tróia (Pimentel, 1992; IICN, 2000; CVRPS, 2008).

4 CONCLUSION

This study offers an insight about the attributes valued by restaurant professionals in the Setúbal Peninsula. Being able to recognize such attributes showcases which elements of culture, geography, identity, and heritage are present in the cuisine. Gastronomy is highlighted as a motivating factor to travel, an aspect that can be presented as a tool to support tourism. The reasons for visiting are associated with the fact that many restaurants present local cuisine and the profusion of gastronomic festivals promoting the raw materials. It is believed that the data obtained may contribute to the work of a group of entities with responsibilities in the areas linked to tourist activities and of companies promoting the region associated with the region's identifying products.

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Experiencing and Envisioning Food: Designing for Change – Bonacho et al. (Eds)

Ecolabel SOU Sustainability Origin UFRJ: Entrepreneurship and innovation in gastronomy

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ABSTRACT: To achieve a more sustainable food system, the population has to have access to different ways of producing, processing, and marketing food (Martnelli and Cavalli, 2019), as well as access and understanding of information that induces more appropriate food choices (Grunert, 2011). Sustainability certifications (ecolabels) help the consumer in the purchase decision, as they indicate attitudes and practices to improve the production and marketing process (Asioli et al., 2020). This paper aims at describing the ecolabel SOU (Sustainability Origin UFRJ) ongoing creating process, a certification system for artisanal food products with a focus on the quality and sustainability.

1 INTRODUCTION

Contemporary societies face the challenge of rethinking their ways of production and consumption so that we can achieve a degree of sustainability compatible with maintenance of life on the planet. The sustainable development goals adopted by the United Nations in 2015 shows the changes that need to be made and some of them are directly related to the way we produce, distribute and consume our food (UNDP, 2015).

In this sense, the field of design can contribute decisively by supporting innovation processes aimed at meeting these needs, proposing solutions that put theoretical discussions into practice. Design thinking, collaborative design methodologies, the ability to visualize future scenarios are some of the valuable resources for the transition towards a more sustainable future.

In this work, we propose to present a research, development and innovation project carried out by a multidisciplinary team of researchers and professors from the Federal University of Rio de Janeiro, led by the department of gastronomy and with the financial support of the UFRJ Technological Park. The main development of the Origin UFRJ project is the creation of the ecolabel SOU (Sustainability Origin UFRJ), a sustainability certification system for artisanal food products.

2 RESEARCH CONTEXT

2.1 *Why create an ecolabel for artisanal food products?*

The environmental and/or sustainable certification market is a market of giants. Due to the costs involved in the certification processes, as well as the conditions imposed for the acquisition of ecolabels, it becomes almost impossible for micro and small companies to qualify their production in order to guarantee the sustainability of their processes. The high investments supposedly necessary to adapt their production methods alienate entrepreneurs who seek to act more responsibly in the market.

Consumers are aware of the demands for sustainability and can drive significant changes in the market from their choices, especially with regard to food (De Tavernier, 2012). However, the lack of information about production processes and their resulting impacts on society make it difficult for consumers who want to direct their purchase options towards more sustainable products.

The certification marks act precisely to alleviate this difficulty, verifying with the producers if their production processes meet certain criteria previously established according to the objective of the ecolabel. Supported by the reputation of the institutions responsible for conducting the evaluation process,

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the ecolabels generate the necessary trust for consumers to validate their choices.

Bringing this approach to the context of artisanal food products has the potential to include numerous micro and small entrepreneurs who are currently on the sidelines of this debate.

2.2 *What do we mean by artisanal food products?*

For this research, we are using as a reference the definition of artisanal food products presented by the Ministry of Agriculture, Livestock and Supply of Brazil within the scope of discussions on the conception of the Art Seal, aimed at qualifying artisanal production in the country, but without a specific focus in sustainability. According to this definition, artisanal food products are:

> *"(...) made from ingredients of recognized origin and sanitary quality, made on a restricted scale, from manual processing, with the possibility of partial mechanization of the processes, and the handlers have mastery and knowledge of the entire production process, being able to have variability in the organoleptic characteristics of the products, with restricted use of food additives and non-adoption of cosmetic additives"* (MAPA, 2019).

This definition helps us to define the type of product that the certification system we are proposing intends to work with. Our intention is to develop dimensions and aspects focused on the analysis of sustainability not only in production processes, but also considering the complexity that the topic of sustainability represents.

2.3 *How do we understand sustainability(ies)?*

There are many possible approaches to address the issue of sustainability. We can speak from a more technical or conceptual perspective; focusing on aspects related to strictly environmental issues or expanding to their impacts on culture, the social fabric, the economy; we can start from a more localized scale or understand its implications at a global level. However, there is no doubt about the imperative imposed on contemporary societies about the need for transformations in the way we produce and consume.

According to Manzini (2008), the transition towards sustainability will be a social learning process where each human being will gradually learn to live well, consuming (much) less and regenerating the quality of the environment (of the global ecosystem and local life contexts). . In this process, the most varied forms of creativity, knowledge and organizational capacity must be valued in the most open and flexible way possible.

It is in this sense that the Origin UFRJ project intends to act. Bringing the sustainability debate to the artisanal production of food and beverages is bringing the debate to the daily lives of all of us. It is to question what each citizen, whether a producer or consumer of food, can do to improve their relationship with the physical and social environment.

2.4 *The Origin UFRJ Project*

Geographical Indications (GI) constitute a powerful territorial development strategy based on their own characteristics and resources. Appellations of origin are a type of GI where the characteristics of the territory and the production method define the quality of the product. Inspired by this concept, we propose the Origin UFRJ project, whose general objective is to foster entrepreneurship and innovation in the production of food and beverages in the university environment. The project will certify, through the creation of the ecolabel SOU, a group of entrepreneurs and their products. As UFRJ is one of the most prestigious scientific institutions in the country, present in all national and international rankings that assess the excellence of universities, and considering that the project concentrates efforts in the field of Gastronomy through the Bachelor's Degree in Gastronomy at UFRJ, We understand that in addition to contributing to the construction of an identity for the course, the project will promote the basis for the distinction of our students and graduates in the job market.

The project develops from 3 main axes: the creation of a certification system focused on the analysis of the sustainability of artisanal food products; the selection, qualification and certification of micro-small food-producing entrepreneurs; and, the creation of an exclusive space for the commercialization of certified products.

In this work, we propose to present the process of creating the certification system of the ecolabel SOU.

3 METHODOLOGY

To achieve the desired objectives and deliver a new ecolabel framework a series of methodological steps were taken from a bibliographic collection to the development and trial of the proposed sustainable specifications.

Firstly, data gathering was performed through the study of scholarly publications on the challenges of current labeling systems to identify potential pitfalls and strengths inherent to sustainable food certification systems. Likewise, such a collection helps shape a common knowledge in the field of food ecolabels which so far lacks empirical research, especially in the case of small and artisanal food producers on a domestic scale. A report will then be produced to join together useful information to guide the further steps.

Another important stage of data gathering was the study of an international database on ecolabel frameworks, the Ecolabel Index platform, which collected detailed information on 147 food ecolabels frameworks worldwide. Through the processing and analysis of such information a general understanding of how

ecolabels function and what are the dominant markets will be provided. Also, particular cues on the certification process and modes of governance will be evaluated and taken as examples for our ecolabel's future prototype as a way to apply procedures that are proven effective in consumer communication.

A final step in data gathering is the identification of potentialities inherent to ecolabels and what aspects should be replicated in a future labeling system concerning our particular target group and population. Once the background information is prepared, a multidisciplinary research group is created to submit the preliminary bibliographic findings of the project and conduct further inquiries on practical actions concerning each of the group's component's expertise. The main barriers to the success of an ecolabel lie in its mode of communication to the end-user and the interface of communication with customers. Thus, our challenges bear on developing innovative strategies for the design, communication, statutory framework of the new ecolabel, its future application, and commercialization of newly ecolabeled products. Moreover, the range of impact of the new ecolabel must be defined, considering the interposed theoretical framework for sustainability that encompasses segmented social, economic, and environmental improvements (FAO, 2018).

4 RESULTS AND DISCUSSION

4.1 *The ecolabel SOU scheme*

The ecolabel SOU was born as a certification scheme to encourage and promote attitudes that guarantee the sustainability and quality standard of artisanal food products, as well as their production processes. It operates based on rules and guidelines that the enterprise follows which are necessary to ensure the improvement of its socio-environmental context, both for itself and the planet. During the certification process, food products will be selected, whose companies are committed to streamlining their production processes articulated in six dimensions defined by the SOU ecolabel's regulation as Origin (related to the acquisition of inputs); Production (related to inventory and production management); Offer (related to communication and marketing); Respect (relating to good practices in the relationship with the employee and the environment); Affection (related to sociability); and, Diversity (relating to representativeness and productive insertion of vulnerable groups). Each of the dimensions above has a detailed assessment routine with specific thresholds and parameters (Table 1). Then, an analysis is assembled through predetermined aspects and checked against standard requirements for the acquisition of the ecolabel.

Table 1. Sustainability attributes considered in the assessment of the SOU ecolabel.

Dimensions	Description of assessed aspects	Assessed aspects
Origin	Ingredients acquisition	1. Proximity to the producer 2. Production method of agricultural ingredients 3. Ingredient Processing Degree 4. Waste Reduction 5. Valorization of Brazilian Sociobiodiversity 6. Production distance 7. Consciousness
Production	Inventory and production management	1. Inventory Management 2. Environmental practices 3. Waste 4. Natural Preservatives
Offer	Communication and marketing strategies	1. Accessibility 2. Marketing Strategies 3. Distribution 4. Communication 5. Circularity 6. Other certifications
Respect	Work relationships and the environmental protection	1. Respect for the worker 2. Waste Management 3. Academic appreciation 4. Worker appreciation 5. Commitment of partners
Affection	Sociability	1. Social gastronomy 2. Affective food 3. Production context 4. Food as culture
Diversity	Representativeness and minorities	1. Commitment 2. Job opportunity 3. Identity valuation

4.2 *Target audience*

In this first round, the targeted audience of candidates to receive the ecolabel are artisanal food products SMEs with an active enrollment to attend graduate and post-graduate degrees offered by the Federal University of Rio de Janeiro (UFRJ) and the alumni of the undergraduate degree in Gastronomy or Nutrition sciences from the Nutrition Institute of the same university (INJC/UFRJ). We chose to target students at this moment because we intend to test the feasibility of the certification system, and with the feedback provided by them will be possible to improve the system before it is open to non-university entrepreneurs. After that, we intend to open the submission process to anyone interested in certifying their products.

Figure 1. Ecolabel SOU logo.

4.3 *The process*

The process for obtaining the SOU certification starts with candidate enrollment through a web-based site in which it must be informed what products will undergo the evaluation and further details about the business. A preliminary quality assessment is forwarded through an automated survey and is a self-declaration of conformity with the standard sanitary requirements imposed by the Brazilian authorities as minimum sanitary requirements for food production. Approved candidates go through a detailed assessment to select which products will be eligible to receive the certification, based on their performance after an evaluation tool is applied. This detailed assessment involves the analysis of mentors and the scientific committee, after which a dossier is prepared and submitted to the evaluation and approval of a multistakeholder technical committee which is the forum to analyze, discuss, and deliberate on the approval of not of the candidacy. Eventual appeals and dispute settlements will be forwarded and resolved by this committee. Below is the step-by-step process:

1. Completing the certification request form | by entrepreneur
2. Receipt of the order and verification of documentation | by technical committee
3. Appointment of a Mentor to accompany the diagnosis | by technical committee
4. Product diagnosis for Ecolabel acquisition | by entrepreneur
5. Preliminary assessment of diagnosis | by mentor
6. Diagnostic review | by entrepreneur
7. Final evaluation report for the acquisition of the Ecolabel | by mentor
8. Final decision on the acquisition of the Ecolabel | by technical committee.

4.4 *The tools*

To support the process of submitting applications to obtain the ecolabel, some tools were developed.

The first of these is the Diagnostic Model. The entrepreneur interested in certification must complete a diagnosis for each product he intends to certify. This tool includes: the dimensions of analysis, for each dimension the aspects to be analyzed, for each aspect an affirmative and the way of measuring the information provided. For each of these items, the entrepreneur must present a qualitative analysis describing how the analyzed process takes place and attach a supporting document. At the end of each item, he must indicate whether it "meets" or "does not meet" the analyzed aspect or if it "does not apply" to the product or enterprise.

To facilitate filling in the "origin" dimension, an auxiliary worksheet was developed where all the ingredients that make up the product to be certified must be listed. For each ingredient, the city where it is produced must be indicated; if it has some type of certification; whether it is purchased with even an intermediary; whether it is purchased from family producers; the degree of processing of the ingredient (in natura; minimally processed; ultra-processed; culinary ingredient); and whether it is a seasonal or Brazilian biome ingredient. With this information, filling out the diagnosis in the "origin" dimension is done in a simple way, allowing a more direct assessment.

At the end of the diagnostic process, mentors are invited to fill in a "final report" systematizing the results obtained and producing a descriptive text of the production process. It must also indicate its recommendation of approval or not of the claim to acquire the ecolabel.

4.5 *Assessment*

Each aspect evaluated is scored. In all, there are 29 aspects distributed in the six proposed dimensions. 10 of these aspects (highlighted in bold in Table 1) are aspects that we believe are essential for obtaining the ecolabel. Thus, candidates who do not meet any of these aspects will not be certified.

To be certified, the product must obtain at least 50% of the points. Within the evaluation process, if any of the aspects do not apply to the product, it must be removed from the total achievable percentage. The final result is the DEFERRAL or DENIAL of the certification request.

4.6 *Renovation*

The Ecolabel is valid for one year. After this period, a new evaluation will be carried out, and to have the certification renewed, the entrepreneur/product must have a higher score than the previous one, progressing at least 5% (out of the total achievable).

Upon reaching 70% of the points, a higher evaluation than the previous one will not be necessary for the renewal of the certification.

4.7 *Governance proposal*

The certification systema proposed will be registred as a certification mark at the National Institute of Industrial Property, linked to the Ministry of Ecnomics of Brazil. The entity responsible for the certification will be the Josué de Castro Nutrition Institute of the Federal University of Rio de Janeiro, the unit to which the department of gastronomy is linked.

We propose two governance instances for the implementation of the ecolabel SOU certification system: a scientific committee and a technical committee. The Scientific Committee will be responsible for the development and improvement of the Certification System and will be composed by researchers linked to the Federal University of Rio de Janeiro. The Technical Committee will be responsible for the final evaluation, approval, or rejection of requests to acquire the Ecolabel SOU. It will be composed by one scientific committee representative, four experts, and three representatives of certified entrepreneurs.

5 CONCLUSION

The ecolabel SOU aims to promote entrepreneurship and innovation in the artisanal food production guided by sustainability in the University environment, as well as conscious consumption practices. As described by Sabourin (2012), qualification processes can contribute to establishing a symmetrical reciprocity relationship between producer and consumer. And so we hope to contribute an experience exchange on the university campus and, later, with the society within the precepts of transparency and sustainability. With this certification system, we intend to progressively stimulate sustainability in production processes, strengthening and encouraging conscious consumption in the gastronomic market.

The creation process of ecolabel SOU took place in a collaborative way between different researchers in the university environment. As a complement to the ecolabel´s creation, we recognize that is necessary to develop methods to marketing access supported by the same values provided by ecolabel SOU. With ecolabel SOU we hope to contribute to the creation and commercialization of quality products favoring a healthy and sustainable diet in the university environment, creating positive impacts inside and outside the university community.

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Experiencing and Envisioning Food: Designing for Change – Bonacho et al. (Eds)

A semi-systematic literature review of design in open source agriculture

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ABSTRACT: The success of open source as a strategy for sharing knowledge has proven its merits over the years. Nowadays, its applications and implications go far beyond the original field of software development, being increasingly integrated into fields such as design and agriculture. Open Source Agriculture is a vision of a potentially more democratised alternative for technology design and development based on community-led ecosystems of food technologies for more sustainable food systems. Similarly, in the last two decades, design practice and research have increasingly become more knowledgeable of the potential of open and collaborative design methods. The aim of this research is thus to map the scientific contributions acknowledging the role of Design in Open Source Agriculture. The research question of this article is: what are the existing connections among design, open source and agriculture? In order to answer this question, we performed a semi-systematic literature review by querying the Scopus database for publications with all the "design", "open source", "agriculture" terms in titles, abstracts and keywords. We identified 137 publications and analysed them with the VOSviewer and Bibliometrix software to explore the overall bibliometrics, titles and abstracts terms co-occurrences, keyword co-occurrences, co-citation networks, bibliographic coupling, thematic maps and evolution. We thus uncovered the primary sources of publications and the main topic clusters, their connections and evolution through the years. Publications started in 2004 with a growth that doubled during 2017-2018; "design" emerged as the main word used in titles together with "system", before "agriculture". In terms of thematic evolution, "design" emerged around 2017 from "system", "agriculture", and "monitoring" and then developed into one of the main themes. While "system" and "open systems" are the main topics, more than "agriculture", "design" is a relevant topic that can be found as the main element of a cluster that connects it with strategic topics such as service, sustainable development, regional planning, urban growth or even policy implementation. Thematic analysis shows design as a basic topic, widely developed but not consciously focused and not pushing the field forward. Design in Open Source Agriculture is often considered for orchestrating, monitoring, managing systems such as IoT. Here, design has had an increasing thematic relevance: while it is typically considered as a basic, general, universal practice of developing technology, it is also often adopted together with more strategic topics it deals typically with (service, policy, sustainability). Design is a foundational element of Open Source Agriculture, but there is no research on the specificities of its role in this context. Further research could thus explore the role of design in Open Source Agriculture in a more conscious way and for more strategic directions beyond technological development.

1 INTRODUCTION

The success of open source as a strategy for sharing knowledge has proven its merits over the years (Weber, 2005), in software and by being adopted in many other fields as well. Nowadays, its applications and implications go far beyond the original field of software development, being increasingly integrated into fields such as hardware (Antoniou et al., 2022; Arancio, 2020; Gavras & Kostakis, 2021), architecture (Ratti & Claudel, 2014; Vardouli & Buechley, 2014), and design (Abel et al., 2011; Cruickshank, 2014). Open Source Agriculture is a vision of a potentially more democratized alternative for technology design and development based on community-led ecosystems of food technologies for more sustainable food systems (Giotitsas, 2019). Similarly, in the last two decades, design practice and research

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have increasingly become more knowledgeable of the potential of open and collaborative design methods (Bakırlıoğlu & Kohtala, 2019a; Boisseau et al., 2018; Menichinelli, 2016).

Within the context of this article, we define design both as the activity (i.e. the verb) and a resulting artefact. As Nelson and Stolterman explain that design is an inherently human activity that operates in the tension between a "desire for change", including "a need for comprehensive analysis, and rational decision making. leading to a clear choice for action" while facing a world "much too complex to be dealt with comprehensively" (Nelson & Stolterman, 2014, p. 21). According to the same authors, a design approach is used whenever "any human activity system" is created or modified. Food production systems, such as Agriculture, can consequently be assumed as a possible object of a design approach.

The idea of Open Design (or Open Source Design) shapes the same design approach by bringing the capacity and will to include the community as the practitioner(s) and the object. This transversal presence of the community is possible thanks to alternative ways of prototyping/manufacturing and novelty processes for managing and organizing the design process (Bakırlıoğlu & Kohtala, 2019b). In sum, Open Source Design influences the process, the practice infrastructure and the knowledge management ecosystem.

In this paper, we aim to contribute to a wider investigation of how these emerging design processes can be embedded in food production and how positively they can impact it, by understanding how novel ways of designing are related to the emergence of more sustainable food systems. Therefore, this article aims to map the scientific contributions acknowledging the role of design in Open Source Agriculture. In this case, we want to map out how literature that refers to agriculture, design, and open source addresses or contributes to Open Source Agriculture.

Giotitsas defines Open Source Agriculture as the result of three motivational frames: openness, sustainability and autonomy, wherein the specific case of the open source he concludes that it "is presented as a continuation of ancient agricultural practices which were collaborative rather than antagonistic, while modern ICT technologies allow for such collaboration in a scale never before possible" (2019, p. 64). The now extinct and controversial MIT OpenAg initiative (Cohen, 2019, 2020) presented "Open Agriculture" as a vision of an ecosystem of collaboration around AgTech development (Freire & Monteiro, 2020). In sum, the technological possibilities, and the way they are dealt with, from a design and collaborative perspective, are a common denominator in the definitions found so far. According to Kneafsey et al. (2021), the emergence of sustainable food production-consumption practices implies immediate reimagining and rethinking; for example, the creation and sharing of appropriate technologies for small-scale and ecologically-conscious farming, which overlaps with the previous definitions.

Open sourcing agriculture (in terms of agricultural knowledge and not just of agricultural technology) is about much more than just releasing agronomic data or technology. The disciplines and areas of knowledge involved in making agriculture open source are potentially transdisciplinary. The research question of this article is: what are the existing connections among design, open source and agriculture? In order to answer this question, we performed a systematic literature review by querying the Scopus database for publications with all the "design", "open source", "agriculture" terms in titles, abstracts and keywords. We identified 137 publications and then we performed a semi-systematic literature review (Snyder, 2019), that included bibliometric analysis, and the qualitative analysis from a resulting sub-selection of the 10 most cited articles. We analyzed the publications with the VOSviewer (van Eck & Waltman, 2010) and Bibliometrix (Aria & Cuccurullo, 2017) software to explore the overall bibliometrics, titles and abstracts terms co-occurrences, keyword co-occurrences, co-citation networks, bibliographic coupling, thematic maps and evolution. We thus uncovered the primary sources of publications and the main topic clusters, their connections and evolution through the years.

After having defined the context and our goals in this introduction (1), we present both methodology (2) and consequent results (3) in two steps: first the bibliometric analysis of the data extracted in terms of co-authorship, co-citation, bibliographic coupling (3.1), co-word analysis (3.2), thematic analysis (3.3) leading to a comparison grid (3.4) where we did a literature review of the 10 most cited articles in our database, about their approach to design and open source as previously defined. Finally, in discussion (4) we confront our expectations, embedded in the definitions of Open Design and Open Source Agriculture previously presented with the data extracted both from mapping the research through bibliometric analysis and the later literature qualitative analysis. The conclusions (5) gravitate around the absence and manifestation of open source and design in the scope of the study as well as on the opportunities and gaps for future research on the topic.

2 METHODOLOGY

This research traces a map of the convergence field of open source, design, and agriculture in scientific and indexed publications. For that, we found it most adequate to use a set of methods that allow tracing a quick graphic panorama. The goal is to "to map a field of research, synthesize the state of knowledge, and create an agenda for further research"(Snyder, 2019, p. 335)

This first step involved the collection of articles. For that we queried the Scopus database for articles containing "design", "open source" and "agriculture"

at the same time on their titles, abstracts and/or keywords. Even though we acknowledge the fact that the body of knowledge about open source agriculture and open and collaborative design processes in the agricultural field is not confined to Scopus indexed research, we decided to start our mapping journey in this database. Also, wide-range databases like Google Scholar do not allow exporting a document set with cited references, not being appropriate for this kind of work (Zupic & Čater, 2015). The resulting dataset from our Scopus query were sufficiently significant in terms of the number of documents to analyze, making it a considerable sample (Tables 1-2). The attempt of merging the results with the Web of Science database was successful, and after removing all the duplicate entries, the result wasn't much different from the original database. This merged database raised some technical difficulties when being used in VOSviewer, while in Bibliometrix the results were very similar, also explaining our option for the sole Scopus database.

The dataset (137 documents) is split between Journal Articles and Conference papers (65 and 64 respectively) with a residual amount of 6 reviews, a book chapter, and a retracted article.

The predominance of articles about Computer Science (65) and Engineering (52) in detriment of Agricultural and Biological Sciences (with just 27) and the absence of the design field in this list is also interesting to observe (Figure 1).

Table 1. Query details.

Source	Scopus
Search query	TITLE-ABS-KEY ("open source" AND design AND agriculture) AND (EXCLUDE (PUBYEAR, 2022))
Date	20/01/2022
Results	137

Table 2. Overview of the results from the query (generated with Bibliometrix).

Description	Results
MAIN INFORMATION ABOUT DATA	
Timespan	2004:2021
Sources (Journals, Books, etc)	118
Documents	137
Average years from publication	5.45
Average citations per documents	6.62
Average citations per year per doc	1.192
References	4009
DOCUMENT TYPES	
Article	65
book chapter	1
conference paper	64
conference review	3
Retracted	1
Review	3
DOCUMENT CONTENTS	
Keywords Plus (ID)	1397
Author's Keywords (DE)	510
AUTHORS	
Authors	550
Author Appearances	579
Authors of single-authored documents	12
Authors of multi-authored documents	538
AUTHORS COLLABORATION	
Single-authored documents	14
Documents per Author	249
Authors per Document	4.01
Co-Authors per Documents	4.23
Collaboration Index	4.37

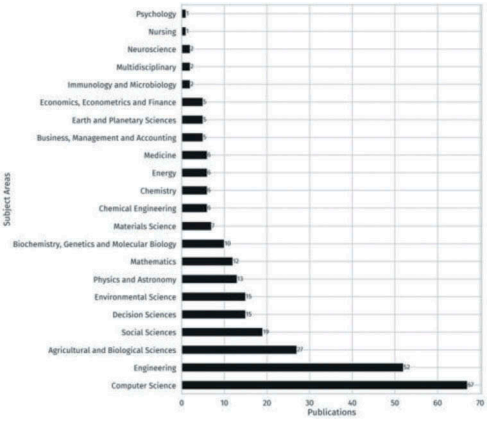

Figure 1. Publications by subject areas.

In terms of the origin of the researchers' affiliation, the first country is USA (33) followed by China (19) and then India (14), but the whole EU could be considered as the first country with 47 articles (Figure 2). Publications started in 2004 with a growth that doubled during 2017-2018 (Figure 3).

The option of running bibliometric analysis without any major reading and selection process as in traditional systematic literature review processes is directly linked to the nature of the study where the purpose is understanding how a specific subject area(s) deal(s) with a specific topic, but rather map it in order to understand its diversity, and how both open source and design related with agriculture within indexed research.

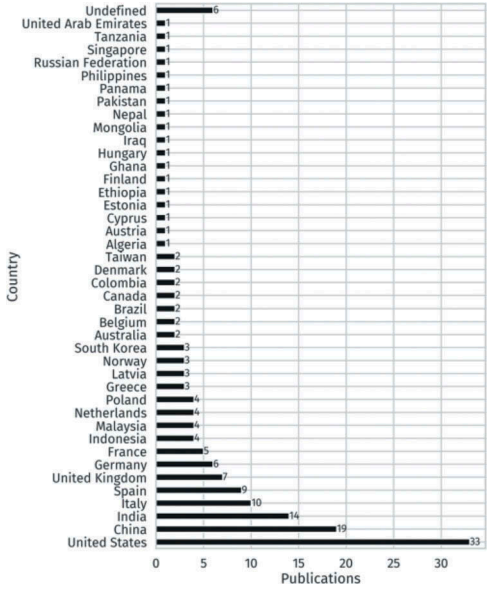

Figure 2. Publications by country.

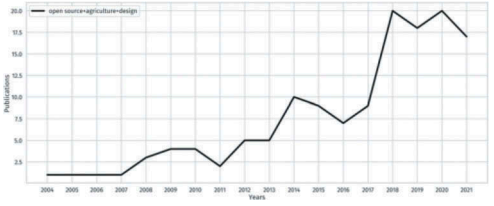

Figure 3. Yearly output of publications.

The idea is to have the bibliometric analysis provide this global view while highlighting clusters, thematic approaches and relevance and consequently aiding the selection process for further qualitative analysis.

3 RESULTS

3.1 *Co-authorship, co-citation and bibliographic coupling*

In order to explore the social system behind research on Open Source Agriculture, we elaborated co-authorship, co-citation and bibliographic coupling analyses with VOSviewer (van Eck & Waltman, 2010). The co-authorship network (links that connect authors working together on a publication) shows that among 550 authors, only 26 are connected through co-authorship (4.73%): less than 5% of the authors work together, showing a highly fragmented network: there is thus almost no collaboration among the authors working on Open Source Agriculture. Within this network, there are 2 clusters of 5 authors each: a) (Biagioni et al., 2013, 2014), b) (Jiménez-Carvajal, García-Bañón, et al., 2017; Jiménez-Carvajal, Ruiz-Peñalver, et al., 2017); 3 clusters of 3 authors each: a) (Ault et al., 2018; Welte et al., 2013), b) (Hynek et al., 2005; Hynek & Richard, 2004), c) (Montoya, Kacira, et al., 2020; Montoya, Obando, et al., 2020). Finally, 2 clusters of 2 authors each: a) (Jinbo et al., 2018, 2019), b) (Nadji-Tehrani & Eslami, 2020a, 2020b). The clusters mainly cover specific designs of Open Source Precision agriculture, mainly hardware-based and one Virtual Reality example. Few publications instead focus on grey literature and one only on the potentialities of Open Source Agriculture and of a specific Open Source Agriculture center at Purdue University. Overall few authors and clusters, of small size, show an extremely fragmented social structure mainly focusing on technical development and implementation of Open Source Agriculture cases and not on reflecting on it.

Table 3. Clusters of co-authorship (generated with VOSviewer and edited).

N. of authors	Authors	Publications	Topic
5	biagioni s. - carlesi c. - farace d. - frantzen j. - schöpfel j.	(Biagioni et al., 2013, 2014)	An open source database of good practices in the field of grey literature in all its life cycle (production, processing, distribution, uses, preservation) to be captured in a standardised format for all stakeholders.
5	jiménez-buendía m. - jiménez-carvajal c. - molina-martínez j. m. - ruiz-peñalver l. - vera-repullo j.a.	(Jiménez-Carvajal, García-Bañón, et al., 2017; Jiménez-Carvajal, Ruiz-Peñalver, et al., 2017)	Design and operation validation of a low cost open hardware agroclimatic data acquisition Raspberry Pi system for irrigation monitoring based on weather and lysimetric data.
			Design and operation validation of a low cost open hardware instrumentation system capable of accurately determining water balance during irrigation periods using a weighing

(*Continued*)

Table 3. (Continued)

N. of authors	Authors	Publications	Topic
			lysimeter for potted crops.
3	ault a. - buckmaster d. - krogmeier j.	(Ault et al., 2018; Welte et al., 2013)	Introduction to how open source can address the issues of interoperability, data privacy, data quality and talent attraction and of the Open Ag Technology and Systems (OATS) Center at Purdue University. Design and implementation of a novel distributed set of open source collaborative mobile apps for specialized farm management information systems (FMIS).
3	bryden k.m. - hynek j.s. - richard t.l.	(Hynek et al., 2005; Hynek & Richard, 2004)	Virtual Reality tools that couple computational tools with building geometry in a virtual reality environment for supporting livestock production via simulations..
3	kacira m. - montoya a. p. - obando f.a.	(Montoya, Kacira, et al., 2020; Montoya, Obando, et al., 2020)	Two low cost open hardware Arduino-based food production monitoring and control systems: an aeroponic irrigation system and an indoor plant factory. Low-cost open hardware microcontroller platform for monitoring equipment for plant-factory automation of crop production.
2	jinbo c. - lam a.	(Jinbo et al., 2018, 2019)	An open hardware networking application system with video monitoring function based on motion detection
2	eslami a. - nadji-tehrani m.	(Nadji-Tehrani & Eslami, 2020a, 2020b)	A novel open source method and framework for a brain-inspired evolutionary cognition Artificial Intelligence that can be applied to many contexts including industry and agriculture.

(*Continued*)

The co-citation network (links that connect documents that are cited together) is made of clusters of groups of publications that are considered the intellectual base of a research field shows that among 137 publications, only 4 are connected, so only 2% of the documents are recognized as part of the same research field. Here as well publications are about specific Open Source Agriculture technological development and implementation: the center of the network (Bitella et al., 2014) is also connected to another document (Montoya, Obando, et al., 2020) as part of a cluster of 2 documents and it is connected to a cluster of 1 publication (Iqbal et al., 2020) on one side and to another one on another side (Coelho et al., 2018). The intellectual foundation of the research community of Open Source Agriculture rests on very few documents and that serve as an inspiration for other technological developments: there are no reflections on cross-sectional or general topics of Open Source Agriculture.

The bibliographic coupling network (links on publications that share the same references, i.e.,

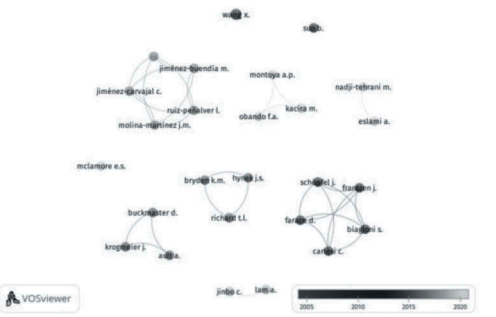

Figure 4. Network of co-authorship (generated with VOSviewer).

Table 4. Clusters of co-citation (generated with VOSviewer and edited).

N. of Publications	Publications	Topic
2	(Bitella et al., 2014; Montoya, Obando, et al., 2020)	A low cost open hardware platform for multi-sensor measurements of soil water content. Low-cost open hardware microcontroller platform for monitoring equipment for plant-factory automation of crop production.
1	(Iqbal et al., 2020)	An open source indoor and outdoor autonomous robot for conducting plant morphological trait phenotyping and soil sensing.
1	(Coelho et al., 2018)	An embedded system for performing spatial variability data analysis in the field on top of soil-plant system data.

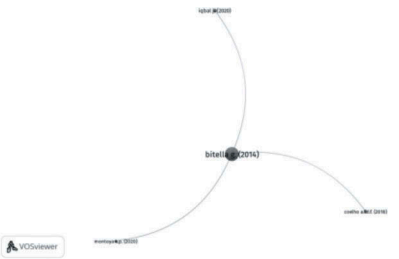

Figure 5. Network of co-citation (generated with VOSviewer).

they share same intellectual foundations) is here as well a very reduced part of the whole set. Among 137 publications, only 8 are connected (5.83%), with a first cluster with four articles (Bitella et al., 2014; Mesas-Carrascosa et al., 2015a; Piromalis & Arvanitis, 2016; Zujevs et al., 2015) attached to one with two articles (Iqbal et al., 2020; Khan et al., 2018) and another one with two articles (Coelho et al., 2018; Montoya, Obando, et al., 2020). Here again mainly articles of technological cases, except for one publication that reviewed all the contemporary sensor systems that could be used in Open Source Agriculture.

3.2 *Co-word analysis*

We also ran co-word analysis with VOSviewer (van Eck & Waltman, 2010) which allowed us to understand consolidated themes emerging from shared words and their interactions. We analyzed *terms* (these can be considered as bottom-up themes: emerging from the words used by authors in abstract and titles) and *keywords* (top-down themes: consciously

Table 5. Clusters of bibliographic coupling (generated with VOSviewer and edited).

N. of publications	Publications	Topic
4	(Bitella et al., 2014; Mesas-Carrascosa et al., 2015a; Piromalis & Arvanitis, 2016; Zujevs et al., 2015)	A low cost open hardware platform for multi-sensor measurements of soil water content. Design of an open hardware system for crop monitoring based on crop yield models and real-time data. A new Wireless Sensor and Actuators Networks (WSANs) architecture for hostile operating environments in agricultural applications. A review of modern sensor systems (computer vision, chemical sensors, tactile sensors and proximity sensors) used in semi or fully automated robotic fruit detection, localization and harvesting.
2	(Iqbal et al., 2020; Khan et al., 2018)	An open source indoor and outdoor autonomous robot for conducting plant morphological trait phenotyping and soil sensing. Design, implementation, and testing of an autonomous agricultural robot with GPS guidance for fertilizing and weed detection and removal.
2	(Coelho et al., 2018; Montoya, Obando, et al., 2020)	An embedded system for performing spatial variability data analysis in the field on top of soil-plant system data. Low-cost open hardware microcontroller platform for monitoring equipment for plant-factory automation of crop production.

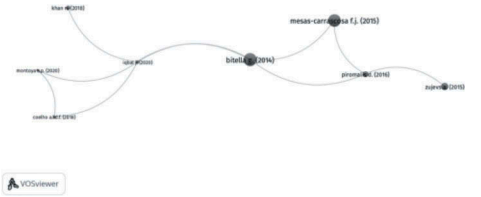

Figure 6. Network of bibliographic coupling (generated with VOSviewer).

decided by authors), checking how they co-occur among each other. This allowed extracting map visualizations on the overall conceptual groups clustering as well as later analyzing their evolution. In order to make them comparable, we found that the most appropriate criteria were to look for 8 co-occurrences in terms and 3 co-occurrences in keywords. Since there are 5265 terms and 1710 keywords, terms are roughly 3 times the number of keywords. With these criteria we were able to identify comparable networks: 130 items and 7 clusters for terms (Figure 7, Tables 6-7), and 123 items and 8 clusters for keywords (Figure 8, Tables 8-9). These clusters are a mix of different types of terms, we highlight how "system" and "open systems" are among the main elements

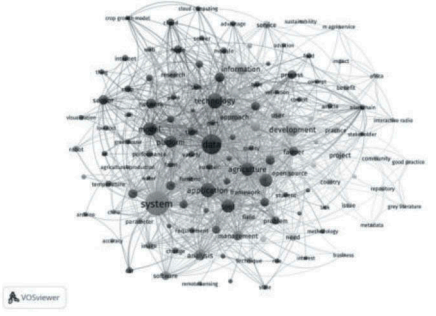

Figure 7. Co-word analysis: network of terms from title and abstract (generated with VOSviewer).

Table 6. Co-word analysis: clusters of terms from title and abstract (generated with VOSviewer).

Cluster	N. of terms	Terms (in order of weight, descending)
1	26 (20.00%)	agricultural production, agriculture, application, arduino, area, car, case study, challenge, change, communication, demand, experiment, farm, function, optimization, performance, person, problem, remote sensing, requirement, researcher, role, state, student, tool, use

(*Continued*)

Table 6. (Continued)

Cluster	N. of terms	Terms (in order of weight, descending)
2	22 (16.92%)	architecture, database, day, device, greenhouse, hardware, internet, iot, low cost, network, plant, platform, precision agriculture, quality, sensor, server, solution, temperature, thing, visualization, water, work
3	21 (16.15%)	addition, article, blockchain, concept, context, farmer, food, interest, lack, methodology, module, order, paper, part, power, process, stakeholder, technology, type, validation, variety
4	17 (13.07%)	business, community, cost, energy, field, framework, good practice, grey literature, industry, issue, maintenance, metadata, need, production, project, repository, term
5	16 (12.30%)	africa, benefit, country, development, impact, improvement, information, interactive radio, knowledge, m agri service, open source, practice, service, study, sustainability, user
6	14 (10.76%)	advantage, cloud, cloud computing, crop, crop growth model, data, environment, implementation, model, node, number, soil, task, time
7	14 (10.76%)	accuracy, analysis, approach, china, image, management, open source software, parameter, research, robot, software, system, technique, web

Table 7. Co-word analysis: first 40 terms from title and abstract ranked by weight of links among them (generated with VOSviewer).

Terms	Cluster	Weight<Links>
agriculture	1	129
development	5	128
paper	3	127
data	6	126
application	1	125
platform	2	125
information	5	125
system	7	124
environment	6	123
management	7	122
use	1	121
solution	2	121
technology	3	121
open source	5	121
model	6	121
field	4	120
analysis	7	120
approach	7	120
area	1	119

(*Continued*)

Table 7. (Continued)

Terms	Cluster	Weight<Links>
tool	1	119
user	5	119
implementation	6	119
time	6	119
network	2	118
need	4	118
production	4	118
study	5	118
farmer	3	117
database	2	116
work	2	116
process	3	116
project	4	114
practice	5	114
problem	1	113
architecture	2	113
improvement	5	112
sensor	2	111
industry	4	111
issue	4	111

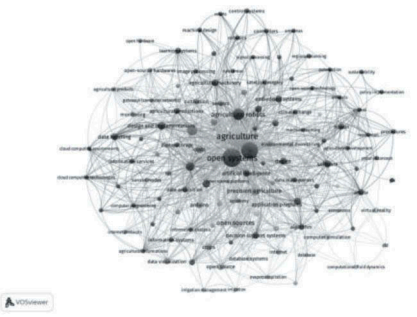

Figure 8. Co-word analysis: keywords (generated with VOSviewer).

Table 8. Co-word analysis: clusters of keywords from title and abstract (generated with VOSviewer).

Cluster	N. of keywords	Keywords (in order of weight, descending)
1	20 (16.26%)	software, artificial intelligence, software design, decision support systems, data management, article, algorithm, human, animal, animals, procedures, data processing, humans, nonhuman, mobile application, automation, machine learning, food supply, methodology, proof of concept
2	20 (16.26%)	cloud computing, design and implementations, data handling, information management, data acquisition, digital storage, web services, information use, information services, information analysis, agricultural informations, distributed database systems, cloud computing technologies, computer programming, information systems, cloud computing environments, search engines, graphical user interfaces, management information systems, data warehouses
3	20 (16.26%)	open systems, open source software, agricultural robots, agricultural machinery, hardware, agricultural productions, learning systems, satellite imagery, embedded systems, image processing, user interfaces, control systems, machine design, global positioning system, controllers, robots, signal processing, unmanned aerial vehicles (uav), robotics, antennas
4	17 (13.82%)	agriculture, open sources, remote sensing, visualization, software engineering, environmental monitoring, computer software, application programs, computer simulation, virtual reality, database systems, database, geographic information systems, ecosystems, agricultural fields, cfd, computational fluid dynamics
5	14 (11.38%)	precision agriculture, crops, internet, arduino, computer hardware, open source, open-source, wireless sensor networks, soil moisture, evapotranspiration, water supply, open source platforms, irrigation, irrigation management
6	12 (9.75%)	design, sustainable development, data set, regional planning, urban growth, open-source technology, climate change, agricultural development, policy implementation, sustainability, rural areas, gis
7	10 (8.13%)	big data, quality control, costs, sensor, cultivation, monitoring, gateways (computer networks), open-source hardwares, agricultural products, agronomy
8	10 (8.13%)	internet of things, sensors, data visualization, sensor nodes, iot, internet protocols, internet of things (iot), smart city, smart farming, open hardware

(*Continued*)

Table 9. Co-word analysis: first 40 keywords from title and abstract ranked by weight of links among them (generated with VOSviewer).

Keyword	Cluster	Weight<Links>
agriculture	4	118
open systems	3	111
open source software	3	94
agricultural robots	3	68
precision agriculture	5	60
cloud computing	2	59
internet of things	8	58
open sources	4	57
software	1	54
remote sensing	4	52
crops	5	45
design and implementations	2	41
artificial intelligence	1	39
internet	5	39
software design	1	38
arduino	5	38
computer hardware	5	38
decision support systems	1	36
open source	5	36
sensors	8	36
data handling	2	35
agricultural machinery	3	35
big data	7	35
quality control	7	35
information management	2	34
visualization	4	34
design	6	34
data management	1	33
data acquisition	2	33
article	1	32
hardware	3	32
costs	7	32
data visualization	8	32
algorithm	1	31
agricultural productions	3	31
software engineering	4	31
sustainable development	6	31
learning systems	3	30
satellite imagery	3	30

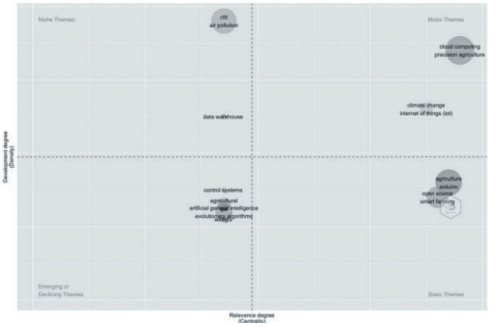

Figure 9. Thematic Map based on Authors' keywords (generated with Bibliometrix).

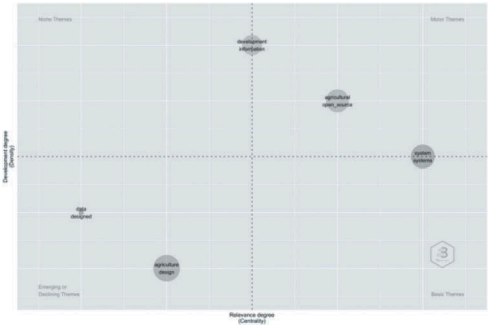

Figure 10. Thematic Map based on Titles (just single words - unigrams) (generated with Bibliometrix).

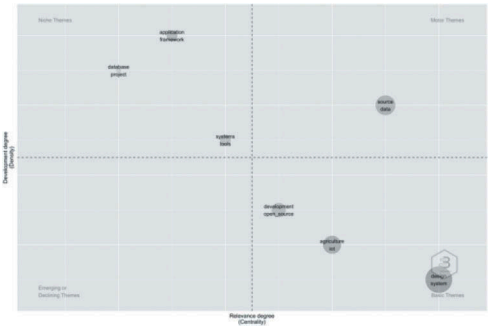

Figure 11. Thematic Map based on Abstracts (just single words - unigrams) (generated with Bibliometrix).

3.3 *Thematic analysis*

To deepen the conceptual structure mapping, we used Bibliometrix (Aria & Cuccurullo, 2017) that automates the thematic analysis process.

In the first stage, we traced thematic maps as strategic diagrams, which we obtained by automatically characterizing each theme in terms of density and centrality. These maps facilitate the classification into four groups (Cobo et al., 2011), as plotted in Figures 9, 10 and 11. We repeated the process three times for Authors' Keywords, Titles and Abstracts (on the latter two, just for single-word expressions - unigrams).

The upper-right quadrant hosts the motor themes as they present greater values for centrality and density. This classification means they are related to external concepts that apply to other themes that are also conceptually related.

The upper left themes are more related to the others extracted from the database but are not related to the same external themes as the previous.

Lower-left themes have a low level of development and are marginal in terms of importance/relations in

the field. In contrast, the lower-right ones are transversal and general but not significantly developed.

In the three maps, we can observe that "open source" always occupies the right side of the map, as it is considered well developed or underdeveloped but always transversal, meaning they are closely related to other external themes (Cobo et al., 2011).

A closer look at the Authors' Keywords thematic map plot situates technological themes such as "cloud computing", "precision agriculture" and "internet of things" alongside "climate change" on the motor-themes quadrant, "both well developed and important for the structuring of a research field" (Cobo et al., 2011). "Arduino", one of the most paradigmatic open hardware projects, appears at the top of the lower right quadrant. If this quadrant hosts both emerging and declining themes, we need to be supported by the trend topics graph in Figure 12 to verify positively its emergence instead of decline.

Lastly, the variation of "design" across three different quadrants in the three maps doesn't allow tracing a pattern about it nor concluding any role for the theme in what concerns the bibliometric analysis of this database.

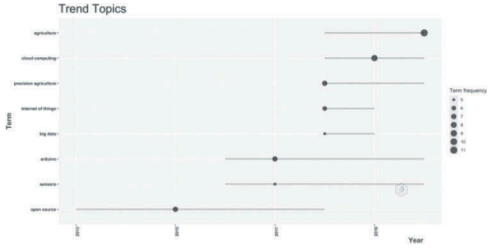

Figure 12. Trend Topics (generated with Bibliometrix).

3.4 *Most cited publications qualitative analysis*

The co-authorship, co-citation and bibliographic coupling analyses (section 3.1) showed that there is no clear conceptual and social structure yet behind Open Source Agriculture research, as it has been so far mainly the work of individual and very few teams on cases of technological development and implementation more than a reflection on the foundations of Open Source Agriculture. It is almost impossible to point out publications about Open Source Agriculture, rather only implementations of it. In order thus to explore the topic, we then decided to qualitatively analyze a set of selected articles that we sampled from the dataset. After carefully exploring the possibilities, we considered that analyzing the ten most cited articles could respond to our expectations on extracting valuable data about the presence, impact, and relations among "open source", "agriculture", and design in the analyzed dataset (Table 10). Since collaboration networks weren't conclusive enough to derive the idea of Open Source Agriculture as an established field of research and did not highlight specific topics, the ten most cited publications can be considered as representative of the field.

Nevertheless, it was captivating to understand that in most (seven out of ten) of the read articles, we identified a connection between "open source" and "design". The design process presented in three of these articles resulted in open source artefacts. In only one, open source is shown as a resource-only usage; in the majority (six), open source is present on both sides, as a resource and an output.

It is also important to point out that both Bitella et al. (2014) and Mesas-Carrascosa et al. (2015b) address designing an open software and hardware platform. Also, they both acknowledge the process of deriving from other open source projects such as Arduino. Both articles establish a deeper relation between design and open source as they address the process from a technical development standpoint, highlighting advantages such as cost and accessibility but skipping any impact of open source on a collaborative design process.

4 DISCUSSION

We were surprised by the diversity of scientific areas and geographies and the increasing scientific production pattern associated with our query. Of course, food production is a relatively ubiquitous thematic, but the query combination could have had its impact. Conversely, it was also surprising to understand the lack of networks and collaboration extracted from the bibliometric analysis. Collaboration is a natural implication of open source and is expectedly natural among communities that address the topic. There is clearly no established community working on Open Source Agriculture and by itself cannot be considered yet an established research field, only a new emerging phenomenon that, beside technological development, has still to be defined and deeply unpacked.

The co-word analysis also delivered compelling topics for discussion, especially if we overlap these results, that mainly expose a technological centrality with the diversity of scientific areas.

The fact that the query included open source and its link to technological development is an obvious connection.

Publications started in 2004 with a growth that doubled during 2017-2018; "design" emerged as the main word used in titles together with "system", before "agriculture". In terms of thematic evolution, "design" emerges around 2017 from "system", "agriculture", and "monitoring" and then develops into one of the main themes. While "system" and "open systems" are the main topics, more than "agriculture", "design" is a relevant topic that can be found as the main element of a cluster that connects it with strategic topics such as service, sustainable development, regional planning, urban growth or even policy

Table 10. Analysis of the 10 most cited publications.

N.	Ref:	Open source as	Design as	Connection between design and open source	OS based on? outputs?
1	(Bitella et al., 2014)	open source software;open source hardware.	equipment design and software that facilitates adoption and continuous improvement in the context of open hardware technological development.	yes	both (also addresses its impact)
2	(Bontemps et al., 2015)	open source software.	algorithm and system design and design of a data set;Software design process including prototyping and implementation.	yes	both
3	(Busch et al., 2009)	open data.	generic expression of design in the context of establishing criteria to read the available data.	no	output
4	(Jenkins et al., 2019)	open source software;open source hardware.	hardware and software design including evaluation of the system where it is being applied to.	yes	both
5	(Pulley & Collins, 2018)	open source software.	no reference	no	output
6	(Kuhlgert et al., 2016)	open source software; open source hardware; open design; open science	full paper around the design of a software/ hardware platform, its community testing and recommendations for future development.	yes	both
7	(López-Riquelme et al., 2017)	open source software.	design of software and hardware for precision agriculture	yes	both
8	(Mesas-Carrascosa et al., 2015b)	open source hardware.	design of open source hardware,design, implementation and validation of the system,prototyping,design criteria are mostly technical.	yes	both (also addresses its impact)
9	(Shahrubudin et al., 2019)	open design	open source CAD design	yes	outputs
10	(Xie et al., 2011)	open source software	system design, forest plan design	no	based

implementation. Thematic analysis shows design as a basic topic**,** widely developed but not consciously focused and not pushing the field. Design in Open Source Agriculture is often considered for orchestrating, monitoring, managing systems such as IoT. Design has here had an increasing thematic relevance: while it is typically considered as a basic, general, universal practice of developing technology, it is also often adopted together with more strategic topics it deals typically with (service, policy, sustainability).

5 CONCLUSION

What relations can we trace between scientific research that combines “design”, “open source”, and “agriculture”? Or, more succinctly, what is there to map when combining these themes?

Firstly, we can assume that the results express a technological dominance over any expression of collaboration and community that could be expected from the topic of open source. Also, regarding design, it is presented as a natural activity, not being explored in its essence. This absence somehow corroborates the wholeness of our preliminary definition. Still, it indicates a gap, meaning there is no sign of design processes being studied in (or about) agriculture, even when openness (open source hardware, software, and others) is at stake.

Thematic analysis exhibits design as a basic topic, widely developed but not consciously focused and not pushing the field. Design in the context of the dataset we obtained from our query is often considered for formulating or improving systems such as IoT. Design shows thematic relevance: while it is typically viewed as a primary, general, universal practice of developing technology, it is also often adopted together with more strategic topics it generally deals with (service, policy, sustainability). The conscious application of design to these is still lacking, but we think that their presence in publications could be a sign that also a strategic role of design could be further developed here. Design is a foundational element of Open Source Agriculture, but there is no research on the specificities of its role in this context. Further research could thus explore

the part of the design in Open Source Agriculture more consciously and for more strategic directions beyond technological development. Furthermore, while the social dimension is a foundational element in open source, here it is lacking, and further research should address it. It has to be noted that there is no community or social structure of researchers working on Open Source Agriculture and there is no focus on communities and social structures in it in research so far.

As limitations, we should acknowledge the ones related to the bibliometric component of our semi-systematic literature review, especially the exclusivity of the English language and the already explained option for a single database, Scopus. In the end, even if we assume it is the best choice for the bibliometric component, it narrowed the qualitative approach by removing a lot of non-indexed research that could have an essential role in tracing the map of research on Open Source Agriculture.

Nevertheless, in terms of existing connections between design, open source and agriculture, it is clear that the most relevant work being done in this area is technologically grounded, involving design processes but not focusing on them. Also, the open source field is not deepened in terms of impact or design processes.

We consider that this combination opens many possibilities for future studies, especially those that relate to the processes and platforms for a possible open agricultural design and the expansion of the objects of this very same design beyond the mere technological development support.

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Experiencing and Envisioning Food: Designing for Change – Bonacho et al. (Eds)

Envisioning sustainable futures through co-creation of cocoa food products

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ABSTRACT: Los Chiles is a rural region located in northern Costa Rica. It is considered one of the most vulnerable areas in the country because of its low development rates. Cocoa production in this region has increased recently with the rise in the number of small entrepreneurs interested in value-added cocoa products. In this study, our objective was to co-create a food product that would help a local entrepreneur and his group of consumers to build a commercial dynamic that met both actors' needs and desires. The methodology consisted of three main components: 1) understanding context and people, 2) collaborative generation of ideas and concepts and 3) food product prototyping. This exercise allowed us to bring together the key actors to speak the same creative language and to build a product proposal that fitted their common vision for a more sustainable commercial future.

1 INTRODUCTION

Los Chiles is a rural region located in northern Costa Rica. Commercial activities in the area are performed primarily by small and medium producers in the agriculture and livestock sectors (Ministerio de Agricultura y Ganadería, 2020).

Cocoa is one of the representative agricultural goods of this region. The importance of this product has been increasing in recent years at both the local and national levels. Costa Rica is currently recognized by the International Cocoa Organization as an exporter of 100% fine or flavor cocoa (International Cocoa Organization, 2020).

A large part of the Los Chiles territory is at a social disadvantage. About 80% of the population receives the lowest economic income in the country. Other problems in the area include limited access to electricity, Internet, health services, education, and sources of employment (Ministerio de Agricultura y Ganadería, 2020).

To increase the competitiveness and sustainability, the development of strategies that promote the use of local raw materials, and resources have been proposed (Comisión Interinstitutional de Cacao, 2018; Ulloa Leitón, 2019).

One of these strategies involves the potential consumer in the stages of ideation, creation and implementation of products, services, or local food systems (Mars, 2015). This co-design approach is commonly called value co-creation and has roots in the human-centered design (HCD) approach. Co-creation is an active, creative, and social process where multiple stakeholders collaborate as "experts of their experiences" (Ranjan & Read, 2016; Sleeswijk et al., 2005, as cited in Thabrew et al., 2018). Participants contribute to the process by providing their experiences, concerns, perspectives, and knowledge as valuable resources. Such cooperation generates mutual benefits; customers receive an offer that meets their expectations, and the company is able to increase its competitive advantage and long-term profitability (Banović et al., 2016; De Koning et al., 2016; Frow et al., 2015, Koniorczyk, 2015; Mars, 2015; Velazquez et al., 2022).

Co-creation of sustainable and meaningful value-added products in food systems has been shown to promote the development of local communities and enterprises (Barone et al., 2021; Food and Agriculture Organization of the United Nations [FAO], 2018; Mars, 2015; Tardivo et al., 2017). Furthermore, co-creation can help companies maximize their resources and improve their performance while becoming more sustainable (Kruger et al., 2018).

In the present project, this approach was applied to co-create a cocoa-based food product consistent with the shared vision of a local entrepreneur and

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a selected group of consumers for future cocoa development in their community.

2 METHODOLOGY

2.1 *Project development*

A co-creative product design and development approach was applied, considering the entrepreneur and his potential consumers as the main actors. The project contemplated three main components and followed a human-centered design methodology (IDEO, 2015). The project components are described below.

2.1.1 *Understanding the context, entrepreneur, and consumers*

Documentary research was carried out to obtain information about the cocoa sector in Costa Rica and local and international trends for consumption of cocoa products.

Surveys were applied, and work sessions were held with the entrepreneur using some of the tools described by IDEO (2015) and Gray *et al.* (2010) to recognize the company's motivations, values, priorities, and general work culture.

A potential consumer profile was built using information collected through surveys and virtual sessions. A total of 120 people participated. Ten of the participants were recruited to form the group of consumers for the co-creation process.

2.1.2 *Collaborative generation of ideas and concepts*

Two co-creation workshops were held to generate ideas and concepts:

a. *Co-creation workshop I with potential consumers:* participants were asked to generate ideas and create product concepts based on their own needs and desires. The workshop was designed and executed using De Koning (2017) methodology as a base and idea-collection tools described by Gray *et al.* (2010), IDEO (2015), and Kumar (2013). Participants were given initial inputs on market trends and characteristics of different products to inspire them to create their own ideal products. The input material was prepared using the Miró platform, and virtual sessions were held via Zoom. The information collected was tabulated and analyzed by thematic analysis (Castleberry & Nolen, 2018).
b. *Co-creation workshop II with the entrepreneur:* a virtual work session with the entrepreneur was done with the objective of evaluating the ideas generated by the potential consumers during co-creation workshop I. The most important values for both actors were identified and represented in a Venn diagram and used to define the product concept, the product requirements, and the design brief.

2.1.3 *Product prototyping and testing*

Low, medium, and high-resolution prototypes were elaborated using laboratory-scale equipment and evaluated with the consumer group until the product concept that best fit their requirements was obtained (McElroy, 2017). Before building the final prototype (high-resolution model), a face-to-face workshop was held with the consumers to determine which aspects they liked about the three main ideas built throughout the process. In this way, the most valued characteristics were identified and included in the final prototype.

3 FINDINGS AND RESULTS

3.1 *Context and people*

3.1.1 *Cocoa market: Status and trends*

The local cocoa market in Costa Rica is made up of three medium-sized companies and approximately 40 small companies. These companies have started to produce fine chocolates from local premium cocoa beans to serve national, tourist, and export markets (Fallas Salas, 2019).

The supply chain of cocoa products in the Costa Rican market is limited and may become saturated since many entrepreneurs produce handmade chocolate bars. The larger companies focus on chocolate confectionery for mass consumption (Fallas Salas, 2019).

We identified five main local and international cocoa trends: comprehensive use of the cocoa fruit, innovative fillings, healthy foods, gourmet chocolate, and foods with environmental and social awareness, like vegan chocolates (Purcell, 2020; Zegler et al., 2021). Several sub-trends were observed within the category of healthy foods, including chocolates with a high cocoa content, probiotics and gastrointestinal health, functional fillings, chocolates with low or no added sugar, and raw cocoa chocolates (Alpízar, 2016; Ulloa, 2019).

3.1.2 *Entrepreneur identity*

The entrepreneur owns a small Costa Rican company with the following main values:

– Eco-friendly: uses clean energy and organic inputs.
– Fairtrade: pays a fair price for cocoa to local producers.
– Quality products at a reasonable price: Maintains a balance between high-quality healthy ingredients and price.
– Local value and community: Motivated by the community while wanting to be a role model for social change.

The technical capabilities of the company are shown in Table 1.

Table 1. Company technical capabilities.

Aspect	Detail
Plant	Small facilities located in Los Chiles
Employees	3 workers
Equipment	Small-scale equipment for cocoa processing including refiner, temperer, roaster, mill, dragee and winnower.
Main Challenges	Implementation of HACCP system, difficulty finding some organic supplies and limited ability to enter new stores.

The company is committed to social and environmental causes while seeking to provide its customers with products of remarkable quality, flavor, and price.

This small company aspires to be recognized globally for its commitment to quality and care for the environment while offering delicious products at affordable prices.

3.1.3 *Consumers' identity*

The typical consumers of this company are between 25 and 40 years old, lead a healthy and active lifestyle, and seek to maintain a healthy and nutritious diet. They want, above all, to eat foods that meet their flavor expectations. They love nature and embrace foods that support environmental conservation and the development of local communities.

3.2 *Product ideas and concepts*

Through co-creation workshops, we identified values held in common by the company and its group of consumers.

The values shown in Figure 1 were essential for the creation of a shared vision for the future and the definition of product requirements for product conceptualization and prototyping (Table 2).

Figure 1. Venn diagram of aspects important to the company and its consumers.

Table 2. Product requirements.

Requirement	Explanation
Tasty	Delicious taste experience
Healthy	Made with natural ingredients with healthy and nutritious properties
Sustainable	Eco-friendly process and inputs, fair trade with cocoa producers
Accessible	Price that meets the consumer´s expectations and reality
Attractive	Packaging design that captures attention and reflects the product values
Convenient	Practical presentation and size that fits a busy lifestyle

The product brief established together with the different co-creating actors reads as follows:

A sustainable "hybrid" between a traditional chocolate bar and an energy bar that is so delicious that it doesn't seem healthy (but it is).

3.3 *Product prototyping and testing*

Two conditions were fundamental during prototyping to meet the values and aspirations of consumers and the entrepreneur: 1) to use natural, local, and inexpensive plant-based ingredients and 2) to maintain a minimum cocoa content of 70% in the final chocolate.

The origin, cost, and availability of potential ingredients were analyzed in relation to consumer expectations and the entrepreneur's ability to access them. The selected ingredients are shown in Table 3.

Table 3. Selected ingredients for prototype making.

Category	Ingredients
Nuts and seeds	Almonds, peanuts, cashew seeds, sunflower seeds, walnuts
Dried fruits	Cranberries, dates, goji berries
Cereals	Oats
Vegetable proteins	Soy protein, pea protein
Fibers	Inulin, cocoa fiber
Sweeteners	Honey, maltitol, coconut sugar, allulose

The following layer combinations were tested to explore the possibilities between a regular chocolate bar and an energy bar (Figure 2): a regular chocolate bar with no filling (A), chocolate with milled seeds of different sizes (B, C, D), granola bar with chocolate on top (E), a muesli bar with a chocolate center (F), a chocolate bar with a granola center (G), and chocolate with a jelly filling (H).

Consumers were more attracted to the chocolate with a jelly filling; therefore, the following explorations focused on the product type (H).

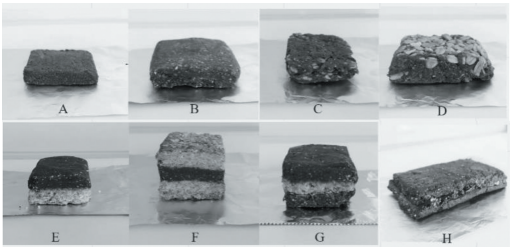

Figure 2. Layering exploration to find the preferred format between a traditional chocolate bar and an energy bar.

To find the chocolate filling that would best meet the consumers and the company expectations, approximately 25 fillings (Figure 3) were made using different combinations and proportions of ingredients (Table 3). Creaminess and sweetness were adjusted to obtain a filling with the desired qualities.

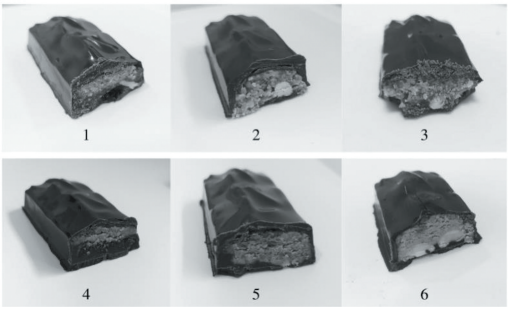

Figure 3. Chocolate bars with different fillings. 1,3 – Chocolates with almond and cashew seed fillings. 2,5,6 – Chocolates with a peanut butter filling. 4 – Chocolate with a cranberry and almond filling.

During the co-creation process, consumers mentioned that they wanted to be in control of what they eat. They felt more attracted to chocolate bars that could be broken into smaller portions. They considered this convenient and adaptable to their lifestyles.

Also, in addition to a good nutritional profile, consumers showed interest in highly functional food products. Functional foods are those that improve people´s health, reduce the risk of disease, or both (Vicentini *et al*., 2016). Options for making a functional chocolate were investigated, such as increasing the content of 1) soluble fiber, 2) antioxidants, 3) protein and 4) vitamins and minerals, especially vitamin E, magnesium, phosphorus, and manganese. The nutritional composition of the prototypes was adjusted to maximize their functional properties.

Another important aspect for the consumers was to reduce the consumption of foods high in added sugar, artificial sweeteners, or stevia. About ten formulations reduced in added sugars were ideated. Some of the prototypes included coconut sugar, allulose, and fibers of natural origin, such as inulin.

In pursuit of a more sustainable and healthy chocolate, the use of food by-products such as cocoa fiber was explored. The cocoa fiber was obtained from roasted cocoa husks after cleaning, macerating, and sterilization (Food Ingredients Group, 2021). Cocoa bean husks are one of the main residues from chocolate production. Valuing this residue helps to increase the chocolate product's nutritional profile, as it contains dietary fiber, polyphenols, and other functional compounds (Belwal et al., 2022; Balentíc et al., 2018).

Packaging alternatives were explored to reduce or replace the use of traditional plastic. A NatureFlex™ biodegradable cellulose product was chosen for the primary packaging, and the packaged bars were placed in a kraft paper box.

Colors, type of illustrations and feelings to be evoked were explored together with the consumers for the package design. The packaging was intended to reflect elements of nature, environmental sustainability, and the company's relationship with the community.

3.3.1 *Product concept definition*

Throughout the process, approximately 25 product concepts emerged. The three most appealing concepts chosen by the group of consumers are shown in Figure 4.

Figure 4. The three main product concepts 1- Balfour Protein bar: a peanut-based protein bar; 2- Cranberry chocolate bar: a bar filled with cranberries, cashew seeds and almonds with antioxidants; 3-Vegan bites: chocolate filled with almonds, cashews, orange essence and cocoa fiber.

Before evaluating the prototypes, the participants prioritized the product requirements and assigned an importance relative value (weight) to each (Table 4). Results from the evaluation of the three concepts are presented in Table 5.

Table 4. Relative value assigned by consumers to each of the product requirements.

Requirement	Importance relative value (%)
Tasty	45
Healthy	15
Sustainable	15
Accessible	12
Attractive	8
Convenient	5

Table 5. Ratings and comments regarding the final product concepts.

Concept	Ratings	Main comments
Chocolate bar filled with cranberries	82	Excellent or best flavor. The packaging design with needs to be improved. A presentation that can be divided into smaller portions is recommended.
Peanut-based protein bar	77	Good flavor combination. Packaging evokes energy and activation. The best in terms of utility (sports specific use) and nutritional properties (high in protein).
Vegan bites with orange and fiber	76	Beautiful packaging design (the best) A creamier texture is recommended Ideal size. The orange flavor needs to be morintense.

These observations were used to build and refine the final proposal described in section 3.3.2.

3.3.2 *Final prototype proposal*

The final product prototype is a filled chocolate bar that combines the flavor of the Cranberry chocolate bar with the attractive packaging design of Vegan Bites (Figures 4, 5, 6). It is a sustainable product with functional properties.

The ingredients used in the final formulation included 70% cocoa chocolate (cocoa paste, coconut sugar, cocoa butter, and inulin (fiber from chicory root)), cranberries, almonds, cashews, dates, oats, and cocoa shell fiber.

This product prototype is described by the consumers as tasty and delicious. They considered it is an affordable filled-chocolate bar with an ideal contrast between the chocolate and the cranberry filling.

This is a functional chocolate that offers high content of fiber from cocoa shells, oats, and inulin (~4 g per serving) and vitamin E from almonds (~2 mg per serving). Furthermore, it has natural antioxidants from dark chocolate, specifically polyphenols (460-610 mg/kg), which have been associated with health benefits such as lowering blood pressure, insulin resistance and vascular function (Aprotosoaie et al., 2016; Hooper et al., 2012; Montagna et al., 2019).

This plant-based product is made in a local production unit using primarily local raw materials and re-valued cocoa by-products.

The bar is practical and convenient and can be easily divided into small individual portions. All the materials used for packaging are recyclable or compostable.

This chocolate bar is considered to meet the needs and desires of the entrepreneur and its consumers, being a product that truly represents a shared vision for future commercial development. The values that guided the design and development of the product were identified through the co-creation approach. Thus, the prototype meets the expectations of both actors in terms of taste, nutritional and functional content, sustainability, accessibility, attractiveness, and convenience.

Figure 5. Filled chocolate bar for the final prototype.

Figure 6. Final prototype external packaging: a 12.5 x 10 x 2 cm box featuring an illustration of a local woman carrying cocoa pods. Each box contains three 30 g bars.

4 CONCLUSIONS

In this experience, the co-creation approach was a powerful tool that encouraged the active participation and integration of all actors to create a shared vision of the future and generate a reality-aligned product proposal that will contribute to local development.

A similar experience was reported by Mars (2015), where interaction between producers and consumers was key to the innovation process required to sustain and improve the food systems of local communities. Co-creative product design can lead to a deeper understanding of what stakeholders know and feel, and even their hopes for the future (Thabrew et al., 2018).

We encourage other companies to implement these strategies in other communities and food matrices, considering the strengths of the different co-creation actors. The co-creation approach can maximize the use of available resources, including tangible elements (available equipment, local raw materials, etc.) and intangibles (knowledge), to promote the building of more sustainable economies.

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Experiencing and Envisioning Food: Designing for Change – Bonacho et al. (Eds)

Taxonomic system of organoleptic representation: A case study in the north of Portugal

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ABSTRACT: Within the framework of a food design research project, a case study was developed to assess the food preferences of 102 participants in the North of Portugal.

After statistical analysis of the results obtained, it was possible to map them in a radial pattern of 12 aroma/taste typologies. This "organoleptic wheel" reinforces the existence of two correlation models: by complementary opposition and by the similarity of neighbors, thus representing the northern organoleptic collection, broken down into simple or complex foods.

The conclusions of this study reveal the non-indifference of individuals' food preferences, confirming territorial food patterns and the correlation of choices by association with age group and gender. The evidence demonstrates the need for greater attention to organoleptic culture in complementarity with nutritional science.

1 INTRODUCTION

"Moreover, there is nothing in the understanding that is not sense first. (Praeterea, nihil est in intellectu quod non sit prius in sensu)"

(Tommaso d'Aquino [51886] De veritate, q. 2 a. 3 arg. 19.)

The construction of individuals' tastes is not random. We can say that there is a set of premises underlying their choices: heredity, the influence of the intrauterine gestation process conditioning the formation and function of the senses, the socio-cultural and educational environment to which we have been subjected - determining or not happy events -, not forgetting the implication of the geo-climatic climate in which they are inserted. All of these are activators of the senses, and since feelings are the basis of emotions, they are imperative in the construction of personality. If we take the correlation between sensory learning and the formation of taste, which individuals later consolidate — the biological basis for their cultural identity — it is deducible that the manifestation of what we like to eat is strongly conditioned by the sub or unconscious areas of our cognitive apparatus.

Taste is a repository of feelings and memories: just as the smell is considered the most metaphorical sense, the taste of a particular dish can instantly transport us to a journey in time and space where we first experienced it (Proust, 2012).

The study by Diego V. Bohórquez (2018) on the mental conditioning of the intestines in individuals' decision-making identifies the sugar communicated to the brain by the intestines (through neuropod cells and the vagus nerve). It is thus concluded that human decision-making is essentially visceral (95%) versus (only) 5% of decisions made by the cognitive-logical-deductive apparatus (Ariely, 2009).

Contrasting this relationship to the cultural food circumstance, we understand that human decisions are generally not based on rational analysis of the consequences inherent to ingestion determination but rather on the visceral memorized pleasure that the organism will want to repeat (Reich, 1975, p. 21).

Therefore the cultural creation of habits from the pre-school age will be so important, following the example of the Reggio Emilia school model, thus making it possible to create the conditions for practice and pleasure in nutritional food systems, which are hidden by organoleptic sensoriality.

There is no experience without senses, implying, therefore, that education of the senses is a catalyst for lived experiences.

Admitting the scientific consistency of the analysis and looking at the problem from the point of view of the State and its social responsibility in the management of public health, it seems clear that the implications of food on longevity, quality of life, and health of the population will lead to higher financial cost and communication effort. The mere creation of new food frameworks proposed by the school network to the youngest groups in society is not the only solution; it is necessary to build a new gastronomic culture

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(possibly recovering traditional patterns) more oriented towards the happiness of individuals and not only from the Manichean perspective of nutrition (Polland, 2008, p. 45).

This leads to the conviction that the correction of eating patterns depends more on organoleptic culture than on nutritional science, i.e., when we generically say animal protein, we do not visualize the meaning of a specific type of gastronomic culture which, for example, makes "rojões à minhota" (small pieces of fatty pork are fried slowly in their fat) a product incomparable to its counterparts in the southern part of the same country. By doing so from the scientific perspective of nutrition, we reduce it to just one protein as the primary nutrient of a food system, overlooking all the layers of meaning and flavor of this organoleptic heritage in favor of a mere sum of chemical constituents.

Corroborating Polland (2008), on what he calls the American paradox: the more significant the concern about nutrition, the less healthy man becomes by substituting food for nutrients overlaps the functional performance of nutrition to the cultural perspective of food. Hence his manifesto: "Eat food. Not too much. Mostly vegetables."

This cultural perspective of food extends to all sorts of memories that are found in the time dispensed, the type of combustion used, the provenance of raw materials, and the heritage of procedures that materialize in abysmal differences between the same cooked, baked, or grilled dishes. This organoleptic acuity is translated into the chromaticism of the variety, which is reflected in the taste (taste buds of the tongue), the smell (retronasal olfactory cells), the texture (tactile surface of the mouth concavity), and the crunchiness (vibrations transmitted by the masticatory apparatus to the ear).

2 EXPERIENCE DESCRIPTION

Framed within a food design research project, the aim is to redesign a system of edible vegetable-based containers — with dehydrated fruit and vegetable-based pastes, previously rejected by quality control — offering an alternative to the hegemony of wheat and getting closer to the current trend of vegetable-based food consumption. Its objective is to promote eating habits that lead to better habits without neglecting the playful dimension or the organoleptic framework of cultural reference (regional gastronomy).

The aim of this case study started from a qualitative methodological perspective whose objective was to assess, statistically synthesize and understand the context of the organoleptic culture in the North of Portugal, declined in the radial mapping of the components of regional organoleptic.

The ethnographic observation presents a heterogeneous sample of 102 participants — 57% female and 45% male —, from the child, adult, and senior age groups, in a spectrum of ages between 4 and 79. In addition, unstructured interviews were carried out and recorded on video to obtain more diverse and unconditioned participation in studying the phenomenon of food preferences (taste).

Given the difficulty in distinguishing between perceptions of taste and smell due to the phenomenon of contaminating retronasal olfactory perception of taste in the mouthpiece, we will use the analysis of the answers obtained (simple and compound products) as a basis for taxonomy based on the holistic experience of taste sensations, organized into 12 typologies: starchy, marine, fruity, minty, herbaceous, peppery, faisandé, acid, vanilla, Maillard, toasted, smoked.

From the analysis of the answers to the survey, the most commonly mentioned foods fall into the following types: roasted, fruity, acid, and smoked, as shown in Table 1. Statistically observing the age between the female and male groups, there is gender parity.

Investigating the statistical results, we obtained, in a first analysis, three conclusions:

1) In the results of the Wilcoxon table, there is a tendency for the choice of roasted flavors among women and smoked flavors among men (p-value ≤ 0.05).
2) Considering the association between types of flavors and age (quantitative variable), we can deduce from Table 2 that the group of individuals that do not identify (m_0) and the group of individuals that do not identify (m_1) do not report significant differences, but allow us to perceive consumption tendencies. Furthermore, identifying the roasted and smoked types prevails among the youngest, while identifying the fruity and acid types prevails among the oldest.

Table 1. Main organoleptic typologies mentioned.

Characteristic	N	Overall, N= 102[1]	F, N= 57[1]	M, N= 45[1]	p-value[2]
AGE	102	38 (32, 48)	38 (32, 46)	38 (31, 59)	0.5
TOASTED	102	69 (68%)	44 (77%)	25 (56%)	0.020
FUITY	102	54 (53%)	29 (51%)	25 (56%)	0.6
ACID	102	36 (35%)	22 (39%)	14 (31%)	0.4
SMOKED	102	30 (29%)	10 (18%)	20 (44%)	0.003

[1] Median (IQR); n (%)
[2] Wilcoxon rank sum test; Pearson's Cbi-squared test

Table 2. Comparison of ages between groups that do not reference categories and those that do.

		p value Wilcoxon	Q1_0	median_0	Q3_0	Q1_1	median_1	Q3_1
1	T_FRUITY	0.91452423	31	38	41.91667	32.00	38.5	41.46296
2	T_ACID	0.14597956	30	37	40.62121	33.75	40.5	43.61111
3	T_TOASTED	0.06326393	33	40	47.12121	31.00	38.0	39.07246
4	T_SMOKED	0.29501618	32	40	42.34722	29.50	36.0	40.06667

3) After the Cramer's V diagram (Figure 1) analysis, which relates the prevalence among the four typologies — fruity, roasted, smoked, and acid — there is scientific evidence of preference for the fruity and acid typologies.

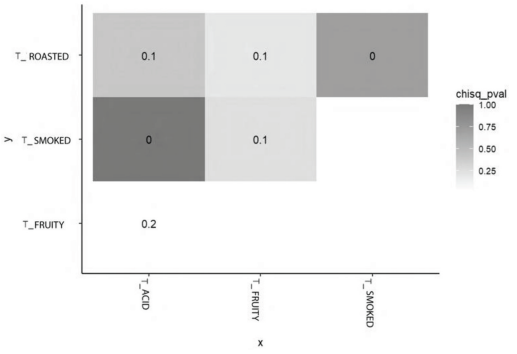

Figure 1. Relationship diagram.

This is the basis for an organoleptic preference trait in the Northern region of Portugal, which is characterized by the dominance of smoked among males, and roasting among females, a tendency to consume roasted and smoked among the young, fruity and acidic among the older and, finally, evidence of a correlation between fruity and acidic flavors.

3 ORGANOLEPTIC WHEEL

Following the Master's research in food design (Afreixo & Providência, 2012), plus an exploratory study on organoleptic and the contribution of food design to democracy in early childhood education — complementary to nutritional monitoring — (Afreixo, Providência, & Rocha, 2021) a taxonomic system on olfactory-gustatory perceptions has been built, which we call the "Organoleptic Wheel."

The cultural context of the individuals surveyed and the food model of each territory will determine their preferences, here representing the Northern area between Porto and Aveiro, the nature of the sampling, translating into a map of the mix with the Mediterranean (rich in aromatic herbs and olive oil) and Atlantic (rich in smoked meats and brassicas) diets.

The Atlantic diet (Trabazo & Sierra, 2009) was presented in 2009 as an alternative to the Mediterranean diet, and in 2013 it was scientifically officialized by the World Health Organisation and the European Union. The origin of the Atlantic diet lies in the food profile of countries bordering the Atlantic Ocean, namely those of the Iberian Peninsula, northwestern Spain (Galicia), and northern Portugal, Ireland, and France. These regions share geographical, climatic, and cultural similarities that give rise to a characteristic food pattern (Almeida & Oliveira, 2017). Fish, especially cod, salted, fresh or dried; a variety of mollusks and crustaceans; pulses; vegetables (legumes, vegetables of the brassica genus) and fruit; dairy products (cheese and milk); wholemeal bread; vegetable soup; pork and beef in small quantities; olive oil (as the primary cooking fat); potatoes; water and wine; daily physical activity and conviviality at the table, which is synonymous with sharing meals with family and friends, preserving traditional Atlantic eating habits.

The studies already carried out on the benefits of consuming this diet, although reduced by the brevity of its age, gather the following evidence:

1. The occurrence of acute myocardial infarction is inversely proportional to the adoption of the Atlantic diet;
2. This dietary pattern is inversely associated with high waist circumference, systolic blood pressure, as well as cardiometabolic risk factors;
3. The Spanish national statistics pointed out that the Galician living population has a longevity index above 90 years compared to other regions of Spain.

It also alerts to the relationship between the Atlantic dietary pattern and the non-occurrence of coronary heart disease that could be further optimized if the consumption of foods such as potatoes, red meat, and pork were reduced (Almeida & Oliveira, 2017, p. 26).

Considering the totality of simple and complex products mentioned in the survey, an organoleptic collection of 330 entries was reached. 12 typologies of aromas/flavors reorganized these elements:

1. Starchy (potato, rice, bread, beans),
2. Marine (hake, shellfish, seaweed),
3. Fruity (strawberry, mango)
4. Minty (peppermint, coriander)
5. Herbal (cabbage, broccoli)

6. Spicy (pepper, chili, mustard)
7. Faisandé (cod, matured cheeses, mushrooms, venison)
8. Acid (orange, olive oil, tomato sauce, pineapple)
9. Vanilla (honey, milk)
10. Maillard (roasts, cola, caramel)
11. Roasted (coffee, peanuts, cinnamon, cocoa)
12. Smoked (sausages, ham).

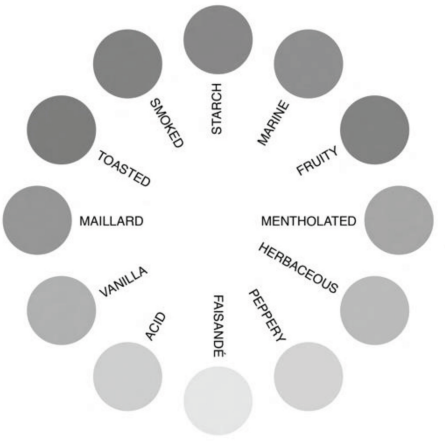

Figure 2. Visual representation model of smells/tastes or "sensory wheel".

This radially organized set allows us to perceive, as in Itten's color circle (1974), the existence of two correlation models: by complementary opposition and by the similarity of a neighborhood.

On the outer perimeter is the representation of the different foods, which can be simple products or components of complex products.

Applying this model to organoleptic studies in other regions will make it possible to observe differences in the products mentioned and their incidence among individuals from these cultures.

However, archetypical patterns can be identified in the model, such as acidic fermented products (beer, tomato sauce, pineapple) and sweet fermented products (wine), smoked, salted, and boiled foods, fried foods, or sweet and neutral starches, not forgetting roasted foods which, in each culture, acquire relevance and specificity built up over their history.

Starting from the complex foods invoked, we identified traces of complementarity between the taste sensations of smoked, starchy, and herbaceous (as in the case of "cozido à Portuguesa" (Portuguese stew), or the case of "bacalhau cozido com todos," the combination between faisandé (cod, matured cheeses, mushrooms, matured game), starchy (potatoes, rice, bread, beans) and herbaceous (cabbage, sprouts, parsley).

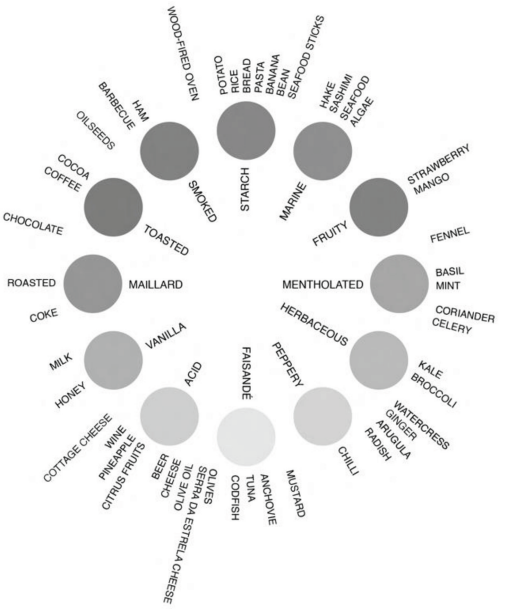

Figure 3. "Organoleptic wheel," a model for the visual representation of smells/tastes with an outer perimeter relating to food.

4 CONCLUSIONS AND FUTURE DEVELOPMENTS

In democratic societies, the State has taken parity and equality of individuals in access to knowledge and wealth as a factor for social development. Within this framework of intervention, guaranteed access to education (from primary education onwards) has been integrating nutritional food qualification means, recognized as necessary for students' good performance and protagonism, the future active citizens. The present statistical evidence supports the conviction that the guarantee of social democratization will also depend on nutritionally correct and organoleptically satisfactory food.

In that sense, the common framework of the old "pyramid," today's "food wheel," present in Portuguese public schools, could be accompanied by this proposal of organoleptic taxonomy, a complementary instrument for better development of individuals enabling them to have a more diversified organoleptic collection and, consequently, promoting, from the initial stages of cultural characterization, a greater openness to what is different which will correspond to a higher tolerance to innovation and creativity. Furthermore, greater organoleptic diversity will promote individuals with greater flexibility.

The world of gastronomy and food professionals could also use this taxonomy as a creative object for culinary organoleptic combinations.

The conceived "organoleptic wheel" will constitute a model of visual representation of smells/tastes/

foods that will broaden the awareness of food design, namely among chefs and food professionals.

The "organoleptic wheel" can also be used to promote individuals' quality of life while respecting regional cultures. A more cultured society will be more accessible, with more possibilities for choice, and consequently, a more developed one. Social development through organoleptic will promote the processes of subjectivation and difference, as opposed to the massification of globalization.

Therefore, it is considered that as future research developments, it would be of great scientific utility to observe the gastronomic heritage of the country's various regions and to record the adaptation of the "organoleptic wheel" to the specificity of each of its cultures.

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Experiencing and Envisioning Food: Designing for Change – Bonacho et al. (Eds)

Gastronomic culture and design education

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ABSTRACT: The paper exposes transversal and cooperative participation as part of design education process, expending teamwork with several partners, from academic field and business world. The research assumes Heidegger's propositions and, it is focus oriented on new products development - comprised by a seat, a fashion accessory and a toy - carried out by the gastronomic culture of a place, i.e. procedures, ingredients, utensils, persons and processes that define a regional dish. With this philosophy in mind, it was intended to recognize cooking as a systemic and interactive action to define a new costumer oriented product. With this study the authors proved that cross-ventures between entities from the same place can be an occasion to create social competences in design education and to develop sustainable skills. The need for cooperation became an innovation process, defining new markets chances and flexible solutions to climate change, in order to respect environment and living beings.

1 INTRODUCTION

1.1 *Cooking as something that show-it-self-in-itself*

This study assumes the phenomenological proposal of being and time defended by Heidegger in order to be able to interpret the true.

Etymologically, the word 'Kitchen' comes from the Latin 'coquină' and is presented as a term composed of the word 'cŏquo' and the feminine suffix 'ina'. Likewise, it is a word that "means "to alter (something, such as records) with the intention of deceiving or misleading" (Merriam-Webster 2016).

Like design, cooking elevates the individual to something that is between being and time, anything that is in the threshold between before and behind and in continuous transformation. As a phenomenon of something that shows itself, the 'show-it-self-in-itself' (Heidegger 2005) and that reveals itself in a hermeneutic process with progresses and setbacks, something characteristic of a reality that accepts the action of external factors in the process. For instance, something like the impact of culture, art, communication, urban fluxes, pandemics or wars. That is, when the multiple possibilities of 'being' are assumed and revealed.

Hence, in this study, all assumptions regarding the meaning of the word 'Cooking' are taken as a phenomenon that diverges with time, space and circumstances. Thus, in its purpose to the scope of design, the designer should reflect what the 'object/cooking' in the 21st century asks to be and, not forcing the sense of 'objetc/cooking' to become what the designer wants it to remain or to look like what it was in another time. In this sense, the notions of the meaning of 'cooking' are expanded, demanding that a researcher will never be able to fully understand experiences how they were understood in the past, because the pre-knowledge or the 'fore-structures' (Heidegger 2005) influence the process of comprehension. Martin Heidegger also describes that these external elements, when integrated into the knowledge process, can guide human being towards understanding and reaching the truth. "A fore-structure can be amended, but only by appeal to further interpretations, not to raw facts:' Even a description is already 'interpretation' ('Auslegung'), something as 'colour', as 'sound', as 'size'. There is interpretation and interpretation. Physical interpretation! (LXV, 166)." (Inwood 199). So, the meaning of 'cooking' may be interpreted as a circular process in which time corresponds to the concrete reality that is intended to be understood. For this reason, Martin Heidegger states there is a nebulous first moment that - combined with the knowledge of the past and with the experience of the individual - can provoke the comprehension of the future, completing a circle that promotes the increase of knowledge and leads to the interpretation. "But the explication of Dasein in its average everydayness does not give us just average structures in the sense of a hazy indefiniteness. Anything which, taken ontically, is in an average way, can be very well graspedontologically in pregnant structures which may be structurally indistinguishable from certain ontological characteristics (Bestimmungen) of an authentic Being of Dasein."

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(Heidegger, 2005: 70). Therefore, the new information must be integrated with the previous knowledge guiding the project towards the process.

In light of the new developments, inherent to li-quid modernity (Bauman, 2000), it is possible to argue that gastronomy manifests itself as a current phenomenon of the act of cooking, an action of mutation that adds "the art or activity of cooking and eating fine food" (Webster 2016). In this study, the logic of gastronomic culture is interpreted as a responsible and prudent act, focus on the process and which foresees the life cycle of a product. In this scenario the notion of gastronomy can be explained like "something-in-order to" (Heidegger 2005). And this means that 'cooking' only becomes a phenomenon when it is used by the human being, in a process that applies another term to allow the Dasein. Assuming Heidegger's thinking to develop this study, if the meaning of cooking is something phenomenological, then, today, cooking can be interpreted as a gastronomic culture.

1.2 *Cooking as gastronomic culture*

According to Chef Ferran Adrià gastronomy means cooking in order to eat fine food, so designing is something as if the kitchen is a transversal laboratory, accepting teamwork from different fields. Ferran Adrià states that "cooking is drawing. I have in my workshop an industrial designer, Luke Huber, and a graphic designer, Marta Méndez, and they work with the others in the same way. In team we don't just elaborate the food but, for instance, we draw also dishes, among others" (Adrià cit in Patitucci 2006). This statement constitutes as Portuguese Designer Daciano da Coste affirmed that gastronomy is a creative process, promoting connections. It starts with the market and with the choice of materials, goes through the ceremonial process of provision and flavoring and, finish not exactly, but deeply intuitive, with the control of temperatures and fire times" (Costa cit in Saramago 2006). This reports reinforced the crosswise thinking in gastronomic technique. As Bruno Munari stated as matter of fact, "(…) the analysis of food provides an articulated and complex context and, that inevitably refers to a qualified culture, that goes beyond the gastronomic sector." (Munari 1983).

If food reflects the culture of a place, then it is essential to analyze the way it is prepared, presented or eaten, in order to understand how it suggests the essential characteristics of the place. Gastronomy asserts itself as a multisensory world, an occasion to develop a complex project, which seeks to cross tastes, emotions, flavors, feelings, culture, art and knowledge, creating moments that appeal to active participation (Brown 2009).

Thus, in this research the authors states that designing is like gastronomic culture, something in endless transformation.

2 RESEARCH PROCESS

2.1 *Purpose*

The study aims to reveal an approach in which transversal participation is part of design process, in order to build a local network system, relating different professionals from different fields. It means, integrating a design school (including 31 scholars and 2 professors), 3 companies (furniture, fashion and toys fields) and several artisans of the same place. The designers adopt the role of a "reflective practitioner" (Schön 1983), contributing to recognize the values of sustainability and the impact of business innovation applied to furniture, fashion and toys sectors. In addition, the paper aims to create a complex system that considers human factors included in the whole environment that may present a solution to design products with social responsibility.

With this philosophy in mind, in this paper it was intended to analyse gastronomic culture as something systemic and interactive, which the result should be applied to a design product. Students developed seats, bags and a toys.

2.2 *Related work*

The design team has some projects that relate gastronomic culture with design education. First, with 'De cenários, receitas e outros ensaios' the recipe fully reflects the identity of a highly spiritual place, whose strong traditions intersect with mysticism and legend, where the products are the result of a correct management of their own resources. (Aparo et al. 2012). Secondly, project 'Palea mater' proved that these cultural characteristics of a place can inspire new products with authenticity and sensory feel, as demonstrated by the fashion accessories or gourmet product packaging that were created during this research. (Aparo et al. 2013). Finally, project "Tera Sabi" that was developed between the academic domain and the business environment, in order to create products with the genius Loci of Guinea-Bissau." (Soares et al. 2020).

3 METHOD

3.1 *Methodology*

This academic research project was guided in different phases. The study was based on co-design an on mixed, interventionist and non-interventionist methodology, combining qualitative and quantitative methods. In the non-interventionist stage, the study was based on analyzing theoretical concepts and literature review and in order to create case studies that supported the topic.

The paper explored the interventionist stage of collecting, analyzing the concept and generating ideas and prototyping. The students traveled to the places where dishes were originally created. During this practical process, scholars interviewed chefs,

cooks or locals who knew procedures and specific techniques. The main goal was to implement this knowledge in new product development.

Figure 1. From top to button: Students with the Chef and the Architect of Alma D'Eça Restaurant at Braga (North of Portugal. Students with artisans from Vila do Conde (North of Portugal). Workload.

Source: the Authors.

3.2 *Materials and appropriation*

The diversity of materials and techniques in the confection of gastronomic dishes established the need to use different materials in the design process. Having this idea in min, students moved on creating team work. During the process it was highlight and proved that there were some materials in common among groups, for instance, wood and textiles.

Consequently, transversal work was promoted, guaranteeing testing for all students. The cooperation among teams was important do the design process, considering that principles such as solidarity and cooperation among students were instilled. This means, for instance, that some students brought materials for other colleagues. Also, the students became peers to each other.

Table 1. Materials' appropriation.

Material	Number of students
Wood	31
Textiles	28
Natural fibers	6
Metals	1
Skin and hides	7
Ceramics	1

3.3 *Implementation*

The artisans shared their knowledge with students about working materials and techniques and students shared methodologies. Artisans renounces the role of a hermit worker who works alone in a small workshop, becoming participatory and regenerating elements of their reality (La Pietra 1997) and combining traditional artisanal techniques with modern technological tools and with the external factors that qualify reality (Micelli 2011).

3.4 *Benefits of the process*

On the one hand, new products development focus oriented on furniture, fashion and toys can achieve market demands (Turinetto 2005). Also, cross-fertilization (Cappellieri 2005) can be an opportunity for the survival and change of craftsmanship, creating partnerships and developing mixing materials. On the other hand, design education teaches how to create cultural, friendly and ecological solutions. Moreover, the products created by students become ambassadors of the gastronomic culture of a place, encouraging the desire to visit restaurants and the region.

3.5 *Weaknesses of the process*

The generational difference between players is a weakness. That is, the fact that the artisans are over 60 years old and the students are around 20 years old can compromise the implementation of the project in future. In the same way, external factors, such as, the pandemic situation or the war situation may create communication, economic and cultural issues in the design process.

4 DESIGN-DRIVEN INNOVATION

Radical innovation happens when there is long-term competitiveness and guarantees. Then, strategy is design-driven innovation as people buy meanings

and not products (Verganti 2009). In this study, there is a design-oriented research into new languages, creating new markets. This design-oriented strategy is established by socio-cultural context of its origin. Today, the great levels of aesthetic quality, productive care, good work and innovation are associated with a place. Designer as a storyteller interpreted the spirit of the place.

Therefore, the paper defined the responsibility to create sustainability and creativity between entities. In addition, the transversal design research stated adaptable solutions to climate change, in order to respect the environment.

Figure 2. Workload.
Source: the Authors.

5 PRODUCT DEVELOPMENT

The new product development highlighted the semantic competence on design, including tactile qualities. Having this idea in mind, the students worked in team groups of 3, developing a seat (or a chair), a bag and a toy. This pilot project showed that these required types inspired new products with genuineness and sensory sensations, as demonstrated by fashion accessories, furniture or toys that were created during this research. With this rationality, students developed their projects, promoting craft-design alliances. From 18 initial gastronomic recipes from the North of Portugal, the students developed 12 recipes (see Table 2).

Then, each system express de spirit of a gastronomic dish, such as, "Sopa Seca from Valença (North of Portugal). This traditional dish, in particularly, is related with an ancestral recipe that consists of using leftover bread. All that was left was used to make this meal. Based on this principle, the students design a line with three different products, alluding to *genius loci* (Aparo et al. 2019) of Valença. This action include a cultural transfer from craft segment adding the Portuguese concept of "design-chão" (Costa, 1998). That means, it "(…) was based on the principle of simplicity as translating the ideal relationship between the artisans, cookers and designers. It was intended to meet people's real needs of enjoyment and use.

Table 2. Gastronomic recipes.

Recipes	Places
Sopa Seca	Valença
Água d'Unto	Melgaço
Bacalhau à Luziamar	Viana do Castelo
Tarte de Viana	Viana do Castelo
Fidalguinhos	Braga
Roscas de Monção	Monção
Bolinhol de Vizela	Vizela
Tortas de Guimarães	Guimarães
Caminhenses	Caminha
Bolo de Discos	Arcos de Valdevez
Petinga à moda das Caxinas	Vila do Conde
Tripas à Moda do Porto	Porto

The collaborative teamwork ran as a mutual learning mechanism and both sides - students and artisans - exchanged knowledge to enhance their skills. In this case, students realized that the project needed materials such as linen, wood, and leather, and this also means it was indispensable to get in touch with other artisans.

5.1 *Fashion*

Fashion accessory was designed in order to carry out sensorial and knowledge experience, which highlighted the practice of gastronomic flavors as a desire to visit the place. The bag "Sopa Seca" was made up of scraps of diversified fabrics from different origins.

The idea was to highlight the semantic competence of the several linen scraps from different seamstresses and embroiderers, by relating the traditional material with new technological products, such as, a neck bag to carry the cell phone.

Design performs as a cultural stimulus to transfer ideas from one source to another, guiding to new connexons and ideas. In the specific case, students qualified the linen patchwork with the taste of Sopa Seca from Valença.

5.2 *Toys*

Toys were developed, producing arguments for a new generation of accessories, starting with spices and reaching gastronomic processes or other alternative and current paths. The object was designed taking diverse wood scraps of the region.

In addition, like the dish, the student worked with different woodworkers and carpenters. Like the seat, the student collected different woods form the

Figure 3. Bag "Sopa Seca (Valença, North of Portugal)" designed by the student Joana Miranda.

Source: the Authors.

Figure 4. Toy "Sopa Seca (Valença, North of Portugal)" designed by the student Gabriela Ribeiro.

Source: the Authors.

region, and crossed the low-tech of craftsmanship with the high-tech of laser printing.

5.3 *Furniture*

The furniture would achieve its primary function of sitting, without compromising its poetics. That is, the student developed a furniture that would be the clear outcome of a correct interpretation of a gastronomic culture. The seat "Sopa Seca" is composed of wood scraps from the region. For this, the student collected oak-Alvarinho (Quercus robur), chestnut (Castanea sativa), hazel (Corylus avellana), hawthorn (Crataegus monogyna), holly (Ilex aquifolium) and Gilbardeira (Ruscus aculeatus), Cork Oak (Quercus suber), the Arbutus unedo (Arbutus unedo) or Loureiro (Laurus nobilis). The new composition was achieved with the introduction of a leather belt.

Figure 5. Seat "Sopa Seca (Valença, North of Portugal)" designed by the student Francisco Araújo.

Source: the Authors.

6 CONCLUSIONS

In light of the new developments, the paper analyzed Martin Heidegger's thinking as a statement to think cooking as gastronomy culture. In this study, the authors avowed that gastronomy is something that exists between being and time, meaning that it is something in continuous transformation. Therefore, the notion of being in a world is interpreted as something that considers time, space and circumstances

For design education, the manuscript discussed transversal and mutual involvement as part of primarily teaching process. In pragmatic terms, the study assumed teamwork with partners from the academic domain and the business world to developed a pilot project. Also, the paper contributes to the diffusion of Martin Heidegger's legacy in order to think liquid reality. It is, also, expected that sustainability will be implement in the design process of future designers. In addition, design schools become social stimulus between the Academia and the real world.

For business world, the skills of designers have increased and design is extensively applied to various markets. Thus, the topic of motivating local manufacturing requires design knowledge and craft-design alliances may be a solution to reinvent local industry and promote sustainability. The results of this cooperation denoted that a local industry, which import knowledge from other businesses became a source to export new languages for new markets expansion. The inputs created by design allowed other activities to reinvent themselves and to generate chances for interdisciplinary partnerships. The product development introduced design-driven in-novation to create new meanings and market opportunities. It means, the research created the basis for the development of new products focus oriented on furniture, fashion and toys.

The creation process is important both for industries and school. Industries ensures the survival of craftsmanship activities in the market and the quality factor that handmade conveys. The academia confirms the legacy of the culture of drawing. In the near future, the proposals developed during this pilot project will be presented in to the community, the media and several local stores. The products will also expected to be present in fairs abroad.

Finally, this project has confronted the community to act in a constructive way and the results of the collaboration have received attention from designers. It was also an opportunity to explore new market solutions for the industry community. The authors wonder that other practitioners can learn from this study in order to operate in transversal and cooperative process.

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Experiencing and Envisioning Food: Designing for Change – Bonacho et al. (Eds)

Development and acceptance of sourdough breads fermented by endogenous yeasts of *Pyrus communis*, *Malus domestica* and *Pistacia lentiscus*

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ABSTRACT: We intended to develop an organic baking yeast fermented from Pera Rocha do Oeste (*Pyrus communis*), Maçã Bravo de Esmolfe (*Malus domestica*) and mastic tree (*Pistacia lentiscus*) to apply on doughs. The production processes were: yeast and lactic acid bacteria fermentation and dry heat dehydration. Each one of the baking yeasts was used to bake white wheat breads, evaluated by a tasting panel. The parameters addressed were: the number of alveoli in the bread crumb; the diameter of the alveoli; the acidic flavour, the generic aromatic profile and the overall preference and acceptance. Both fruits revealed to be effective fermentation starters, with leaves being a poor plant organ to induce the fermentative process, due to its natural low sugar concentration. Breads fermented by these baking yeasts showed a significant acceptance by the tasting panel and a higher preference when compared to a bread fermented by a regular single-species yeast.

1 LITERATURE REVIEW

1.1 *Humankind and yeasts: A love-hate relationship*

The relationship between humankind and yeasts has, undoubtedly, a dichotomic character. It could even be said that this is a historical love-hate relationship, as these microorganisms may cause severe infections and are responsible for food spoilage and simultaneously they play a major role in keeping our intestinal health strong and are essential for the development of beer's particular aromas and for the production of something so dear to most of us: bread.

Since the early days of the human species, we have come into contact with these single-cell creatures. However, their diminutive size in no way diminishes the importance they have in our lives as we know them today. In fact, they are so famous that in 2013 a library was set up in Belgium dedicated to this type of fungi, especially those responsible for the production of sourdough, essential for the manufacture of breads with large air pockets in the crumb, with the characteristic acidic taste and the particular flavour of breads made out of sourdough. The purpose of this living memory institution is to catalogue and preserve the several types of yeast starters that exist and, similarly to the present paper, to show "(…) how endless the variety of sourdoughs, flavours and bread is" (Puratos, n.d.).

1.2 *Yeasts and bread production: The sourdough*

Bread, in its immense variations and types, is the most consumed food on the planet (Tapalaga, 2020). Actually, the first known record of fermented bread goes back to 3500 years, in Ancient Egypt (Lahue *et al*, 2020). Until then, the bread produced and eaten by the human species was nothing less than a dense mixture of coarse grain flours and water, without the presence of air pockets (alveoli), acidity and the characteristic flavours of a bread made out of a sourdough. In effect, these types of breads are, indeed, the traditional and most consumed breads in some regions of the world, particularly in the north of Africa, in the Middle East, in the Balkans and in the centre and south of the Asiatic continent (Pasqualone, 2018).

To the fermented mixture of flours and water that, after baking, will originate a leavened bread, we give the name of sourdough (Gül *et al*, 2005). The nuclear purpose of bread doughs fermentation is to obtain a much lighter dough and, consequently, the production of a more voluminous bread, less dense.

However, the fermentation process of these doughs, by yeasts and lactic acid bacteria, produces not only a lighter bread, but also a bread characterized by its distinct sour taste and complex flavours (Arendt *et al.*, 2007). Sourdough contributes, as well, to the increase of bread shelf life, it boosts the nutritional properties and value of bread and enhances its content in bioactive compounds and the bioavailability of mineral salts (Pétel *et al.*, 2017).

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When it comes to the impact that sourdough has on the rheological features of bread, Arend *et al.* (2007) underline that breads produced from sourdough have a significantly better texture, as the organic acids derived from the metabolism of lactic acid bacteria involved in the fermentation process and set free to the dough, affecting not only the protein fraction of the flours, but also the starch fraction of doughs. This happens because the activity of the amylase and protease enzymes is increased, given the pH decrease in the medium, which will give the bread the capacity of hold on a larger amount of humidity for a longer period of time. The authors explain, in addition, that bread texture is directly influenced by the ecologic composition of the microorganisms responsible for the fermentative process and by the speed in which those microorganisms metabolize the sugars present in the dough.

Nowadays, the application of sourdough in bread production is linked to the growing demand for healthier and less-industrialized food, and for the aromatic profile that sourdough confers to breads. As said by Pétel *et al.* (2017), the fermentation of bread doughs from sourdough represents the bigger production vector of volatile and aromatic compounds in both the crumb and the crust of breads.

The metabolic activity of both yeasts and lactic acid bacteria originates a wider diversity of potentially aromatic compounds, in particular organic acids, alcohols, aldehydes, esters, and ketones (Pico *et al.*, 2015), which, together with aromatic molecules derived from lipidic oxidation, sugar caramelization and Maillard reaction – without forgetting the particular and naturally existent aromas of the flours used in the bread making and other eventual ingredients – as well as the processes involved in the bread manufacture, confer this food its characteristic taste and smell. This is what the contemporary consumers are looking for.

Therefore, we understand that, to be able to impact and, to a certain extent, manipulate the aroma and the taste of fermented sourdough bread, it is decisive to control the ingredients used, the bread production methods and, specifically, some parameters as dough pH, the fermentation time-temperature binomial, the water activity (aW), the oxygen concentration (Arendt *et al.*, 2007), the concentration of sugars in the dough, the addition of salt, the strains of yeasts and lactic acid bacteria added and/or previously existent in the sourdough and the quantity of the sourdough itself in the bread, and, eventually, the amount of enzymes and flour correctors added to the dough (Pétel *et al.*, 2017).

When it comes to the ecological composition of the microorganisms responsible for leavening of bread doughs, Arend *et al.* (2007) mention that, usually, in sourdoughs, we are able to find more than fifty species of lactic acid bacteria, mostly belonging to the taxonomic gender *Lactobacillus*, and more than twenty-five different species of yeast, mainly belonging to the following taxonomic genders: *Saccharomyces* and *Candida*. The authors add that the principal species of yeast isolated from sourdoughs are the following: *Candida humilis, Candida glabrata, Candida boidinii, Saccharomyces exiguous, Saccharomyces cerevisiae, Torulaspora delbrueckii, Torulaspora pre-toriensis, Galactomyces geotrichum, Dekkera bruxellensis, Debaromyces hansenii* and *Issatchenkia orientalis*.

2 PRODUCT CONCEPT

The product we developed is intended to be an organic baking yeast (leavening agent) for fermentable doughs, to apply on bakery and pastry products. The product is composed of flours (in particular, whole spelt, *Triticum spelta*, flour and chickpea/gram, *Cicer arietinum*, flour, both organic) and of fruits or leaves of plant species: Pera Rocha do Oeste (*Pyrus communis*), Maçã Bravo de Esmolfe (*Malus domestica*) and mastic tree leaves (*Pistacia lentiscus*).

The Pera Rocha do Oeste is a protected designation of origin pear from the western region of Portugal, native from Sintra, a village close to Lisbon. The Maçã Bravo de Esmolfe is a protected designation of origin product, as well, and is an apple cultivated in the central northeast region of Portugal for, at least, 200 years. As for the mastic tree, it is an evergreen shrub that grows in the wild, in dry rocky areas of the Mediterranean Europe, including Portugal, especially in the southern areas of the Portuguese territories.

These ingredients, in particular the fruits and the leaves, play the role of fermentation starters, by the existent yeasts and lactic acid bacteria on their surface and will, therefore, start the fermentative process inherent to the product development method. This product aims at representing an organic alternative – consequently, more natural and less industrialized – to the commercial yeast that the market has to offer to consumers (some of them already derived from genetic enhancements).

Apart from the organic/natural component (resulting from the fact that all of the ingredients used are organic and that all the yeasts and lactic acid bacteria used are natural and, therefore, not submitted to any technological procedures) and thanks to the aromatic features of each fruit or leaf, against what happens with products using commercial yeasts, this baking yeast will give the bread a differential aroma and taste to the baked goods previously fermented with it.

This specific and complex flavour comes from the organoleptic features of each fruit or leaf, but also from the fact that each one of these plant structures presents a unique population of yeasts and lactic acid bacteria that depends exclusively on the ecological ambient where it has grown, *i.e.*, of the terroir.

We assume, simultaneously, that this product includes itself in a national movement of circular economy, by the use of food waste derived from the activity of both agricultural industries and other food-related industries.

We aim, identically, at showing the potential of this baking yeast in the preparation of doughs that require a previous fermentation (specifically bread doughs), in contrast to commercial baking yeasts, widely available, in particular by the differentiation in flavour.

3 METHODOLOGY

3.1 *Development of the baking yeasts*

The process of the development of the organic baking yeasts started with the fruit picking and leaf harvest. All these vegetable structures had to be organic or wild, because we could not wash them in order to preserve the yeasts naturally present on their surface. Then we measured equal parts of fruit or leaves, *i.e.*, Pera Rocha do Oeste (*Pyrus communis*), Maçã Bravo de Esmolfe (*Malus domestica*) or mastic tree (*Pistacia lentiscus*), flours (spelt and chickpea/gram flours) and water, and blended all the ingredients. Afterwards, we submitted the mixture to an eleven-day fermentation, at 27.º C, at ambient relative humidity, adding up, on a daily basis, equal amounts of the flour mix and water. After this process, the fermented mixture was dehydrated, at 43.ºC, with 0% relative humidity, for three hours. Then, we grinded the dried mixture into a powder (Figure 1) and thus the whole fruit was used, excluding the peduncles, the seeds and the petioles from the leaves used.

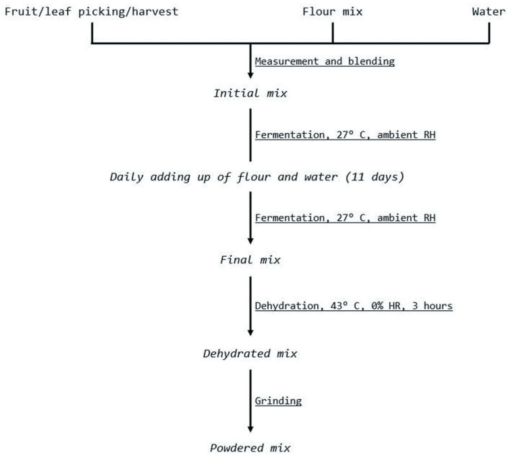

Figure 1. Diagram of the product's development process.

3.2 *Proofing of the baking yeasts*

To proof all the three different baking yeast previously produced, we fermented bread dough with them. Firstly, we measured all the ingredients: baking yeast, flour, water, and salt, and kneaded the resulting dough. Secondly, the dough fermented at 30.ºC and ambient relative humidity for sixty minutes. Lastly, the dough was baked at 210.ºC for thirty minutes (Figure 2).

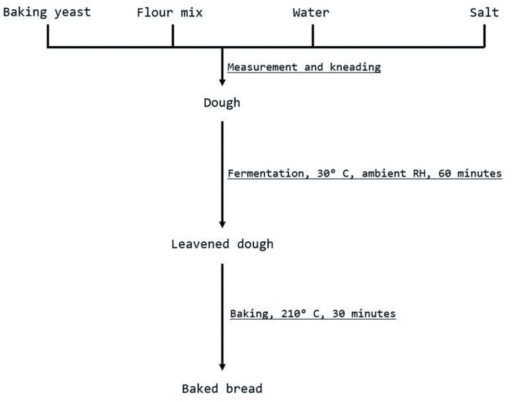

Figure 2. Diagram of the proofing of the baking yeast's process.

3.3 *Sensory analysis*

As it is not coherent to apply a sensory analysis to a yeast *per se*, this part of our investigation was conducted through the analysis of breads fermented by the baking yeasts produced.

Apart from the baking yeasts obtained from the Pera Rocha do Oeste (*Pyrus communis*), Maçã Bravo de Esmolfe (*Malus domestica*) and mastic tree (*Pistacia lentiscus*) leaves, we fermented a dough with a store-bought baking yeast of a single-strain yeast *Saccharomyces cerevisiae*, which played the role of our control sample.

The parameters addressed were: the number of alveoli in the bread crumb; the diameter of the alveoli; the acidic flavour, the generic aromatic profile and the overall preference and acceptance. All the parameters were scored by the tasting panel using a scale of 1 to 8.

3.3.1 *The tasting panel*

To do this sensory analysis, we gathered 17 tasters, 10 men and 7 women, aged between 21 and 47 years old.

3.3.2 *The tasting moment*

Seventeen white napkins were prepared, containing four slices of bread, one of each, weighting 15g, and each one of the slices was identified by a three-number code (as shown in the Table 1).

Table 1. Sample codification.

Sample	Sample code
Pyrus communis	315
Malus domestica	700
Pistacia lentiscus	818
Store-bought yeast	110

4 RESULTS

To address the results obtained from the sensory analysis' tasting panel, we used a descriptive statistics approach (Tables 2 to 6) and, afterwards, we ran a non-parametric statistical test, the Friedman test (Tables 7 to 11).

Table 2. Sensory analysis results, parameter: alveoli number (descriptive statistics).

	Samples			
	110	315	700	818
Minimum	2	5	4	1
Maximum	7	8	7	5
Mean	4,92	7,12	5,59	2,35
Median	5	7	6	2

Table 3. Sensory analysis results, parameter: alveoli diameter (descriptive statistics).

	Samples			
	110	315	700	818
Minimum	1	3	3	1
Maximum	6	8	7	5
Mean	4,59	6,06	4,53	1,88
Median	4	6	4	2

Table 4. Sensory analysis results, parameter: acidic flavour (descriptive statistics).

	Samples			
	110	315	700	818
Minimum	2	3	3	1
Maximum	6	6	6	5
Mean	3,47	4.47	4,82	2,82
Median	3	4	5	2

Table 5. Sensory analysis results, parameter: generic aromatic profile (descriptive statistics).

	Samples			
	110	315	700	818
Minimum	2	2	3	3
Maximum	5	8	8	8
Mean	3,88	5,59	5,35	6
Median	4	6	6	6

Table 6. Sensory analysis results, parameter: overall preference and acceptance (descriptive statistics).

	Samples			
	110	315	700	818
Minimum	2	4	3	2
Maximum	6	8	8	8
Mean	4,12	6,41	5,71	5,47
Median	4	7	6	6

Table 7. Sensory analysis results, parameter: alveoli number (Friedman test).

p-value	$6{,}3616 \times 10^{-9}$			
X^2	38,488		Samples	
	110	315	700	818
110	-	$9{,}155 \times 10^{-5}$	0,06956	0,0002518
315	0,0005493	-	0,0005188	$2{,}289 \times 10^{-5}$
700	0,4174	0,003113	-	$4{,}578 \times 10^{-5}$
818	0,001511	0,0001373	0,0002747	-

Table 8. Sensory analysis results, parameter: alveoli diameter (Friedman test).

p-value	$1{,}6074 \times 10^{-8}$			
X^2	16,571		Samples	
	110	315	700	818
110	-	0,0007934	1	$4{,}578 \times 10^{-5}$
315	0,00476	-	0,002746	$2{,}289 \times 10^{-5}$
700	1	0,01648	-	$2{,}289 \times 10^{-5}$
818	0,0002747	0,0001373	0,0001373	-

Table 9. Sensory analysis results, parameter: acidic flavour (Friedman test).

p-value X^2	0,0003947 16,571		Samples	
	110	315	700	818
110	-	0,0422	0,002899	0,2643
315	0,2532	-	0,2855	0,001007
700	0,01739	1	-	0,0006256
818	1	0,006042	0,003754	-

5 DISCUSS OF THE RESULTS

Through the statistical analysis that we conduct-ed, it was possible to acknowledge that the bread

Table 10. Sensory analysis results, parameter: generic aromatic profile (Friedman test).

p-value X^2	0,00035582 17,312		Samples	
	110	315	700	818
110	-	0,003952	0,003067	0,001282
315	0,02371	-	0,6048	0,449
700	0,0184	1	-	0,1521
818	0,00769	1	0,9127	-

Table 11. Sensory analysis results, parameter: overall preference and acceptance (Friedman test).

p-value X^2	0,000475 16,112		Samples		
		110	315	700	818
110	-	0,0003433	0,0001831	0,04843	
315	0,00206	-	0,05536	0,1028	
700	0,001099	0,3321	-	0,8311	
818	0,2906	0,6165	1	-	

fermented with the pear-based (Pera Rocha do Oeste) yeast was the one that, according to the tasting panel, had the more alveoli, standing out from the other breads in this specific parameter.

Between the bread leavened with the store-bought yeast and the bread leavened with the apple-based (Maçã Bravo de Esmolfe) yeast, there were no significant differences in the number of alveoli in the respective bread crumb.

As in the aforementioned case (referring to the quantity of alveoli), the tasting panel gave, again, the highest score in the alveoli diameter parameter to the bread fermented with the pear-based yeast.

Between the bread leavened with the store-bought yeast and the one fermented with the apple-based yeast, there were no significant differences in the size of the alveoli.

Thus, it can be understood that the yeast that revealed the best overall performance in the fermentation process was the pear-based yeast, since it was the yeast that gave the bread dough, and consequently the baked bread, a higher quantity of alveoli with, simultaneously, a larger diameter.

The evaluation of both these parameters, i.e., the number of alveoli in the bread crumb and the diameter of the alveoli, made it possible to determine the power and the efficacy of the fermentation process, since the greater the quantity and size of the alveoli, the stronger the fermentation and therefore the more active the yeasts and the lactic acid bacteria present in the dough (Chiotellis and Campbell, 2003).

Therefore, we can acknowledge that, of the yeast test-ed (the pear-based yeast, the apple-based yeast, the mastic-based yeast and the store-bought yeast), the pear-based yeast is the most active and the mastic-apple yeast is the one with the lowest and weakest activity.

Regarding the acidic taste parameter, the bread fermented with the apple-based yeast expressed a more acidic taste than the bread leavened with the store-bought yeast.

The mastic-based yeast-fermented bread, according to the tasting panel, had a much less acidic taste when compared to the pear-based yeast-fermented bread and the apple-based yeast-fermented bread.

According to the descriptive statistical analysis performed, the bread leavened with the mastic-based yeast had the lowest score (median) for the acidic flavour and, on the contrary, the apple-based yeast fermented bread got the highest score (median).

The results obtained in this parameter can be explained through two different paths. On one hand, the higher the fermentative activity, the more acidic the resulting bread will be. This phenomenon is due to the fact that during the fermentation process, alongside yeasts, there is a similar and concomitant activity of lactic acid bacteria which, in the course of their natural metabolic process, produce organic acids, releasing them into the surrounding medium, thus increasing the concentration of these compounds in the bread dough (Collado-Fernándes, 2003 and De Luca et al., 2021). On the other hand, apple is a naturally acidic fruit, which may also contribute to the result in this parameter in the case of the bread leavened with apple-based bread.

In the generic aromatic profile parameter, the bread prepared with the store-bought yeats was the one with the less aroma, compared to the other three bread samples testes by the tasting panel.

According to the descriptive statistical analysis of the generic aromatic profile parameter, the bread fermented with the mastic-based yeast had a higher score (median) than the other breads. This result is explained not by the fermentation process itself, but by the characteristics of the plant that was on the base of the mastic-based yeast. In fact, the species *Pistacia lentiscus* has practically no culinary application in Portugal, although it is widely used in the North of Africa and in the Middle East for the extraction of mastic, a spice that results from the solidification/hardening of the liquid resin of this plant. Mastic is then used to flavour a wide variety of traditional Arab sweets. This plant spices is rich in aromatic compounds, which explains the result obtained in this parameter by the mastic-based yeast-fermented bread (Boelens and Jimenez, 1991).

Finally, if we interpret the statistical analysis of the overall preference and acceptance parameter, we may realise that the tasters preferred less the control sample (the bread fermented with the store-bought yeast).

There were no significant differences between the remaining three samples (the pear-based yeast, the apple-based yeast and the mastic-based yeast). The

results obtained in the overall preference and acceptance parameter are believed to be due to the fact that the three breads fermented by the three yeasts developed (the pear-based yeast, the apple-based yeast and the mastic-based yeast) represented a novelty and a unique and distinctive gastronomic experience for the tasting panel.

The fact that these breads have a stronger and more peculiar aroma than the bread leavened with the store-bought yeast-fermented bread (which has no particular acidity, nor aroma) may also have contributed to this specific result.

6 CONCLUSIONS

In conclusion, we can affirm that the developed product represents, indeed, a sustainable alternative to vegetable food waste, especially fruits, as naturally sugar-rich vegetable food is preferable, due to the nature of the fermentation metabolised by yeasts, and raw leftovers of this food might be used to produce baking yeasts, not only in our households, but in restaurants and industries as well.

The product, once applied to dough and eaten in the form of bread, was validated by a sensory panel and significantly accepted by that same panel. We also believe the product we developed has added value over similar products on the marked, as the distinctive aromatic profile these baking yeasts give to breads were much appreciated by the sensory panel.

To finish, we would like to add that some further research directly linked to this investigation might help to deepen the knowledge in this area, specifically, it would be interesting to study, comprehensively, the microorganisms present in these baking yeasts and compare them to other baking yeasts developed in identical frames as these ones. This also goes to research the impact of the terroir on the aroma of fermented bread leavened with yeasts from the same vegetable species, but harvested or picked from different geagraphic locations.

ACKNOWLEDGEMENTS

At the end of this research project, we believe the aim was achieved: the development of a food product that simultaneously meets the trends of the current food paradigm, particularly those concerning the demand for plant-based foods, from organic and sustainable agriculture, and is less submitted to industrial and technological processing. At the same time, it is part of and promotes a movement of national circular economy, through the use of food waste resulting from agricultural and/or industrial activity.

It was understood that obtaining yeasts (to apply on doughs of baked goods that require previous fermentation) from plants leaves, given the naturally low sugar concentration in the plants organs, would require the addition of some form of sugar in order to enhance the budding (reproduction) of the endogenous yeast population and, subsequently, its own fermentative activity, by creating an environment/medium with a higher concentration of available fermentable biochemical compounds.

Apart from the factor underlined above (concentration of sugars available in the medium), in order to achieve successful fermentation, there are other factors and parameters to be taken into consideration and, above all, monitored, specifically, the temperature of the environment/medium in which fermentation takes place (an excessively low temperature slows down or, if below 0º C, reversibly inhibits cell metabolism and, therefore, the fermentation process, whereas excessive heat can result in cell death and irreversibly inhibit fermentation); the humidity of the medium; the flour used (it is advisable to use flours with a significant concentration of fermentable biochemical compounds, in particular, sugars); the water itself (e.g., tap water with considerable chlorine concentration can have a inhibiting effect on the metabolic/cellular activity of yeast and lactic acid bacteria), among other aspects.

The application/testing of the final product and the sensory analysis carried out allowed the product developed to be evaluated and, most importantly, validated, both technologically and organoleptically, as well as at a possible commercial level.

The baking yeasts developed differ from store-bought yeasts in particular due to its characteristic aromatic profile which varies accordingly to the plant organ (fruit or leaf) that was the basis for its production, to its own terroir and, consequently, the yeast population in the tegument and the conditions under which the fermentative process took place.

The present research project made it possible to simultaneously verify and confirm that, although we are dealing with not washed food, this aspect does not prevent us from ensuring food hygiene conditions and, above all, food safety during the production phases of the product, as long as we develop and implement a robust and efficient HACCP plan and, consequently, if we monitor the critical control points.

A food product was developed that fits into to-day's trend towards circular economy movements, through the use of food waste, which meets the demand for organic food products based of the premise of sustainability, validated both sensorial and technologically, safe in accordance with the current regulations concerning hygiene and food safety, and which, it is believed, has the potential to become a successful product on the national and European markets.

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Experiencing and Envisioning Food: Designing for Change – Bonacho et al. (Eds)

The sustainable food design hub: A transdisciplinary approach for ecological transition

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ABSTRACT: The 2030 United Nation Agenda for Sustainable Development such as the European Green Deal and the Farm to Fork strategy stress the emergency of a radical change in food production: we have to reduce greenhouses gases and water consumption, preserve biodiversity and promote circular economy for a shapely, safe and economic growth of the Planet resources and ensure food for all.

To support Italian small and medium-size farms in their ecological transition, the Sustainable Food Design Hub (SFD Hub) was founded by a group of researches in November 2021 at the Research Centre for Food and Nutrition. The main SFD Hub's goal are: a) to improve sustainability and food quality of Italian food products, involving farmers in projects with a transdisciplinary approach; b) to increase both producers and consumers knowledge/awareness on issues such as food sustainability; c) to raise awareness among the new generations on topics as mandatory as the sustainable food choices.

1 SUSTAINABILITY AND FOOD DESIGN

Sustainability is the word *du jour:* for the web, major research projects, economic strategies, agri-food routes and for everyday talks. The "*sustainable development",* assessed for the first time in the Bruntland report of 1987 as "*the development that meets the needs of the present without compromising the ability of future generations to meet their own needs*", has nowadays become the very core of world strategies aimed to the safeguard of our Planet resources and closely linked to the human health.

In the last few decades, the impact of human activities on the environment and global health has escalated to alarming numbers with 48% of the Planet's lands taken by agricultural production and animal farming. Despite the commitment of National and International Organization and all their effort put into resolution of world hunger, nowadays over 820 million people are malnourished, 1.3 billion people cannot access to food and 2 billion suffer a micronutrient lack (FAO and WHO, 2019). Food overproduction of our era – the Antropocene - has been pointless in fact, aside some malnutrition issues by default, has increased overweight and obesity issues by excess (FAO and WHO, 2019).

Nowadays, 2 billion adults and 40 million between children and adolescents are overweight and 670 millions of adults and 120 millions of adolescents are obese (around 30% of world population).

The 2030 United Nation Agenda for Sustainable Development, which counts among its main goals to achieve Zero Hunger, addresses as a pivotal strategy the promotion of agriculture sustainability (https://unstats.un.org/sdgs/report/2020/The-Sustainable-Development-Goals-Report-2020.pdf).

Moreover, sustainability is the key word, as well, for the European Green Deal and the Farm to Fork strategy(https://ec.europa.eu/food/horizontaltopics/farm-forkstratgy_it#:~:text=The%20Farm%20to%20Fork%20Stratgy%20aims%20to%20accelerate%20our%20transition,reverse%20the%20loss%20of%20biodiversity).

They underline the needs for the new approach for food production: we need to rethink our way of farming, sharing, and eating in order to satisfy the world population requests, safeguarding our lands, enhancing rural areas development and protecting biodiversity (FAO 2021). We must produce with the aim to reduce greenhouses gases and water consumption and promote circular economy. All these actions are vital for a shapely, safe and economic growth of the Planet resources. As a matter of fact, the food production system is one of the main culprit of climate change and the Planet resources depletion: the agri-food system alone is responsible of 26% circa of greenhouse gasses, employing around the 70% of the water resources (figures calculated from Poore & Nemecek, 2018) and intensive farming is accountable for a biodiversity loss, pesticide use and soil depletion.

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The best practices to ease the food production impact are, in fact, many and a very good hint would be to start changing our eating habits.

In 2019 *Eat Lancet Commission* (Willet et al. 2019) published a very important report: thirty-seven worldwide renowned experts urged us to drastically change our food habits, increase vegetable food consumption and reduce animal ones stating, at the same time, the difficulties of producing sustainable food. Vegetable food, in fact, is produced with a low environmental impact, limited water and soil consumption, low carbon and nitrogen emission, and we must support both biodiversity and ecosystem and with a new care for the producers' needs.

Willet et al. 2019 paper is a complex scrutiny that explain how the food system change and the shift towards a vegetable-based diet can improve human health, as numerous studies on this matter can assess (Fresán et al. 2019; Hemler et al., 2019) and moreover, it may reduce greenhouse gasses and water consumption, keeping biodiversity strong, improving our future and our Planet's one: "*Food is the single strongest lever to optimize human health and environmental sustainability on Earth".*

The Panel, also, anticipates the "One Health" concept: human and animal health are closely linked with the ecosystem one, they are, in fact, intertwined.

In this scenario the role of Food Design is a mandatory one: it faces the new challenges of food significance and production. It is no longer enough to design a food with high organoleptic and healthy qualities: our food must be also sustainable.

Since the late XIXth century and the industrial Revolution, Food Design aimed to improve food organoleptic qualities, packaging and, in the last 20 years, to design healthy products. The latter are the so called "*functional foods",* characterized by peculiar nutritional properties able to improve health, reduce pathologies risks and are, more than ever, closely connected to new biotechnologies.

Food Design and Agritech must work together: the latest digital technologies have to meet with agri-food production process. Agritech, also, aims to improve farming performances in line with the "nutritional goals" stated by the Eat Lancet Commission (Willet et al. 2019).

Too often the word "design" recalls something expensive, sophisticated and attractive but, as the philosopher Bruno Latour explains (2009) "Design is not a random invention, given by creativity alone, as it always holds a purpose".

A true design project is always focused on a new function of the object in question, on a new meaning, is not about beauty or luxury in itself: design is not a hedonistic pursuit.

The great designer Leonard B. Archer reminded us that "*The design issue essentially arises from a need"* and, nowadays, sustainability is mankind current need.

2 THE SUSTAINABLE FOOD DESIGN HUB

As previously stated, the *European Green Deal* and the *Farm to Fork Strategy* require that all the agri-food companies should supply their products according to sustainable development tenets.

The large multinational agri-food companies have all the necessary tools to face the changes requested by the ecological transition, meanwhile the smaller ones may experience many troubles in improving their production sustainability: their economic resources could be scarce, farmers are often worried that an increase of the products cost might not be understood by the consumers and that they could not be interested in spending more money determining, in this way, a significant loss of profits. For Italy this is a hot topic as medium and small agri-food farms are almost the 80% of the grand total (Table 1).

For this very reason, in order to support Italian small and medium-size farms in their ecological transition process, the Sustainable Food Design Hub (SFD Hub) was founded by a group of researches in November 2021 at the Research Centre for Food and Nutrition (www.sustainablefoodesign.com, site under construction).

Table 1. Italian agri-food Italian farms size.

Italian Farms Size Numbers of employees	Numbers of agri-food farms/companies in Italy (% of total)
0-9 employee	2.724 (42%)
10-49 employee	2.482 (38.5%)
50-249 employee	565 (8.75)
250 employee and more	106 (1.6%)
Not registered farms	554

Data from: Ismea- Federalimentare Report, 2020 "L'industria Alimentare in Italia"

3 SFD HUB'S MAIN GOALS

The Sustainable Food Design Hub first purpose it to improve sustainability production, (through agriculture digitalization and the employment of new farming techniques, keeping high food quality and safety of small and medium size Italian farms as, quite often, they are unable to respond to the request of ecological transition. The Sustainable Food Design Hub promotes a new vision of food, adding to the already well-known values of the Italian food products, new attributes such as environmental and social sustainability, also in line with the consumers new demands. Wherever possible, new sustainability brand for some food products will be conceived. In order to achieve these goals, small and medium size farms producers from different areas will be involved in hub's research projects.

The second purpose of our Hub is to increase both producers and consumers knowledge/awareness on themes of food sustainability, on the possibilities given by digitalization in agriculture and social marketing. Master and masterclass as well will be carried out within research projects already in due course, also with the help of new methodologies such as the so-called social learning, flipped classroom.

Last but not least, our hub aims to raise awareness among the new generations, such as the *Alpha Generation,* on topics as mandatory as the sustainable food choices. In this sight there is already an ongoing project, the *«Green Generation program: planning a sustainable life together»* in which some Italian secondary schools and the European school of Frankfurt are involved.

4 SFD HUB'SPROJECT METHODOLOGY

To achieve these goals, the Hub projects are carried out with a transdisciplinary approach: several experts from different disciplines such as genetic, anthropology, biotechnology, human nutrition, agronomy, food chemistry, design, digital engineering, gastronomy, social sciences, and geography work as a whole in order to find innovative design solutions for a truly sustainable and healthy food. Through their work the SFD Hub researchers were able to gain a significant expertise and to understand the importance of joining their different competences to suggest solutions as clever as tailored for each and every project. They were also able to address both the producers and the consumers towards sustainable choices. The Hub methodology draws inspiration by the book of the famous Italian designer Bruno Munari (1992), *"Da cosa nasce cosa"*. As Munari said himself, a design project must foresee: problem definition (under any facets), data gathering and analysis, a *creative act*, enforcement of solutions and innovative materials (e.g., for packaging), design experimentation and modelling for future references. (FIGURA X)

5 A CASE STUDY OF SUSTAINABLE FOOD DESIGN: THE TORPEDINO TOMATO PROJECT

The Torpedino Tomato Project is a very interesting example, and a case study as well, of an Italian product re-design case. The project *"Certified Quality of Mini San Marzano tomato cultivated in Fondi in relationship to its environmental sustainable and nutritional value*", funded by Lazio Region from 2019 to present, aims to: a) production re-design to reduce both water and energy consumption and pesticides use (precision farming and other digitalization techniques); to achieve a great production yields and improve the Torpedino nutritional value; b) design of a new logo and communication strategy to create a new product storytelling: tomato is a typical Italian product and we want a change of scenario; c) design a new packaging and a smart label to improve the consumers knowledge about the increased value of products; d) a *project modelling* to employ for other productions.

The Torpedino holds peculiar characteristic organoleptic qualities: two different colours, red and green, a firm flesh and a robust skin, with a shelf life well over 20 days. It is still traditionally farmed, and the producers are unable to keep up with the *"farm to fork"* sustainability aims to reduce the water footprint, have good farming yields and keep a high organoleptic and nutritional qualities. As already stated before, this project has been carried out following the Bruno Munari design pattern.

To highlight all the problem facets, the multidisciplinary Hub Team has tailored a questionnaire – *"Portrait of a farmer"* – in order to gain information on the farms (e.g. size, heritage etc.), the farmers (e.g. age, education etc.), on the day to day issues faced by the producers of Torpedino tomato, on their knowledge upon environmental and agricultural sustainability.

The questionnaire counts 40 questions split in 3 sections: 1) farmers and farms personal details (age, education, years of activity, farmed hectares and of which kind etc.); 2) "sustainability" and *"Farm to Fork strategies"* knowledge; 3) farmers perception about the economical acknowledgment of their work and fears for the possible changes outcomes to improve the production sustainability (e. g. economic loss).

Among the outcomes of this survey, the most interesting underline how limited is farmers knowledge on sustainability: 81% of the interviewees, in fact, believe than sustainable farming means a lesser use of fertilizers and pesticide alike, 10% that sustainability is synonymous with bio or biodynamic and only 6% of them identify sustainability with water saving, whereas 3% have never heard the word "sustainability". Moreover, 70% of the interviewed has voiced their concern on micro-irrigation as they believe it can reduce production and increase the final product cost.

According to these outcomes, training and boot camps with various experts were set up, in order to give an answer to farmers doubts and motivate them towards a change. During these meeting, farm routes, strategies, and mandatory topics such as farming digitalization, economical gain from water and energy saving and how to keep a good yield were highlighted. Moreover, it has arose the need to modernize the Torpedino image, setting new marketing strategies to let the consumer know about its sustainability and nutritional quality.

After all these experiences, the farmers began to grow some areas with micro-irrigation and digital techniques; improved sustainability and tomato nutritional quality are currently being analyzed.

Moreover, a complete product re-design has been carried over, giving the Torpedino a new elegant

logo, with the colours of the Italian flag, a new packaging and many, new, communication initiatives (https://www.torpedino.it).

6 CONCLUSIONS

The SFD Hub will be also a sustainability storyteller able to convey every food re-design project, based upon Italian agri-food heritage, into a green route of innovation as a new way of producing, eating, and thinking about food is truly possible. Communication and connection with the new generations will play a pivotal role in order to grow the sustainability culture as this has to become a participatory project to preserve our Planet's resources and global health.

Henk Oosterling with his pun: "*Dasein is Design"* wanted to tell us that "*Design has to be here and now, into the world"* and the Sustainable Food Design Hub is here to take on the challenge to make Italian agri-food production really more sustainable.

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Experiencing and Envisioning Food: Designing for Change – Bonacho et al. (Eds)

Fostering empathy and co-learning skills to drive companies towards sustainability 2030. Design thinking as a metabolic approach

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ABSTRACT: Sustainable development has been ascribed in a variety of ways over time. Today, the climate crisis, and the Covid-19 have resulted in a rise in collective awareness among consumers and businesses. The adoption of sustainable development challenges into a companies' strategic design has an influence on its strategic design, which includes the entire organization, its operations, and reshapes its business model. As a result, it is necessary for a company to broaden its perspective to understand how to respond to a specific need for sustainability relevance by designing new interactions and internal systems that include stakeholders such as workers, consumers, institutions, and all social actors in terms of mutual engagement. Several authors highlight how the holistic and systemic design approach can help companies achieve higher results in terms of profit and collaboration with all stakeholders. In this light, sustainable design aims to create profitable connections and new collaborations to understand and solve complexities in different manners. New instruments are needed to enable companies to use a systematic approach that also considers consumer needs and enables the creation of better sustainability strategies. Collaborative learning has a huge impact on business from recruiting to training and developing talent to co-create sustainability team values. This research examines how it is possible to establish a shared and proactive sustainability vision in a company by using design thinking. It presents a case study workshop held in a high-tech pharmaceutical company where the feedback, observations, and experiences that have resulted are described, as well as instances of how the scenarios have been changed and successfully achieved the prefixed goals. The process was found to be effective in involving participants in system thinking about and discussing sustainability integration in their organizations, appreciating the interconnectedness of related issues, and understanding the collective implications of their potential choices and behaviors, as well as facilitating the socialization of participant thinking in the construction of a collective vision of sustainability.

1 INTRODUCTION

Today sustainability is becoming more and more persistent in every productive and economic sphere, and even different domains, from attention to the environment, to the social and economic impact of individual choices. Education for Sustainable Development (ESD) reassesses "what we learn, where we learn and how we learn" (Venkataraman, 2009). It develops the knowledge, skills, values and attitudes that enable learners to make informed decisions and actions on global problems such as the climate crisis. It empowers learners of all ages to change the way they think and work towards a sustainable future.

ESD addresses the content of education so that curricula include learning about environmental integrity, economic viability and how to work towards a just society. But it also reassesses education methods and outcomes to form critically minded, empathetic workers who can work together to solve problems and act on local and global emergencies. A recent UNESCO study (2019) showed countries have heavily emphasized cognitive learning over social-emotional and behavioral learning, which are crucial tools to empower learners and make change happen.

In this scenario, design takes on different goals: it was initially used in the industrial design sector for the production of sustainable products or services and today is more and more used in a broader way as a holistic and systemic approach to be applied strategically for creating team values and new ideas (Brown, Wyatt, 2010). During the last decades, design has become increasingly associated with a project-based approach, with methods such as design thinking, and, at the same time, the sustainable processes associated with design methods is becoming increasingly important. When solving a problem, the systemic approach of design allows

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the whole network of stakeholders to be involved. This approach must consider challenges in a holistic way by focusing on problem-solving at a higher level, making much more radical changes in consumer habits and behaviors.

The case of car sharing is quite emblematic: the holistic and systemic design approach with which it was designed has turned its attention to the broader concept of mobility in all its meanings, even before heading towards the design of less polluting vehicles. In this perspective, sustainable design tends to purpose in building profitable relationships and new partnerships to address problems in a different way.

Through a systemic approach to solving the needs of companies, it is possible to imagine new horizons by designing new ways of interactions with users and to reach a sustainable approach, even before a sustainable result.

It is therefore necessary for a company to broaden the perspective to understand how to respond to a certain need for sustainability relevance, designing systems within which can involve consumers, institutions and all social actors in respect of their mutual interactions. After the Covid-19 pandemic age, it's even more challenging for companies to figure out how to bring sustainability content into their mission statement, and therefore create a spread of common values within the employees.

This paper presents the underlying background of sustainability evolution and design thinking approach in sustainability and innovation. Then, the method section explains the definition of the framework and the process used during a workshop carried out in Florence, Italy. This is followed by a results section, where the findings of each step of the framework are presented. Finally, the paper concludes by discussing the methods and tools applied, in order to understand how these processes, favour the realization of business design based on a sustainable approach.

2 THEORETICAL BACKGROUND

2.1 *The transition towards sustainability*

The transition towards sustainability passes through values that are closely related to human beings. In the literature about transition to sustainability, the human side is at the forefront. Although the recent increase of environmentalism and overall awareness regarding the dangers of the current unsustainable economic model, even today companies are not fully aware of Corporate Social Responsibility (CSR) meaning. CSR, in fact, is not really a recent topic, but it evolved over a long time. The need for CSR policy arose when companies started to impose costs on society, the so-called externalities, that the company did not compensate financially. Moreover, the need for CSR policies started to be most needed and asked by society especially when effects of globalization occurred (Kercher, 2007).

In an attempt to frame responsible and sustainable corporate governance and to reduce regulation imposed by the government, companies voluntarily adopted tools that define the duty of the management towards all stakeholders (Klettner et al., 2014; Mason and Simmons, 2014). To frame CSR, the first concept needed to be stressed is its absolute voluntary basis. As aforementioned, companies naturally tend toward a deregulated environment rather than an over-regulated one. Actually, their response to government regulations has been a voluntary self-regulation, in order to address "social responsibility issues in a more efficient and productive manner if they are allowed to do so by themselves" (Bryane, 2003).

When analysing employee engagement and sense of belonging towards the company, one of the most crucial elements is its culture. In fact, only if one shares a company's values and mission will satisfaction go far beyond meeting the basic needs that motivate people, such as economic and social needs (McGregor & Doshi, 2015). Inevitably, companies are also faced with the economic crisis that arose as a result of the spread of the coronavirus. Despite focusing on reducing costs and abandoning investments aimed at sustainable company development seems to be the easiest way to go, it is important to take note of how important it is today to focus on the sustainability factor in order for companies to be healthy in the long run, both from an environmental point of view and in terms of economic investment.

Business activities before Covid-19 were mainly represented by a linear economy. This means that raw materials are used to make a product, and after its use any waste (e.g., packaging) is thrown away. Today there is an opportunity to aim for quality growth, through a circular, sustainable and highly competitive economy. For any type of company, of any sector or size, focusing solely on financial returns has become a reductive exercise (Bansal et al., 2021).

The impact of the covid-19 pandemic on the global economy started to emphasize the differences in approach between companies that consider corporate welfare as an instrumental way, and those that have been able to embrace the culture of sharing value between company, workers and stakeholders by applying it to the internal logic of HR management (Gasparri, 2020).

In the face of the criticalities to which companies have been – and still are – subjected, employers have realized, once again, what effort and what operational capacity truly motivated company teams can bring to the table (Phua et al., 2020). Respect for the individual and for work, as well as for health, is paving the way for a growing desire for greater participation, expressed by both workers and employers. Perhaps never before in the history of work have companies perceived the value of community, as an

expression of a common destiny, and employers understood that there is no future in development if the workers themselves are not also involved in the underlying project and in the objectives outlining its path. The new corporate welfare also passes through here and can be one of the tests for companies to grasp the lessons of this crisis and make the most of them (Fana et al., 2020; Figari & Fiorio, 2020).

2.2 *Emotional intelligence and empathy are paramount for companies' development toward sustainability*

Concerns over the effectiveness of stakeholder dialogues in aligning the interests of business and their stakeholders raise the question of why there is little innovation when there is a veritable abundance of differing viewpoints to consider (Lenssen et al., 2006). This would suggest that there are tools necessary to create a shared sense of problem, to explore the best solutions and then channel these ideas through to the implementation phase. In fact, to reach a common understanding from different points of view within enterprises, it is necessary to transcend organizational silos and the single business specialization such as marketing, finance, human resources, strategic planning, operations, and so on (Cross et al., 2010). If managers develop a competence for trans-disciplinarily or transfunctionality, they can draw upon the expertise in different specializations, while rejecting certain knowledge claims from those disciplines that they can spot as the result of unhelpful assumptions or preoccupations.

Consequently, the greatest challenge facing sustainability in enterprise may not be providing creative ideas but helping organizations to exceed paradigms that they've established in attempts to take in consideration also the returns for their stakeholders. Emotional intelligence and empathy then become drivers for innovation in team values creation and business processes.

The role of emotions is fostered by cognitive flexibility. Emotional intelligence is defined as an individual's ability to recognize, distinguish, label and manage their own and others' emotions. The transformations undergone by the concept of emotional intelligence over the years, have led to the creation by psychologists and scholars in the field of different theoretical models of EI, corresponding to equally different definitions and characteristics (Salovey and Mayer, 1990; Goleman, 1995).

The concept of emotional intelligence initially elaborated by Salovey et al. (2003) defined it as the ability to perceive, integrate and regulate emotions in order to facilitate thinking and promote personal growth. However, over the years, this definition was modified to include the ability to accurately perceive, generate and understand emotions in order to regulate them in a reflective manner to promote emotional and intellectual growth. According to the model introduced by Goleman (1995), emotional intelligence encompasses a range of skills and competencies that guide the individual especially in the field of leadership. According to Goleman (1995), to each of the above characteristics belong several emotional competencies, understood as the practical skills of the individual necessary for the establishment of positive relationships with others. These competencies, however, are not innate, but can be learned, developed and improved in order to achieve important work and leadership performance.

Today, therefore, new organizational models are emerging that are more horizontal and participatory, making it increasingly necessary to adopt a new approach and new leadership models that allow the growth of people to be placed at the first place for the development of the organization itself.

A paradigm shift towards a more participative leadership approach makes it possible to abandon narrow hierarchical verticals and facilitates the transition from a logic of control to one that is more goal-oriented, involving people and, above all, their personal and professional growth, focusing on empowerment. Therefore, it is necessary for managers to be increasingly able to involve and inspire others, thus having greater empathy and being able to build a vision, in order to foster a cultural change within the company.

Training emotional and relational skills, therefore, proves to be not only necessary, but strategic for organizations, managers and professionals who want to manage continuous change and increasing complexity in a sustainable and innovative way. Within business contexts, it is essential to be able to activate mechanisms of empathy, in order to "bring people" to understand the causes and consequences of sustainable development, but above all to become active.

The role of empathy is fundamental in co-learning and co-creation processes. How many times have managers said 'stop talking and get back to work'? Socializing is not widely accepted in most corporate cultures because it's thought to be unproductive and wasteful. But, in more recent years, we've seen that it is quite the opposite. Collaborative learning does in fact contribute to business success by increasing productivity, saving time and empowering employees. Co-learning is an educational approach to teaching and learning that involves groups of workers coming together to solve a problem, complete a task, or create a product. Encouraging workers to empathize to one another to solve problems and share knowledge not only builds collaboration skills but leads to deeper learning and understanding. For example, the EOE (Empathy-O-Empathy) model (Massari et al, 2021) is based on the three aforementioned empathy steps needed to go from acquisition of knowledge, to cooperation and finally active co-construction of learning.

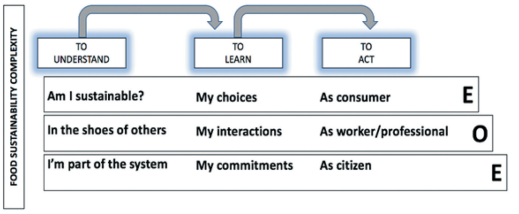

Figure 1. Food sustainability complexity: from education, to engagement to action.

Source: Massari et al. (2021)

Three fundamental phases need to be activated to design a co-learning environment: first "learning from me: Am I sustainable?", an introspective phase, with an hyper-local approach starting from the analysis of one's personal experiences, values and ideas; second "learning by interacting with others: are you sustainable?", an interactive phase, focused on the interaction and cooperation with others, often they are peers, thus including the analysis of different perspectives and backgrounds with a trans-cultural and transdisciplinary approach (employees are managing to gain more information about sustainability, either by themselves and with the help of others); third, "co-creating a learning space: let's make a sustainable action together!" a community phase, in which people are asked to collaboratively develop new solutions and creative ideas and scenarios which were not directly connected with the participants, thus fostering systems-thinking, finding opportunities and underutilized resources.

The EOE model (Figure 1) guides and supports the analysis and the actions to generate innovative and co-creative intuitions and thus foster the understanding of complex sustainability systems' management and development. This empowers people to become aware and express their agency towards sustainability issues, as consumers, as professionals and as citizens.

In summary, through the empathic mechanisms, more collaborative learning systems were activated, based on a greater knowledge of ourselves, of others and of our planet. The three cases well represent an ideal learning system in which personal challenges go and support global challenges. To foster employees in sustainability awareness it is important to learn from others, and to understand the complexity of the system, without forgetting the role of the individual, and his/her role within the system.

3 CASE STUDY: METABOLIC DESIGN THINKING WORKSHOP

In this paper, a case study approach was adopted, in line with several researchers who argue that if the ambition is to explore a field, and if context is deemed important, a case study approach is suitable (e.g., Eisenhardt, 1989; Leonard-Barton, 1990; Voss et al., 2002; Flyvbjerg, 2006). Siggelkow (2007) argues that the key advantage of case study research is that it allows the evidence of causal relationships more directly and gets closer to theoretical constructs than large-sample empirical work. Halvorsen (1992) also points that the initial research question need not be overly specific since the objective is to develop a holistic and meaningful understanding. In particular, the proposed MDT framework was applied in a workshop carried out in January 2020 in Florence (Italy) before the spread of the Covid-19 pandemic.

The research explores the way organization relates to the concept of Metabolic Design Thinking, and its potential links to sustainability innovation. The application Design Thinking to organizations has received limited research attention, so the area can be considered a nascent theory field (Edmondson and McManus, 2007). For this reason, an exploratory, qualitative approach would be recommended for data collection. (Edmondson and McManus, 2007).

The workshop involved a hi-tech pharmaceutical organization and it has been designed to be able to define how the company defines its current definition of sustainability and future activities. The workshop was organized in 1-day and involved about 60 employees (including CEO and Directors). Authors designed and participated in all activities of the workshop.

The goals of the workshop were: (i) Support the company to improve its knowledge on sustainability; (ii) Provide a discussion through a joint design process that leads to an aligned understanding and concretized outcome at the end, to create through the collaboration and a discussion process between participants a common vision that addresses both worker and business insights.

Some parts of the workshop were collected in order to have more evidence on the data that emerged. Each participant at the beginning of the workshop was notified of the activities planned during the day to make them feel more comfortable in the activities carried out.

This process moves its participants between the concrete and the abstract worlds, and it alternately uses analysis and synthesis to generate new products, services, business models, and other designs. In moving among those extremes, it in essence requires participants to engage in concrete experience and abstract conceptualization, reflective observation and active experimentation. The workshop consisted in the following 8 stages, subdivided in 3 phases according to the MDT, described in Figure 2 below.

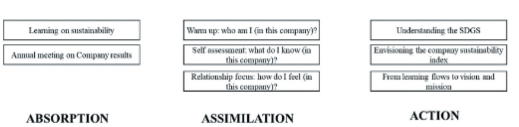

Figure 2. Metabolic design thinking framework.

3.1 *Absorption (Sustainability and the company)*

3.1.1 *Learning about sustainability*

In this step, the business purpose of the workshop is formulated and participants are informed about the timing and activities. The workshop started with a lecture session about sustainability and SDGs. This phase was useful to give a common base of knowledge to all participants through stimuli driven by examples from other companies or sectors. The main question on which the lesson focused was "What does it mean to be sustainable today, and how will the company be able to be in 2030?". This session lasted 30 minutes and during the lecture, the instructor presented sustainability concepts, explaining the area of application of sustainability to business, and other topics such as SDGS and Agenda 2030.

3.1.2 *Annual meeting on company results*

In the second part of this session, the CEO of the company presented the first annual results and explained how sustainability principles were being applied and used within the company. This session lasted 30 minutes and was handled with minimal interactions from the participants who mainly listened and "assimilated" the information.

This part was a theoretical introduction aimed to create shared knowledge around sustainability, developing a common awareness of the argument in their company and considering how the enterprise approached sustainability during the last years.

3.2 *Assimilation (Me and the company)*

3.2.1 *Warm up - Who am I (in this company?)*

This phase aimed at identifying and solving conflicts between stakeholders, utilizing the value currently missed for the business, and searching for opportunities to create entirely new value.

The groups followed an ideation session of 1-hour supported by three main three exercises, namely warm up, assessment, and relationship focus. This phase aimed at identifying and solving conflicts between stakeholders, utilizing the value currently missed for the business, and searching for opportunities to create entirely new value.

All the exercises included a co-creation activity that was carried out working with all the participants in an open and flexible space ideal for "sharing" and for the use of walls for notes.

All participants were placed in a circle within the room separated from each other. The facilitator called out a few actions and activities and based on how well that action had been done or not done by the participant, he or she had to move toward the center of the circle created. This activity allowed to create empathy among the participants, generating common interests and making them know each other better. At the end of each session the results were displayed and discussed in groups.

3.2.2 *Self assessment. What do I know?*

In the assessment phase, participants through an online quiz were asked to test their knowledge on what they learned in the previous session on sustainability. Correctly answering the questions allowed for scores and ranking within a real-time leader board, creating a strong engagement in the participants to be able to rank highly.

3.2.3 *Relationship focus*

Based on envisioning stimuli and direct questions, participants had to report their feedback on a post-it note. The results were then clustered by meanings and common topics and discussed in the plenary. Below we listed some of the questions and issues raised to the participants, using the scenario-based design technique to collect potential definitions and points of view, and activating storytelling processes, evolving the common design thinking exercise often used to facilitate storytelling and commonly called "If I were".

Definition questions:

- When am I unsustainable?
- When am I sustainable?
- How do I feel today? (Social individual, creative individual, economic individual, environmental individual)
- How do I define the term alliance?
- How do I define the term alliance in the company?

Envisioning- storytelling issues:

- If sustainability were an animal, which animal would it be?
- If you were to go to an alien world, what would you take with you to make friends with aliens?

Outcomes from the end of this exercise were used for the collection of everyone's thoughts in a more structured organization.

3.2.4 *Mapping of the business situation*

The fourth step was concerned with determining the current situation about the business and its relation with various stakeholders. The CEO of the company introduced the yearly performances and future plan.

3.3 *Action (We and the company)*

3.3.1 *Understanding the SDGs*

After a brief introduction to SDGs, the aim of this step was to explore new and more proactive performance indicators for the company. 16 SDGs were selected and the participants were organized in groups, one for each SDG, to discuss the implication of the SDGs in their operations. During this workshop, the Wedding Cake (Rockström & Sukhdev, 2016) was a useful tool for getting across the importance of spending time, energy and resources on strengthening the lower layers (Figure 3). Company financial success is dependent on strong environmental and social foundations and

without them will be unable to sustain itself. Sustainability is fundamentally contextual – and the key to achieving sustainability as a business is to present performance in relation to the broader concepts of limits and demands placed on the environment and society. A context-based approach to selecting metrics and setting targets required research, analysis and understanding to address the critical question of whether a company's activities are sustainable. Sustainability metrics were categorized according to three main aspects: economic, environmental and social.

3.3.2 *Clustering and selection of value opportunities*

In this step, several value ideas are selected and clustered according to SDGs topics which can complement the current value proposition by discussing how company and stakeholders' needs could be satisfied and problems be solved most effectively and efficiently.

The outcomes of the groups were clustered and analysed to select the value opportunities for the company according to SDGs topics which can complement the current value proposition by discussing how the company and stakeholders' needs could be satisfied and problems be solved most effectively and efficiently. Then, participants were invited to present and discuss the emerged ideas with the audience. The elements and their interactions are explained, the business and its purpose are delineated, and major problems for the implementation of the value proposition are discussed, before questions of the audience are answered and feedback is provided.

The 2-4-8 DT method was adapted and used to create the "company sustainability index". Design thinking consensus techniques are an excellent tool for prioritizing in large groups. This exercise helps a group reach a decision that everyone can live with, it's usually best to impose tight time limits at every stage of this discussion.

1. Work individually.
2. Form pairs. Each pair discusses the list of possible proposals and is asked to agree on their top 3 priorities (it could be any number, but for this example we used 3).
3. Each pair then comes together with another, to form a group of 4. The 2 pairs compare their lists of top 3 priorities and, after discussion, agree on a joint top 3.
4. Finally, the entire group comes together and reduces it to one list of 3.

Keywords and canvas with instructions were provided on the layout to inform and inspire the group about the activities to carry out.

This part of the workshop was collaborative, but above all the result of a sharing of intentions, of a constant and creative process of engagement, and the principle of an empowerment process. The comments during the discussion were summarized on sticky notes placed on the canvas to document the discussion.

3.3.3 *Presentation of the results and feedback*

The seventh step refers to presenting and discussing the emerged ideas to the audience. The elements and their interactions are explained, the business and its purpose are delineated, and major problems for implementation of the value proposition are discussed, before questions of the audience are answered and feedback is provided.

The entire group of participants worked together to define 3 company statements as the mission for the year to come: (i) economic: promoting collective and inclusive growth; (ii) social: keep green and do training; (iii) environmental: be inspired and promote the principles of the 2030 Agenda (SDGs).

These metrics are part of a wider performance framework that underpins a strategic approach to sustainability, are the indicators participants and their colleagues will use to monitor progress and drive performance against their stated objectives. There should therefore be clear alignment with – and metrics should flow naturally from – the high level and sub-objectives.

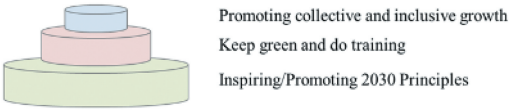

Figure 3. Final output of the workshop – Sustainability layers for the company.

3.3.4 *Documentation of results for further processing*

In the last step, the results considered most important by the participants are recorded for further processing. We conducted follow-up interviews with a smaller group of participants in the following days after the workshop, to collect feedback on the effectiveness of the information disseminated during the workshop. From the follow-up, as a result of the workshop, some new directions were communicated by the company. For example, the workshop inspired the company to reformulate the KPIs based on the three perspectives of sustainability: economy, social and environment. Some of the participants' proposals set the stage for creating incentives for employees across the organization that stimulate creative behaviors. The workshop suggested to the CEO and management to create fixed moments for team alignment through design thinking techniques: yearly, monthly and weekly.

4 RESULTS

Through the MDT model, the participants absorbed notions of sustainability, but also accumulated methods and tools to understand how to implement it within the company. The combination of learning by doing, experiential and challenge-based learning

approaches, applied during the workshop, allowed the participants to use the acquired tools immediately and concretely. The metabolic process has "generated" energy, capable of feeding the development of a corporate creative process. The sustainability-oriented proposals and activities are therefore not perceived as imposed by the management, but rather understood as co-constructed by the entire company group.

The metabolic design thinking model was used to introduce sustainability into the core value of the company. Through the 3 main phases of the framework, participants were able to: (i) "eat" and acquire information and notions about sustainability, through theoretical lessons, and be able at the same time to put them into practice through methods and tools; (ii) this kind of approach allows participants to metabolize them and make that information their own; (iii) if those notions are metabolized, just as the normal digestive process does, they are able to generate energy, which gives input and strength to the whole company. So, this creative mechanism serves to "empower activities" of sustainability, which will work because they are not simply imposed but because they have been metabolized, and serve the employee himself.

The ability to endure over time, both from the point of view of end consumption and by companies, will tend in the future, to be based on different scenarios: it is not the products themselves that will foster choice, but their code of meaning, and the sustainability experience they will provide. The term introduced by Marc Tuters and Denisa Kera, "metabolic interaction design", is used here to suggest a new approach to scientific research and design thinking as applied to sustainability: that of designing business strategies and enhancing the corporate sustainability experience by studying the 'cognitive metabolism of the user' (i.e., how he or she ingests, assimilates, and appropriates the values inherent sustainability).

Members of a community through the described steps are able to control the content and meaning of their actions in sustainability. This permit creating new dynamics and identifying levers to be used to change the most eradicated thoughts and beliefs, even the most established ones. The presence of a young audience curious about novelty and interested in using creative techniques. They embraced the challenge well and adapted the workshop to their business needs. Another factor that helped in the achievement of a good result of the work-shop was the ability on the part of the CEO and executives to put themselves on the same level as the performers and they did the same exercises to arrive at a satisfactory common output. In addition, the heterogeneous group of participants (both in gender and in background and geography) was an added value to have various points of view available. Sustainability today is seen as an important value, not only for the company, but especially for single people and the family. This allowed for a greater ability to "internalize" topics and theory because they are applicable to real life. The time devoted to the workshop was also limited and adequate to achieve optimal results in a short time.

The different activities planned, and in particular the final index and the 3 phases are indeed the result of the joint work of everyone, no one excluded. All participants felt represented. Storytelling showed how it is possible to create strategies and solutions by simply putting together thoughts and beliefs. Everyone's thoughts are always opportunities: collaboration and co-participation were key to problem solving.

MDT helps to identify those beliefs, principles and practices that are key in supporting the progressive advancement of a company towards a status of increased maturity, and that can serve as a starting point for a worthy discussion around it. In addition to perceiving the information outside the company, it is fundamental how the stimuli are internalized within the company. MDT helps build an empathic metabolism process. The internal perception of the value provided must be intimately co-created, so that it can then be transferred to customers through a deep understanding and empathic resonance with them. For this reason, MDT is a tool capable of decoding company objectives and KPAs in an internal language that inspires the organization. Tools such as storytelling and experiential drivers can help make not only data accessible to all, but access the design of new ways to meet customer needs and produce business innovation processes.

A shared understanding of how MDT is practiced within projects and with which tools, gives direction and helps teams to move forward towards meaningful innovations. Dedicating time and effort to select the right sustainability metrics for companies and setting the organization up to monitor and track them is well worth the investment. MDT reaps rewards for innovative business, and society, long into the future.

The Metabolic Design Thinking workshop was included in the company's annual meeting. The main objective was to provide training to employees on sustainability and the application of the SDGs. The training initially focused on corporate well-being and then moved on to the well-being of the planet. During this empathic process, the participant gained a greater awareness of their role as part of a sustainable system; the company managed to strengthen internal identity and build a common vision; participants and the company were able to share and translate their personal visions into 3 statements for the year to come, projected towards the future and sustainability. The co-creative process activated by the Metabolic Design Thinking workshop confirmed to be an excellent method for building a culture of corporate sustainability, capable of motivating participants and influencing their mindset

towards innovation. MDT proved to be a functional tool to strengthen the awareness of one's role in the company team, feeding a more proactive systemic mindset, and acquiring the cognitive and collaborative tools to create a direct and more planning dialogue, between different departments, employers and management.

The MDT alternates visionary creative phases with others that bring the participants back to concrete and real life. This alternation of inspirational and envisioning phases, with others defined as the scenario-based design, helped to activate an equal process of innovation. Chermack and Lynham (2002) have defined it as 'a process of posting several informed, plausible, and imagined alternative future environments in which decisions about the future may be played out for the purpose of changing current thinking, improving decision making, enhancing human and organizational learning, and improving performance'. In this sense, scenarios extend the scope of decision makers by providing a range of possible outcomes and insight into the underlying drivers of change. However, scenario-based approaches are also prone to misinterpretation and manipulation. For example, Roxburgh (2009) described scenarios as counterproductive for developing a clear vision and, therefore, not suited for leadership tasks. In order to limit this misinterpretation, the storytelling techniques included in the MDT model have provided possible strategies to collaboratively resolve internal conflicts and complexities within the company.

5 CONCLUSION

Sustainability can be defined as the set of corporate policies that allow a company to pursue a valuable combination of the three dimensions of sustainable development. Thanks to sustainability, it becomes possible to integrate environmental and social considerations into business strategy, processes and products with the objective to generate value in a long-term perspective. To conduct its business in a sustainable way, the company must find innovative solutions that allow it to understand and respond to the complexity of the context in which it operates. In order to do so, it must adopt a systemic, inclusive and transparent approach, develop a strong orientation towards innovation and improve its ability to measure business decisions by analyzing all the impacts (economic and non-economic) that they determine, in the short, medium and long term. A company that aims to be more responsible is an organization capable of creating a quality relationship with its stakeholders, respecting the environment, innovating production and distribution processes, and adopting virtuous personnel management practices. All of this produces added value for the company itself, but also for its community, and restores the entrepreneur's social, as well as economic, role. Social responsibility is increasingly identified with the ability to profitably manage business risk, optimizing production processes, paying attention to organizational wellbeing, respecting the environment and taking care of relationships and effects on the territory.

Although design thinking has already been applied to such fields as product innovation and business strategy formulation (Holloway, 2009; Lindberg et al., 2011; Skogstad et al., 2011), the present study was the first attempt to integrate elements of design thinking into integration of sustainability in business purpose.

The research provides a structured approach to assess workshop and evaluate its effectiveness by extracting and assessing key elements of the steps described, which can serve as a baseline to develop future work and tools in this context.

This approach becomes a vehicle not only to innovate, but more importantly to find solutions in cases of difficulty. This is possible because it teaches participants to deal with problems by activating those specific skills that are enhanced through a collective approach. MDT is a tool capable of decoding company objectives and creating an internal language that inspires the organization. Tools such as storytelling and experiential drivers can help make not only data accessible to all but access the design of new ways to meet customer needs and produce business innovation processes. Although this workshop was held in the pre-Covid period, it would still work today because it was based on the ability to generate empathy among all employees by working on improving team collaboration. This was done through a storytelling activity related to the specific theme of the importance of sustainability for the company.

As seen in the workshop activities, vis à vis communications enable much more than remote means problem solving, creative exchange, and the ability to focus quickly on priorities (Edmondson, 2018). DT because of its nature of flattening hierarchies, putting focus on users (which in organizations would be employees), enables inclusive conversations, and uses fast prototyping as a vehicle for learning lends itself specifically as a transformative approach to organizations capable of putting the psychological safety of individuals at the heart of their work (Edmondson, 2018). The continuous call conferences, the impossibility to find the right concentration in coworking spaces, the distractions coming from domestic sources and various technologies have strongly contracted the ability to correctly employ the alternation between the two cognitive systems. So, MDT can provide its contribution, trying on the one hand to offer a new "problematization" of work.

The results of the workshop allow us to hypothesize that the MDT could become a useful tool for solving other problems that have arisen in the post-pandemic period in relation to the vision of a company. So, it

might be interesting to perform new research to understand how this type of workshop can become a standard tool in a short-period of time (8 hours total) to manage issues. Just because in the future companies will have to redesign their activities in presence, will increasingly need fast workshops like the proposed one to find moments of aggregation. This is an example of how in 8 hours we managed to do the whole DT phase, including the final assessment and follow-up. For example, the same approach could be used to perform activities such as align groups, provide training on specific topics, or onboard new people in the company and create alignment and team building. The future of companies will be more liquid, transversal and therefore forms of co-design and MDT will be useful to digest metabolic chain processes that create others. Future studies could redefine the workshop into sub-workshops so that the company can focus on specific activities in a more structured way.

Despite the compelling insights emerging from the study, some limitations are evident. The workshop was tested in the field with little control over influences on the participants, since the participants were only employees of the same company, and the workshop was only tested with one company in biotech. Future research may test the workshop with larger groups of company representatives from other industries. Also, it would have been interesting to provide more theoretical information and data to support a "preparation" on sustainability. It would have made the participants more knowledgeable and thus offered them more critical points to discuss.

A further consideration should be made regarding the topic of sustainability. This is complex and has within it some controversial points. Probably by having more time, it would have been possible to "explode" more conflict and creative confrontations, so that all the unspoken doubts and critical issues could have been eviscerated (ex: plastic use, my role as a consumer, CO2 and travel, ethicality of some behaviors, active and non-active citizenship).

DISCLOSURE STATEMENT

No potential conflict of interest was reported by the authors

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Experiencing and Envisioning Food: Designing for Change – Bonacho et al. (Eds)

Circular food waste biomaterials design for the food industry: Exploring its potential

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ABSTRACT: Food industry generates large amounts of wastes with a high negative impact on the environment. Wastes are generated when food is produced (i.e., crop wastes), packed and consumed (i.e., plastic cutlery). Food Design is an emerging field of research where the circular economy approach can be used as a tool to create local organic materials from food industry biowaste which could be used to design products that will substitute other products that generate trash.

The aim of the present study was to generate case studies that inspire others for the creation of new circular materials and solutions in the food sector, which can have positive impacts al local level, by taking advantage of the unused organic flows of the same industry (i.e., crops waste, food waste, etc).

In this research different circular biomaterials and products were created by students of the Engineering Design Master, under the supervision of experts in the fields of Food Design, Industrial Design and Circular and Sustainable Design. Then, materials and products created by students were analyzed by expert in the fields of Food Design, Industrial Design and Circular and Sustainable Design who qualitative and quantitative indicators to determine their level of circularity and its potential for scalability.

Case studies presented in this article evidence that there is a great potential to create circular and compostable products with food waste for the food industry. Nevertheless, further steps will be required in the future to connect this emerging knowledge with the industry to go from local solutions to systematic solutions which could be applied in the entire sector.

1 INTRODUCTION

1.1 *Food industry waste impacts*

According to Corrado & Sala (2018), who reviewed different studies regarding global food waste generation, each person produces between 200 and 350 kilograms of food waste every year. That means an annual global food waste production between 1520-2660 Gt by 2018, related to a world population of 7.6 billion people in 2018. This range of values mainly varies regarding the stages of the value chain considered in the different studies their paper analyses (primary production and post-harvest, manufacturing, production, and consumption). For example, some statics did not account agricultural wastes as they considered that could be reintroduced into the land, which was not something that could be applied to all kinds of crops.

Food industry wastes generate large amounts of greenhouse gas emissions (GHG) every year. These emissions have been mainly linked to the waste's transportation, management, and post-management (Bernstad & La Cour Jansen2012). Between 1961 and 2011 GHG from food waste tripled due to the growing population and meat consumption habits. By 2011 food waste emitted 2.2 Gt CO_2 equivalent, a value that was expected to keep growing, if the trend did not change, up to 5.7 Gt CO_2 equivalent by 2050 (Porter et al. 2016).

1.2 *The strategy: New biomaterials*

The main current strategy to minimize food waste impact is to directly reduce food waste, for example, by producing those foods which generate less waste per unit of mass or nutrient produced. However, this is a complicated solution that needs time to change industry and consumer's consumption habits.

As shown in Figure 1, a possible direct solution to reduce food waste management impacts is to give them new uses before they are composted in waste management plants. It is possible to detect the main unused food waste flows to give them new possibilities. For example, they could be recycled to create local, natural, and compostable products which come back to the earth at the end of their life.

If food wastes were used to create new biomaterials and products, there would be an increase in resources through:

- Reduction of raw materials extraction and the overexploitation of nature it generates.

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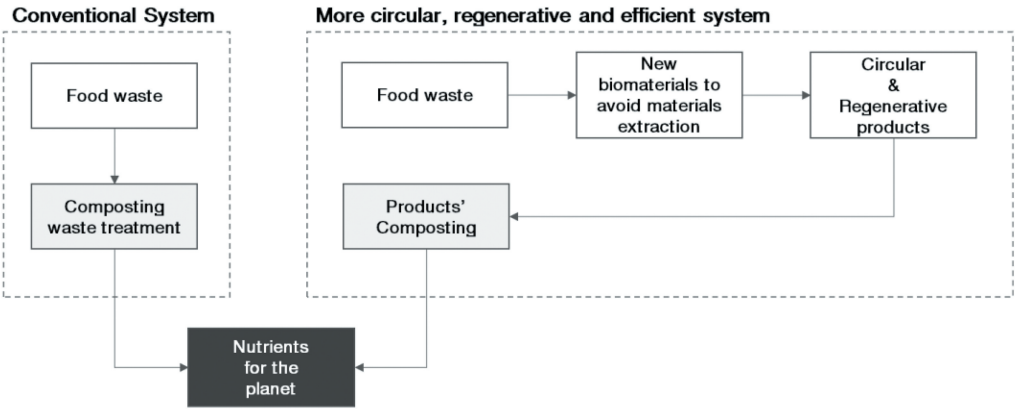

Figure 1. Comparison between conventional food waste flows and a new proposal to increase food waste circularity, regenerative potential, and efficiency.

- The GHG from waste treatment are avoided and allocated to two new purposes: food production & product production.
- Stimulate circular and regenerative product design.

1.3 *Culture and local context waste*

Each region produces different food and consequently generates different organic wastes according to its food culture that comes from the area's climate conditions, water resources, and land properties. Therefore, food waste typologies will determine the possibilities we can explore to create potential new biomaterials and products or applications. Additionally, an extra conditioning layer appears if we want to reduce biomaterials and product transportation, enhance local economies and make communities more sovereign in terms of resources. Producing locally means creating more efficient solutions but also creating solutions for certain consumer cultures that ha different requirements (usability, aesthetic, general needs, …).

1.4 *Biomaterials applications*

The food industry generates different products that are produced with non-renewable materials, such as plastics. Multiple plastic pieces, with a relatively short life span, are used during food production (i.e., elements to guide and fixe tomato plants or plastic protector for young trees) but also during food consumption (i.e., food packaging or takeaway packaging) which can easily be they can end up in natural spaces such croplands, oceans or forests. There are multiple products that the food industry should transform to make them more sustainable, circular, and regenerative. For these reasons, the food industry should be one of the main industries where the proposed new biomaterials could be applied to substitute other materials.

Not all materials produced from food waste may have easy and direct application in the food sector, but provably some opportunities can be found in other industries to substitute the non-circular materials such as the textile or architectural sector (Póveda 2021). In case this situation happens, it would be of interest to look for possible applications in local industry and try to avoid as far as possible exportations to reduce logistics environmental impacts.

1.5 *Goals of the study*

The main goals of the study were to:

- Generate case studies that inspire others.
- Show examples of new industrial biowaste materials.
- Create examples that generate a positive impact on society and the environment.
- Promote new projects in academia with a high potential for industrialization which can lead to new businesses.
- Analyze different case studies to determine their strength and weaknesses.
- Define future recommendations for researchers.

To achieve the cited goals, this research was focused on the context of the Engineering Design Master in Elisava, faculty of Design of the Vic University (Spain), where new circular biomaterials and products were created by students under the supervision of experts in the fields of Food Design, Industrial Design and Circular and Sustainable Design.

2 METHODS

2.1 *Students' profile selection*

During two consecutive editions (2021 and 2022), the students selected to be trained for this research were the ones who coursed the Master of Engineering in Industrial Design at ELISAVA. They came from multidisciplinary backgrounds in engineering and design and were introduced to the scientific method

and knowledge further explained in Section 2.2. To obtain the goals proposed in this research, the projects required engineering, scientific and speculative aptitudes. Engineers have the technical knowledge to develop these new biomaterials and their implementation and adaptation to large-scale industrial processes. By using the scientific method, engineers could elaborate rigorous research which helped them to create more innovative solutions which tackled relevant food waste environmental issues. Additionally, design skills were required to allow new speculative scenarios.

2.2 *Research process*

As Figure 2 shows, students were first introduced to Food Design, understood by the authors as "a growing rapidly field for which there is no agreed definition, that is directly related to culture and modes of consumption". Even though some definitions were stated by Zampollo (2016) or Stummerer *et al* (2020), Food Design has been changing fast and now we can state that today is understood as an agent of change that is able to help improving the food chain creating concrete and impactful solutions through design and received the challenge of creating a new local circular material and product with unused biowaste from the food industry.

Secondly, they were guided to research and detect those wastes that are larger produced by consulting scientific articles and statics centers such as FAOSTAT[1] and the Spanish Statics National Institute.[2]

Thirdly, students were trained in a two days' workshop to learn how to transform the selected organic wastes into new possible circular biomaterials. They were trained with the methodology created in the context of the MaDe European project (Clèries et al. 2020) which combines the basis of DIY materials methodologies (Rognoli et al. 2015; Garcia, Rognoli, & Karana 2017) and the circular economy principles applied in the industrial design process (Llorach-Massana & Fernández 2018). Once materials were created, students were introduced to Materials Driven Design (Karana et al. 2015), Co-Creation and "How might we?" methodologies (Martin & Hanington 2012) to generate ideas of possible products designed with waste materials substituting existing ones that create waste. During this process, students were asked to do research and find a highly productive industry where the material could be applied to substitute already non-renewable or non-circular materials and products. Finally, materials and products created by students were analyzed. First, a qualitative assessment was done by authors (experts in the research present fields) who analyzed the following indicators:

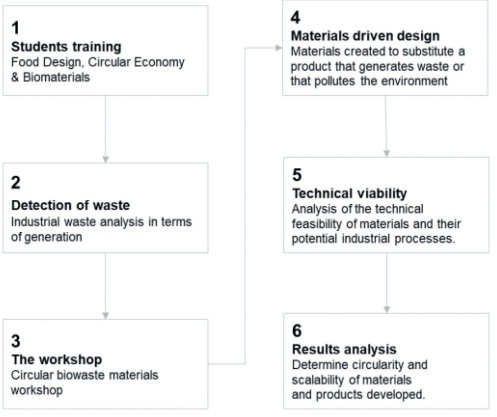

Figure 2. The scheme of the research process followed.

- **Scalability.** It aimed to answer how far were materials from industrialization. Lower values of scalability were associated with more speculative projects whilst higher values were related to projects which were considered to require little or no further research to introduce them in the industry.
- **Circularity.** It described the level of circularity of materials. Those materials 100% compostable were considered to have high levels of circularity, however, those with present some difficulties (i.e., including oyster waste or ceramics) were classified as less circular.
- **Percentage of reused waste.** This value allowed to show if materials created included high contents of waste in their composition or not. This value was provided twice. Once by accounting for water mass and a second time without accounting for it. This differentiation was done because the water was required to create all the materials as it helps to mix the ingredients of each composition. However, high levels of water get evaporated when the materials are produced and dried to guarantee their stabilization and avoid fast degradations.

After the first analysis done by the authors, materials were evaluated through a survey by 7 external experts in the fields of Food Design, Industrial Design, and Circular and Sustainable Design. The survey included a description and pictures of the materials and the following evaluation questions for each material to evaluate the projects and the potential impact on the industry:

1 https://www.fao.org/faostat/es/
2 https://www.ine.es/

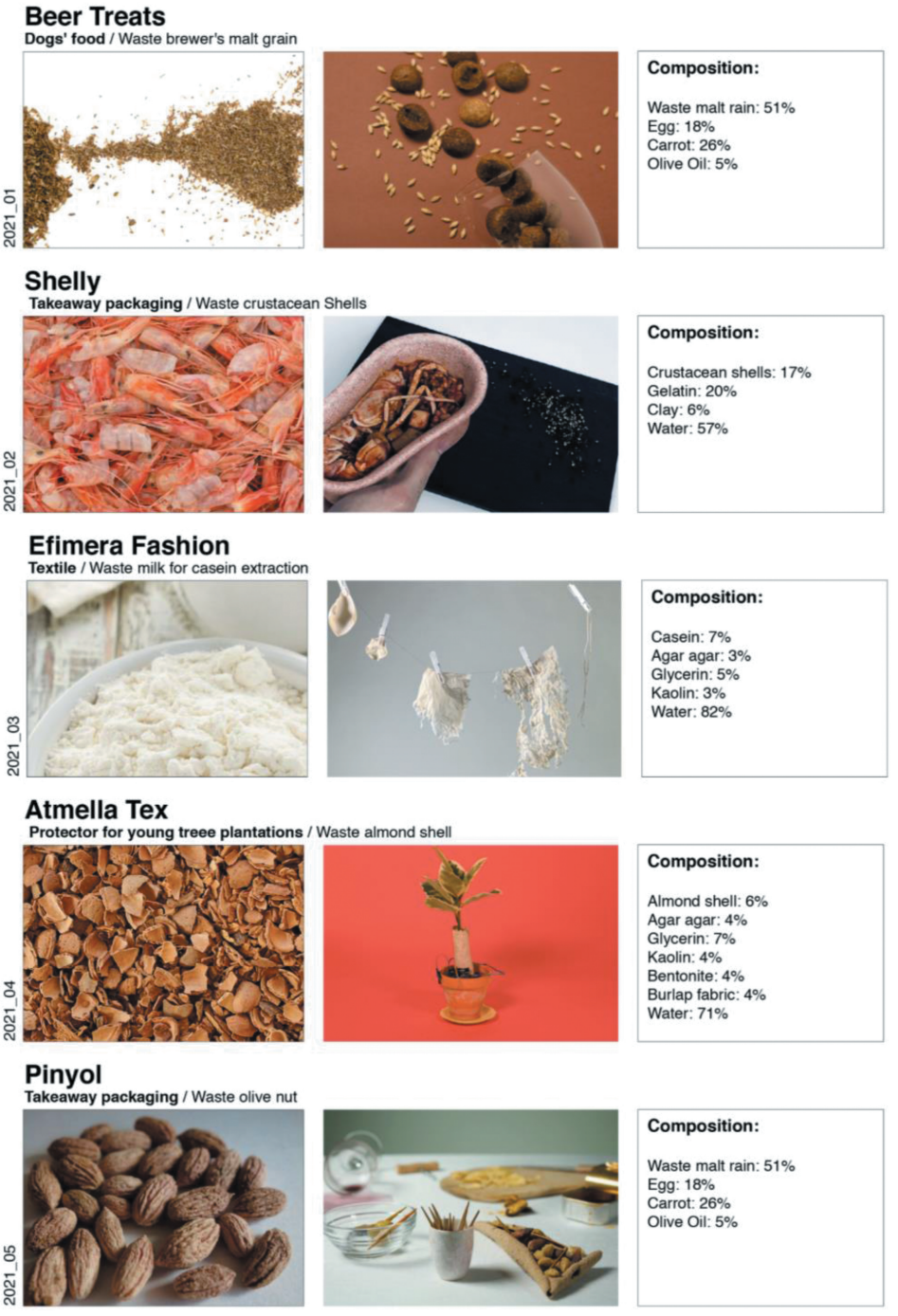

Figure 3. Students' projects developed in the 2021 edition of the Master of Engineering in Industrial Design at ELISAVA.

- Do you clearly understand the material and product created through the images created by students? (Possible answers: value between 0 and 5 were 5 is the maximum)
- Do you think is it interesting to work with the waste selected and that reusing it will contribute to the environment? (Possible answers: value between 0 and 5 were 5 is the maximum)

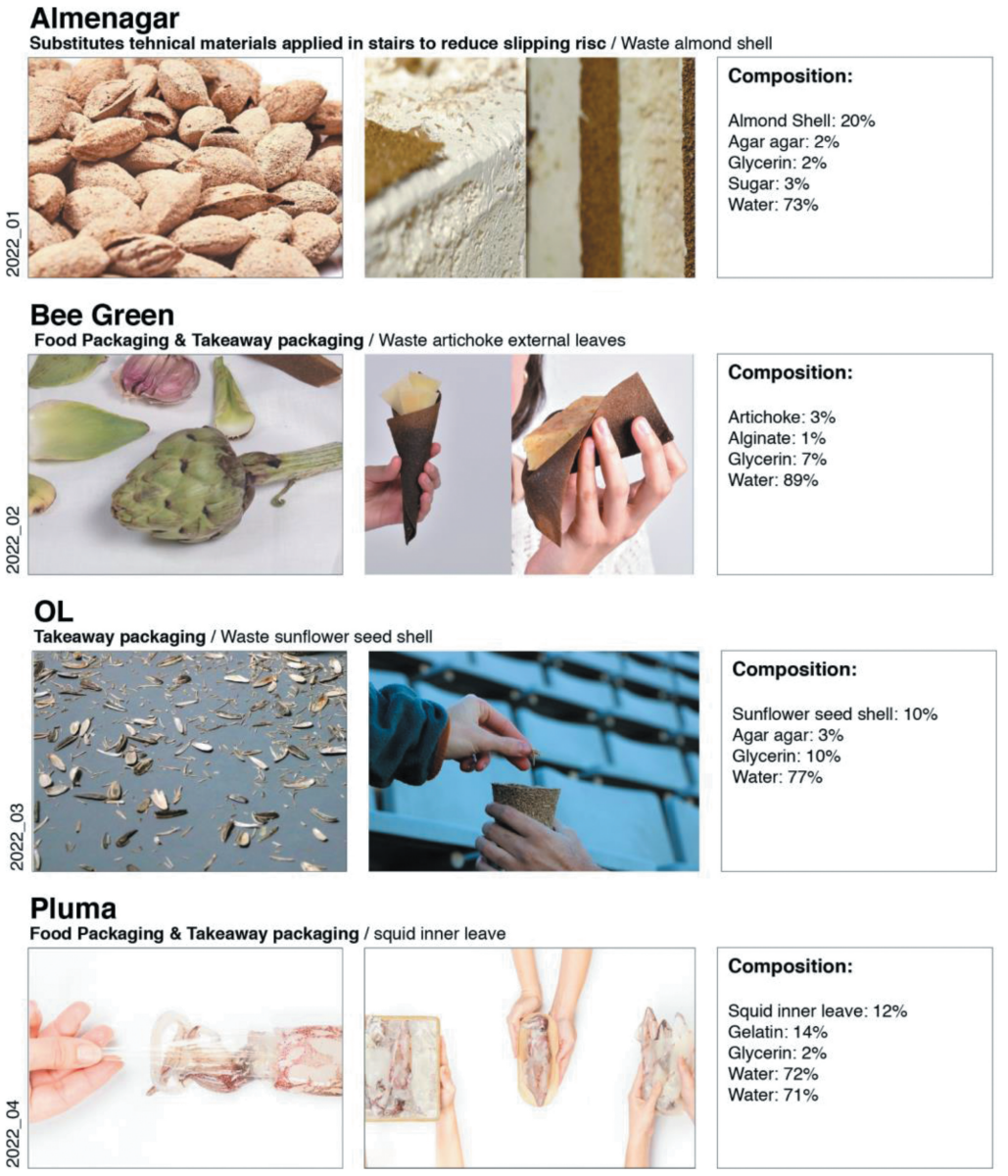

Figure 4. Students' projects developed in the 2022 edition of the Master of Engineering in Industrial Design at ELISAVA.

- Do you think this material created is interesting enough to be further developed in the industry? (Possible answers: yes, maybe, no)
- Do you think the material has potential for application due to its aesthetic and appearance finishes? (Possible answers: yes, maybe, no)
- Do you see coherence between the material and objects designed? (Possible answers: yes, no)
- Do you think the shape of the product proposed is adequate and helps to the product scalability? (Possible answers: value between 0 and 5 were 5 is the maximum)

3 RESULTS & DISCUSSION

3.1 *Students' projects*

Figures 3 and 4 (see next two pages) show the projects developed by the students of 2021 and 2022 editions of the Master of Engineering in Industrial Design at ELISAVA. Figures contain the following information of each project: name of the project; waste used to develop the new material; product proposed to produce with the material and composition of the material.

			Scalability	Circularity	Percentage of reused waste excluding water	Percentage of reused waste including water
2021	01	Beer Treats	8	High	51%	51%
	02	Shelly	4	Low	40%	17%
	03	Efímera Fashion	5	High	40%	7%
	04	Atmetlla Tex	6	Medium	21%	6%
	05	Pinyol	7	High	54%	10%
2022	01	Almenagar	8	High	74%	20%
	02	Bee Green	8	High	25%	3%
	03	OL	7	High	44%	10%
	04	Pluma	8	High	40%	12%
			6,8		**43%**	**15%**

Table 1. Results of the analysis done by authors to define materials scalability, circularity and amount of waste used in the materials.

Tree of the projects focused in using animal food waste (waste crustaceous shells, waste milk and waste squid inner leave). Four projects (Atmetlla Text, Pinyol, Almenagar and OL) used wastes from the nuts industry, which is a type of waste which usually give good results when is mixed with bioplastics produced with agar agar or gelatin. That could be the reason to explain that in webs like Materiom[3], most of the recipes are produced with nuts industry wastes. Finally, only one project (Bee green) uses wastes from vegetable production industry concretely uses artichoke waste leaves.

3.2 *Project scalability and circularity*

As Table 1 shows, six from the nine materials created by students received a 7 and 8 punctuation (in a scale from 0 to 10) regarding their scalability. This means that these projects are considered to use simple transformation processes which are already being used in the production industry. Three projects received values equal or under 6. These projects required further research to stabilize the materials or improve their properties.

Regarding materials circularity, seven of the materials were considered to have a high circularity level. These materials were created with fast compostability compounds like food waste, agar agar, gelatin or casein among others. However, Shelly and Atmella-Tex materials were considered to have a low and medium circularity level, respectively. Shelly is produced with crustaceans' shells (which is not the most easy to compost food waste) and contains traditional red clay which is a non-biodegradable material while Atmella-Tex contains Kaolin, a soft white clay.

In average (see Table 1) the waste used to create the new materials represented the 43% of their total weight if water used is not accounted. Almenagar was the material with the highest content of waste (74%) and Atmella-Text the lowest (21%). Six o the nine materials had a content of waste between the 40% and 55%.

3.3 *External experts' projects' evaluation*

Table 2 shows a summary of the evaluation of materials done by the external experts. As can be observed, the wastes selected to create the new materials were considered appropriate by experts to tackle relevant environmental issued derived from waste food management (including waste from production and post-consumption). Also, most of materials were valued as interesting for further development in the industry.

Related to the objects designed, experts seemed to agree that in most cases there was a good coherence between the material and the object designed. Nevertheless, it seemed they considered that products' shapes were not completely adequate to ensure the scalability and industrialization of the product.

Finally, materials aesthetics and finishes were considered acceptable but not the best to be applied in products. In this evaluation point possible prejudices could had appeared when evaluating the materials, as recycled materials tend to generate a perception of being less quality materials (Polyportis, Mugge, and Magnier 2022).

4 CONCLUSIONS

According to the quality of the obtained results, the methodology used was validated through the work done with the Elisava engineers in industrial design students. After being trained by professionals, they had the appropriate technical and creative skills to create new materials from food waste. Additionally, according to students' behavior and evolution during the project, the authors perceived that the project had a positive impact on the students and gave them new skills to understand that Food Design is an agent of change that would help them to participate in transdisciplinary projects.

Most materials present high levels of scalability due to the simplicity of the processes used to create them. A first technical validation of the materials

3 https://materiom.org/

			Q1	Q2	Q3			Q4			Q5		Q6
					Yes	Maybe	No	Yes	Maybe	No	Yes	No	
2021	01	Beer Treats	3,1	4,1	6	1	0	4	3	0	4	3	4,0
	02	Shelly	3,4	3,7	4	3	0	3	3	1	5	2	3,4
	03	Efímera Fashion	2,7	2,6	2	3	2	2	2	3	2	5	2,1
	04	Atmetlla Tex	3,3	4,1	5	2	0	4	2	1	5	2	3,0
	05	Pinyol	4,6	4,1	5	1	1	3	3	1	6	1	3,6
2022	01	Almenagar	4,0	4,1	5	2	0	4	3	0	5	2	3,6
	02	Bee Green	3,7	4,3	4	3	0	5	0	2	4	3	2,9
	03	OL	3,9	3,4	3	3	1	0	5	2	4	3	3,4
	04	Pluma	2,9	4,0	1	5	1	1	5	1	4	3	3,0
			3,5	**3,8**	**3,9**	**2,6**	**0,6**	**2,9**	**2,9**	**1,2**	**4,3**	**2,7**	**3,2**

Q1- Do you clearly understand the material and product created through the images created by students?

Q2- Do you think is it interesting to work with the waste selected and that reusing it will contribute to the environment?

Q3- Do you think this material created is interesting enough to be further developed in the industry?

Q4- Do you think the material has potential for application due to its aesthetic and appearance finishes?

Q5- Do you see coherence between the material and objects designed?

Q6- Do you think the shape of the product proposed is adequate and helps to the product scalability?

Table 2. Summary of the evaluation of materials done by 7 external experts.

with positive results was also done. However, to further develop these projects, additional samples would be required to make sure materials replicability as well as stability tests to determine the conservation of the materials in different environments.

On average, 43% of the resources used to produce the new materials were food waste. Using the maximum percentage of waste in materials was one of the goals of the present research to increase the efficiency of the proposal presented in this paper. Then, further research may be required to improve compositions and increase the percentage of food waste used in the materials.

Most materials present high levels of circularity, which is a positive result. Nevertheless, the authors recommend using the life cycle assessment methodology in the future to compare the environmental impact of the new material with the impact of the material they are substituting to guarantee that this kind of projects are really reducing the impact of our production system from a holistic point of view.

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