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Editors

International Experience in Developing the Financial Resources of Universities

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Introduction

In the past 100 years, the laws were enacted in many countries to require citizens to attain secondary education. As a result, the global literacy rate has climbed from 30% to 87% over the last century (see Fig. 1) [1], mainly because of increased enrollment in primary education. When the graduates of the secondary education system increased, it caused a higher pressure to study further in the tertiary education system. Governments felt the strong desire of their citizens to study in universities.

The leaders of many countries saw a university education as the only way forward to improve the well-being of their citizens. They believed that an investment in higher education would create new jobs and higher value-added products, and lead to a more entrepreneurial society [2]. They allocated additional funds to establish new universities or to support the current universities to accept more students. The number of universities in the world has grown to approximately 18,000. In the UK, in the 1960s only around six percent of young people were applying and getting places in the universities. This number has grown to about 41 percent in the second decade of the twenty-first century. In South Korea [3], the number of tertiary institutions increased from just one in 1945 to 330 in 2019 (with 2 million students) [4]. In this country, as of 2019 [5], 68% of the population has a degree from a tertiary institution, making it the highest in the world.

Even though higher education is believed to be more useful for technologically advanced societies [6], the growth policy is adopted also in developing countries. Since the average age in developing countries is lower than that in the developed world, this policy provided higher

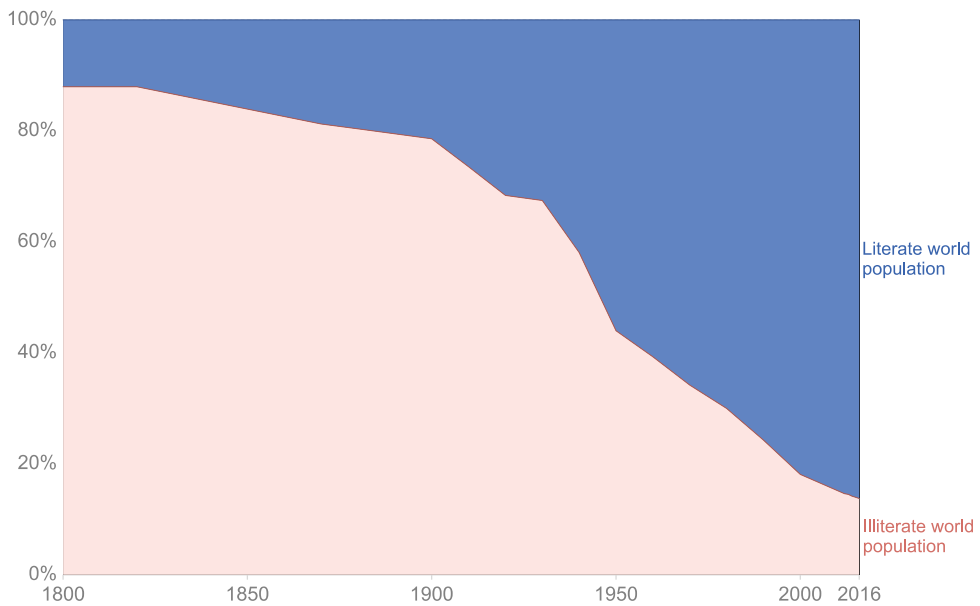

Fig. 1 Percentage of the illiterate and literate world population as a function of years [1]

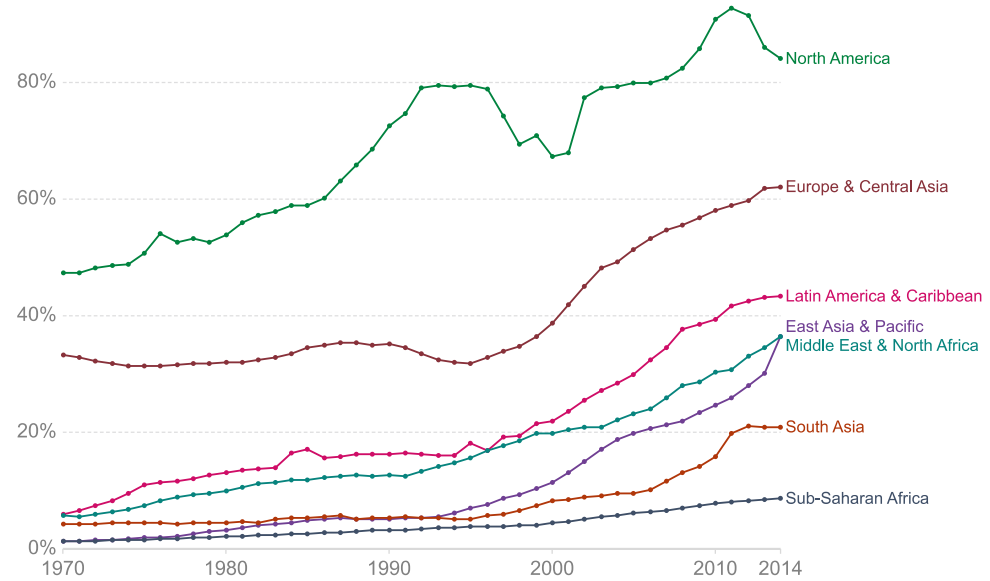

Fig. 2 Gross enrollment percentage in university education as a function of years in different parts of the world [1]

education for a larger percentage of the youth (see Fig. 2). For example, in China, the number of universities approached 3000, while the total enrollment rate increased from less than 10% in the late 1990s to over 45% by 2020. In Korea, the number of universities has reached 370 by 2020.

As more university seats are made available, the percentage of university graduates in those countries increased proportionately, and a smaller percentage of their citizens had to go abroad for tertiary education (see Fig. 3), in spite of the increase in their young populations.

The increased competition in the developed world to attract a higher number of and better students led to the ranking of world universities compiled by a number of private and public institutions. The emergence of these global rankings coincided with the turn of the millennium, when globalization has accelerated. The first such ranking, the Shanghai Academic

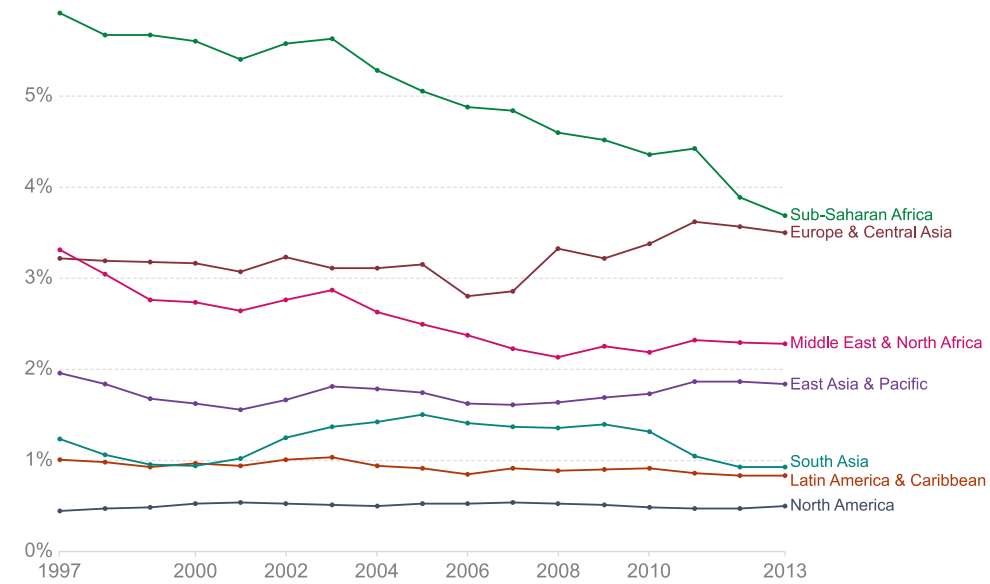

Fig. 3 Percentage of students studying abroad as a function of years in different parts of the world [1]

Rankings of World Universities (ARWU), has started in 2003. It is followed by two British rankings, Times Higher Education and Quacquarelli Symonds in 2004. In spite of the many flaws, these ranking systems were so attractive in social media and among prospective students that even leading universities had to pay attention.

The expansion of the university system required a massive increase in funding. Almost everything a university needs to do costs money: recruiting outstanding faculty members and researchers, giving scholarships to attract better and higher-performing students, increasing salaries of faculty to prevent them from switching jobs in competing universities, improving the facilities or services of the university to increase the quality of life on campus.

As the generous state funding era of the 1950s and 1960s ended in the 1970s after the energy crisis of 1973, the universities had to look for other sources of funding to make up for the declining state support.

If a university is already at a top-ranking, its future is bright: The best students choose institutions with established reputations. The promising young scholars prefer to go to universities with well-known professors. National research funding agencies give the bulk of support to universities with strong faculties. The top universities tend to attract the most gifts and donations from their alumni. Hence, strong universities tend to get better and better. That is why the list of top-rated universities stays almost the same over time. On the other hand, for a young university with inadequate monetary sources, all odds are against its future. Its only bet is to find subsidy or funding to improve their standing. Increased competition forced university leaders to search for opportunities that the commercial world may offer. Therefore, many universities, public and private universities alike, are in a constant search of funding sources on top of their conventional sources. To increase the income, universities tried many moneymaking routes.

In many countries, universities are funded substantially by public sources. Unfortunately, total reliance on government subsidies has not been a sustainable model. Economic downturns and a growing number of students are exerting a strain on the government-funded model. For example, after the Higher Education Act of 2004 of England, the funding model of higher education [7] in that country started following that in the USA: moving away from a wholly government-funded model to a more tuition-funded model. In Korea, a large fraction of the universities are private, reducing the pressure on the tertiary education budget of the government.

Governments base the amount of subsidy on the comparative performance of the university, some by looking at inputs like the number of students, some by ranking the research output, and some by a combination of both [8]. For example, in Germany, the state funding is a substantial portion of a university's total budget and the funding is done to induce a state-induced competition [9]. In Denmark, the funding amount depends mostly on output quantities rather than input quantities. Similarly, in Australia, the government disperses funds based on the calculable and rankable research performance of the universities [10], based on the research output, research grant success, and the number of graduate students.

Some nations have made efforts to propel a limited number of their universities into the elite group of universities in the world, possibly for the purpose of higher prestige of the country and also to be able to attract more international students. The German Universities Excellence Initiative [11] was launched in 2005 to strengthen their research and to increase their global appeal. A total of 4.6 billion Euros were reserved to support this program in the period 2006 to 2019. Russia started funding a national program [12] in 2014 with 2 billion dollars intended to place five of their universities among top 100. Japanese Ministry of Education, Culture, Sports and Technology initiated in 2014 the Top Global University Project [13] to support the selected 37 Japanese universities in their efforts to reform their systems, to accelerate their globalization, to help more of Japan's universities in top 100, and to encourage foreign students to study in Japan.

Because of tight government budgetary constraints following the COVID-19 crisis, many countries will end up cutting the public funding of universities, since the governments need to

provide funding for the unemployed or the small businesses that are under lockdown. Moreover, the pandemic has increased costs at universities for health and technology. In the years following the pandemic, it is probably advisable for the university administrators to focus on increasing the efficiency of operations and to spend time on cutting the nonessential costs.

Many countries have funding agencies to support the research at universities in a competitive manner. This funding mechanism is a much more preferable method in comparison with direct government subsidy since it generates a competitive environment among universities as well as faculty members within a university. It is well known that this method increases the productivity of faculty members and universities.

The economic downturn as a result of COVID-19 pandemic may oblige governments to cut the budgets of funding agencies, treating the money spent on research as in investment too far into the future and hence not a very essential expenditure for the near term. Consequently, the funding agencies with reduced budgets may be forced to prefer applied projects with more immediate monetary revenues rather than projects on fundamental science with likely economic returns in the future.

The universities in countries like the USA and the UK depend highly on the tuition income that the students or their parents pay for higher education. In the USA, the average tuition in both public and private institutions increased by almost 100 percent in the last 20 years, after accounting for inflation. The major reason for this increase is attributed to the inflated salaries of faculty because of stiff competition between universities. This is especially true in areas like business schools and medical faculties, where the inflation-corrected salaries were multiplied by large factors in the last 20 years.

Education fairs are organized in many countries attended by university representatives from all over the world in search of tuition income. US, British, and Australian universities are especially successful in attracting students, because of the native language of those countries. The Netherlands became a destination for international students since many Dutch universities offer programs in English [14]. France started a program [15] to attract international students and encouraging its universities to teach in English. Germany is offering low fees and programs in English for international students to capture a market share [16]. The competition between the universities in the developed world due to the declining number of international students compels universities to offer scholarships by discounting the price of the tuition.

By the turn of the century, some leading universities tried to convert their reputation into cash by establishing branch campuses in regions with a high young population [17]. Branch campuses are educational facilities owned by a foreign institution in a host country. Some host countries provide state subsidies in the initial stages. As of 2016, there were 230 international branch campuses that were established since the mid-1990s.

It is unrealistic to expect an escalation in the tuition amount that the universities collect from students, especially in the wake of COVID-19 pandemic. In many Western countries and especially in the USA, the students demand a reduction in tuition since all or some courses are given online, reducing the costs of running a campus. They justly argue that in the previous years, fully online programs offered by their universities had a tuition amount roughly equal to 60% of the tuition amount of face-to-face students.

Moreover, leading universities expect a reduction in the number of international students during the COVID-19 pandemic, because of travel restrictions and online education. Many international students may opt for local universities, instead of paying the high tuition of a Western university just to get an online education.

In a number of developed and developing countries, the state universities do not charge tuition for own citizens. Since the graduates of a university are the individual beneficiaries, it is logical to expect those individuals to shoulder the cost rather than the taxpayers. On the other hand, starting to charge tuition for university education is a very unpopular decision, even though it may be the most justified and logical choice. It is politically very difficult especially for a democratically elected government to change that policy. If there were a nonzero tuition

amount, that amount could be increased gradually over time without causing big political trouble. Nevertheless, the reduction of government budgets because of the COVID-19 crises may force such governments to allow universities to charge tuition.

Many universities also try to collect tuition income by offering programs for adults or executives in the form of continuing education. These programs are usually in the form of distance education or face-to-face education at off-hours, making them more convenient for working people. Since the recovery from the economic consequences of COVID-19 pandemic may take several years, many unemployed adults may want to invest in an adult education system during that time to increase their chances of finding a new job after the crisis.

The board of trustees of many universities in the USA saw the fund-raising goals as crucial for the future of the university. In this country, one of the most important duties of a (both public and private) university president is accepted to be fund-raising [18]. The success of an incumbent university president is measured by how much he or she raised through fund-raising campaigns.

In the 1980s, more than 60 major universities in the USA conducted fund-raising campaigns to raise more than $100 million each. Typically, about half of the campaign gifts are earmarked for the university's endowment and the rest are spent for short-term goals. Stanford University started its first major fund-raising campaign in 1987 with a goal of $1.1 billion. This was followed in the late 1980s and 1990s by Boston University, Columbia University, Cornell University, Harvard University, New York University, University of Michigan, University of Pennsylvania, and Yale University with goals exceeding a billion dollars each. Oxford University of the UK had to join the trend and to hire its first fund-raising director in 1988, not to be left behind by the competing universities in the USA.

One of the undesired consequences of COVID-19 pandemic crisis may be a reduction in gifts and donations to universities. It is unreasonable to expect that the gifts and donations will stay unchanged and development offices of universities will be as successful as before in achieving their campaign goals in the second decade of the twenty-first century.

Substantial reforms are taking place in higher education systems aimed at encouraging institutions to be more responsive to the needs of the economy. Government cutbacks caused most universities in UK, Australia, and the Netherlands to become more entrepreneurial.

An alternative source of income is industrial or commercial sponsorship of research in the university, particularly pre- and semicommercial applied research. The purpose of this funding model is to promote knowledge transfer from university into business with an entrepreneurial environment [19]. To increase this form of financing, some governments have funded universities directly to encourage university–business relations, for example, to start business liaison or technology transfer offices.

At the beginning of the twentieth century, there was a debate about whether universities should get patents of the ideas developed by their faculty as opposed to making the ideas freely available for others to use them. Bayh-Doyle Act of the USA enacted in 1980 allowed and encouraged universities to patent the discoveries made through research funded by the government. Although for many universities the income from royalty is below the costs incurred in getting and maintaining the patents, the prospect of "hitting the jackpot" motivates universities across the world to invest in this avenue. Past data show that only a few universities made substantial money from the royalty income. One such university, New York University, pulled in several hundred million dollars by the invention of a rheumatoid arthritis drug. Investigation of recent history shows that biomedical technologies and drug research are more advantageous in raising royalty income compared to other fields.

Swedish government opted for a government-led top-down approach discouraging academics at universities from actively participating in the commercialization of their ideas [20]. They invested in expensive research infrastructures, new government-funded research

institutes, and special programs providing direct support for research commercialization. Even though large sums of money were spent, this method was not successful in creating new jobs and science-based accomplishment stories, because it failed to motivate and incentivize individuals to be entrepreneurs [21].

Campus universities need many services for the student population living on the campus. Dormitories are usually run by the university and collect fees from students living on campus. Some campus universities run businesslike functions like food service, catering, and maintenance, directly within university system. The income from such sources may not be much; nevertheless, it adds to the budget of the university in a positive direction.

During the COVID-19 pandemic, many campus universities did not allow students to come to campus. As a result, any dormitory or rental income from third parties that those universities collected disappeared completely, putting the university budget under more strain.

In the knowledge economy of the twenty-first century, robots and artificial intelligence are replacing conventional jobs. Unemployment all over the world is a growing problem. As a possible solution to this problem, many governments are encouraging universities to take part in the formation of start-up companies using the ideas generated by their faculty, to generate more jobs with a higher added value. Innovations arising from university faculty members are expected to stimulate economic growth and skills development through spinout or start-up companies [22].

COVID-19 crisis may be an opportunity rather than a threat for the generation of new ideas. In the turmoil of the economic crisis, innovative start-up companies with fresh ideas may flourish quickly, grab the markets of established companies, and replace them for good.

There is a potential problem that the commercial activities of a university may overshadow the intellectual activities of the university. One inevitable result is that the salaries of faculty in business school, medical school, and some engineering fields are increased at the expense of those in other fields. There was also a fear that the commercialization of universities may undermine the basic research and concentrate more on applied research. Fortunately, this did not happen in the past 20 years.

Search for tuition income may force universities to reduce the acceptance threshold for new students, which may in turn cause the quality and rigor of the teaching across the university to suffer.

Getting corporate sponsors for university research may also lead to secrecy or delayed publication of research results. It is reasonable that the publication of an invention or discovery has to be postponed a few months for the purpose of preparing a patent application [23].

The corporate sponsorship of research may also cause a conflict of interest or unethical behavior, especially in life sciences.

This book aims to provide the experiences and visions of several university leaders in the search for income sources for their universities. In ten chapters, they provide valuable information and guidance for university leaders and administrators all over the world.

This is especially timely when the university budgets are under stress due to COVID-19 pandemic and its dire financial and economic consequences. The authors present their visions on the funding of higher education institutes in the presence of such an unprecedented crisis.

In Chap. 1, Al-Youbi and Zahed show “King Abdulaziz University Approach to Develop Financial Resources.” Their chapter is based on the practical approach of KAU.

Hentschke presents in Chap. 2 “Monetizing and Growing the Assets of Higher Education Institutions (HEIs).” He discusses the most monetization tactics used in HEIs. These tactics are carried out through familiar sounding HEI offices (e.g., advancement) or initiatives (e.g., strategic plans).

Hamdullahpur, in Chap. 3, talks about “Making Choices: Matching Sustainable Funding with Strategic Priorities in Higher Education.” This is done through an analysis of the existing funding and budgeting models open to institutions, the strengths and weaknesses of each

model, how to align funding to cross-institutionally supported strategic objectives, and how to leverage an institution's key differentiators to develop external funding sources for diversification.

Chapter 4 by Mathieson is dedicated to "The Constant Search for New Sustainable Funding Sources for Public Universities." This chapter shows that alternative sources of government funding are needed and there are marked international variations in funding models for public universities. These alternative sources of income include philanthropy, links with industry/business, commercialization of research, and digital technologies.

In his turn, Ritzen in Chap. 5 "Public Universities, in Search of Enhanced Funding" shows that research and quality education are important factors for economic growth. University funding is important to provide education of high-quality education and research. Universities could increase their funding through "knowledge transfer": research contracts with outside partners and start-ups by students or staff from the university or patents.

In Chap. 6, Tierney discusses "The Importance of Fundraising and Endowments: The Role of Private Philanthropy." The author points out that private philanthropy is important at any time, but even more so when a crisis arises such as a pandemic. Endowments enable the university to generate revenue for important institutional activities such as establishing endowed chairs and centers, building research centers and the like, and creating additional investment opportunities. This chapter also shows the different reasons donors give to a university.

Tsui in Chap. 7 which is entitled "Share the Mission: Philanthropy and Engagement for Universities" emphasizes that educational philanthropy ensures a university's sustainability, fosters growth and discovery, and enables a university to help shape its community's social, economic, and technological development. The chapter clarifies that the fund-raising methodology involves branding, community outreach, networking, and strategic messaging which also makes fund-raising entrepreneurial. The author believes that a university should not seek only transformative gifts; in any visionary advancement plan, it must value the participation rate as much as the donation amounts.

Chapter 8 "Technology Transfer and Commercialization as a Source for New Revenue Generation for Higher Education Institutions and for Local Economies" is by Katzman and Azziz. They describe how technology transfer represents an opportunity for universities to secure a return on their academic investment which can then be cycled back into the institution for its further growth and development. The authors also clarify the pillars or fundamental engines that structured the technology transfer.

"An Alternative Model of University Endowment" is the title of Chap. 9 by Atalar. The author proposes an alternative model of endowment applicable in developing countries and explains that a university with campus is basically a small city, where the full control is in the hands of the university administration. Besides that, he explains that the presence of endowment fund will support the university in difficult times when other revenue sources are in trouble and the conventional income of the university is reduced.

In Chap. 10, the editors present "Outcome Summary of the International Experience in Developing the Financial Resources of Universities." The chapter summarizes the different strategies and methods to secure funding for higher education institutes as given through the visions of the academic leaders who authored the previous chapters in the search of more funding for their universities, especially in the aftermath of the COVID-19 crisis.

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About the Editors

Prof. Abdulrahman Obaid Al-Youbi is President of King Abdulaziz University (KAU) and President of the International Advisory Board (IAB) of KAU since 2016. He is Professor of chemistry at KAU since 2000. He earned a Ph.D. in physical chemistry from Essex University, UK, in 1986. Throughout his career, he is an active researcher in his specialization, a passionate teacher, an academic, and an administrator. He participated in many research projects and published more than 150 papers in ranked scientific journals. He also supervised many graduate students. He has held a variety of academic administrative positions at KAU such as: In (2015–2016), he was Acting President of both KAU and Jeddah University, Vice President for Academic Affairs (2009–2016), Vice President (2002–2009), Dean of the Faculty of Science (1999–2002), Vice-Dean of the Faculty of Science (1992–1999), and Chairman of the Chemistry Department. As President of KAU, he has devoted his position to strengthen excellence in academics and research with a dedication to develop an innovative culture. Through his President leadership, KAU has remained the top university, not only in Kingdom of Saudi Arabia, but also in the Arab World. His current focus is on expanding KAU's leadership by continuing to build on its long-standing strengths in education, research, entrepreneurship, and community service to the people of Kingdom of Saudi Arabia. He, President, participated in more than eighty committees, boards, teams and working groups at KAU as well as at Saudi Ministry of Education level. In particular, he has participated in the committees that have established new universities in the Kingdom (Taibah University, Jazan University, Tabuk University, and the Northern Border University). He has also attended many scientific conferences in the Kingdom and abroad. In addition, he is a member in the first formation of the University Affairs Council in the Kingdom of Saudi Arabia.

Prof. Adnan Hamza Mohammad Zahed is Consultant to the President of King Abdulaziz University (KAU) since 2016 and Secretary-General of the International Advisory Board (IAB) of KAU since 2010. He was the KAU Vice President for Graduate Studies and Scientific Research (2009–2016) and worked before that as Dean of Graduate Studies (2007–2009), and before that, he was Vice-Dean of the Faculty of Engineering (1997–2007). He is Full Professor in the Chemical Engineering Department at KAU since 1996. He also worked in the industry sector as General Supervisor (Consultant) in Saudi Badrah Company (Jeddah, KSA, 1995–1996), Deputy General Manager at Savola Food Company in Jeddah (1993–1995), and Deputy CEO of Tasali Company (Jeddah). He holds a B.Sc. in chemical engineering from King Fahd University of Petroleum and Minerals, KSA (1976), and a M.S (1979) and Ph.D. in chemical engineering from the University of California (Davis), USA (1982). He published eleven books, most of them in higher education, and more than 60 papers in international conferences and refereed journals, in addition to one patent and more than 75 technical reports written for many bodies of Saudi community. He also participated as Co-author of several university guides such as the Graduate Studies Guide, Applicable Theses Guide, Thesis Writing Guide, Graduate Studies Procedure Guide, Faculty of Engineering

Prospectus, and Annual Report of Research Activities in Faculty of Engineering. He was included in Marquis (Who's Who in the World 2006). He participated in four academic accreditation meetings in USA and in more than 25 local and international conferences, symposia, and forums. He visited a number of distinguished American, European, and Asian universities as a delegate of the Saudi Ministry of Education.

Prof. Abdullah Atalar received his B.S. degree from Middle East Technical University, Ankara, Turkey, in 1974, and his M.S. and Ph.D. degrees from Stanford University, Stanford, CA, in 1976 and 1978, respectively, all in electrical engineering. From 1978 to 1980, he was first Postdoctoral Fellow and later Engineering Research Associate at Stanford University. For about one year, he worked in Hewlett Packard Labs, Palo Alto. From 1980 to 1986, he was on the faculty of the Middle East Technical University as Assistant Professor. In 1983, on leave from the university, he worked for Ernst Leitz Wetzlar (now Leica) in Wetzlar, Germany. In 1986, he joined the Bilkent University as Chairman of the Electrical and Electronics Engineering Department and served in the founding of the department where he is currently Professor. In 1995, he was Visiting Professor at Stanford University. From 1996 to 2010, he was Provost of Bilkent University. He is presently Rector of the same university. Between 2004 and 2011, he served as Member of the Science Board of TUBITAK.

His current research interests include microwave electronics and micromachined sensors. He was awarded the Science Award of the Turkish Scientific Research Council (TUBITAK) in 1994. He has been Member of the Turkish Academy of Sciences since 1997 and Fellow of IEEE since 2007. He is Member of the KAU IAB.

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King Abdulaziz University Approach to Develop Financial Resources

1

Abdulrahman Obaid Al-Youbi
and Adnan Hamza Mohammad Zahed

1 Introduction

Saudi universities have benefited a lot from the budgets provided by the government to universities in order to encourage education and spread it among the various groups of Saudi society. While many universities around the world depend, as part of their budget, on the university fees collected from students, in addition to the support provided by their governments, the public universities in Saudi Arabia, since their establishment, provide education to their students free. Furthermore, they give their students financial grants covering their personal expenses, based on the Kingdom of Saudi Arabia's policy of building a welfare state for all members of society. In addition to supporting university education, the generous budget received by Saudi universities also supports graduate studies, scientific research, laboratory equipment, infrastructure preparation, and the construction of modern buildings through dedicated budgets. The Saudi education policies have served their purpose and paid off, as several Saudi universities have been qualified to occupy distinguished ranks in the international rankings of world universities, gaining popularity with each occupying a prominent position among their counterparts around the world [1–3].

Beginning of planning for a promising future, the Saudi Vision 2030 is built around three main themes and based on three pillars, namely: (a vibrant society, a thriving economy and an ambitious nation); these pillars are complementary and consistent with each other in order to achieve the goals of the Vision and maximize the use of its foundations. In the pillar of (a thriving economy), the Saudi Vision focuses, among others, on diversifying the economy, allocating government services, achieving balance in the budget, diversifying and maximizing revenue sources, and managing the public budget in a rational manner, while committing to raising the efficiency of public expenditure, achieving efficiency in the use of resources, reducing waste and increasing non-oil government revenues [4].

Based on the Saudi Vision, various parties developed their visions, and the new Saudi universities by-law has been issued at the beginning of 2020. This by-law allowed universities to establish their own endowments, it also allowed the universities and their endowments to establish companies, participate in their establishment or join them as a partner or shareholder. The new Saudi universities by-law also specified the university's revenues from the state subsidy; the cost of the study programs, diplomas, courses, and services provided; donations, gifts, grants, and wills, provided that their terms and purposes are consistent with the university's mission; the return on its properties; the investment of university facilities; its own revenues and endowments; and the financial resources approved by the university's board of trustees, which do not conflict with the university's goals, vision, and mission. The new Saudi universities by-law also allows the university to charge tuition fees for graduate studies programs; diploma and educational and training courses programs; tuition fees from non-Saudi students; as well as sums of money in exchange for scientific research or consulting services for internal or external parties; and sums of money in exchange for contracting with other parties in both public and private sectors to provide the staff members that these parties need or to undertake studies, services and consultations [5].

As is well known, universities play a critical role in the life of nations at different stages of their economic and social development, as their contributions extended to include all aspects of scientific and technical life. This made interacting with society to discuss its needs and provide its requirements one of the most important duties of universities today. There is no doubt that one of the most important requirements of

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Fig. 1 KAU's self resources

society is to reach high ranks in scientific research, to gain access to technology innovation, work to localize it, and increase social awareness. This can only be achieved through increasing funding to spend on education and scientific research. In the spirit of providing the necessary funding for conducting scientific research and revitalizing scientific research in basic and applied sciences. Saudi universities, through the new by-law, have achieved a large degree of independence allowing them to work on diversifying their sources of income. On these bases, King Abdulaziz University, throughout its career, especially in the first two decades of the twenty-first century, has taken many steps that increase the sources of income and develop its financial resources. In this (first) chapter, King Abdulaziz University's approach to developing its financial resources is presented.

2 The Current Status of KAU, Its Financial Resources, and Its Need for Other Resources

The number of students at KAU in the academic year of 2019/2020 is (79,643) students, who all receive scholarships, and it employs about (19,000) male and female employees of both sexes, including (7569) faculty members and their assistants from the academic staff.

KAU receives an annual budget of about (1.3) billion dollars from the government, while the university's own income sources amount to (0.21) billion dollars, which is equivalent to 16% of the university's total budget. In addition to government funding, there are some resources that the university has worked on to increase its budget, depending on its own potential. Figure 1 shows the resources of King Abdulaziz University's self resources.

3 Investment Management in KAU

Investment units were established at KAU in the University Vice Presidency for Projects, Deanship of Student Affairs, and Contracts and Procurement Management at various times as needed. The Investment Management was then established in 2017 to include all investment units, and to organize the investment of real estate and university facilities. The Investment Management aims at studying, increasing and developing investment of real estate and university facilities in a way that contributes to increasing revenues and achieving financial self resources from the university's properties, while raising the efficiency and improving the level of performance of the university's investment projects; in addition to finding investment opportunities for university facilities for the private sector and contributing to improving the level of services provided by the university to the community [6].

4 General Administration for Self Resources

Based on the goals of the university and its scientific mission in disseminating culture, knowledge, as well as scientific, cultural and technical awareness among various sectors of society through the university's academic departments, which abound with distinguished faculty members in various disciplines and advanced scientific capabilities, the university provided paid services to all societal groups through the Deanship of Community Services and Continuing Education and the Deanship of Research and Consulting Institute. In light of the increasing growth of paid educational programs and research and consulting services provided by the university to the community, the university established an independent administration called (the General Administration for Self-finance) in 2003, to manage the funding that the university receives other than its allocations in the state budget, Such as grants and wills, the proceeds of investing in university properties, and the revenues resulting from providing educational services, research projects and studies to other parties. In 2016, the name (General Administration for Self-finance) has been changed to (General Administration for Self Resources) and it is linked to the university vice president for business and knowledge creativity. It also supervises the revenues and expenses of self-funded programs independently of the university's financial management [7]. The goals of this administration include developing cooperation and interaction frameworks between KAU and the public and private sectors in the Kingdom in accordance with the general frameworks of the policy, vision, mission and goals of KAU, through the university's general strategic plan. It also seeks to increase the university self resources using the available means, in order to finance university projects and coordinate in this respect with the relevant parties with regard to organizing financial expenses for all self-resource programs; in addition to making the most of self-revenue in the development of the educational and research process in line with the university's strategic plan.

5 The Deanship of Community Services and Continuing Education

The Deanship of Community Service & Continuing Education was established at King Abdulaziz University [8] to be the link between the community and the university to introduce the community to the many capabilities of the university so that the surrounding community can benefit from them. The Deanship offers several programs to the community on a commercial investment basis at competitive prices. These include specialized diploma programs and targeted training courses. It also provides free services to the community through educational lectures and other community activities, the most important of which is hosting the famous TEDx program [9, 10] in the university, which is organized by the Deanship to provide an inspiring opportunity for people to expand their horizons and achieve their hopes, by building a culture of creativity and cross-pollination of new and creative ideas worth spreading.

6 Research and Consulting Institute (RACI)

The Research and Consulting Institute (RACI) was established in 1997 to be a window for KAU in dealing with the public and private sectors with regard to providing specialized consultations and conducting studies, in addition to other scientific services, in exchange for a financial return for the university [11]. The institute's vision states that the first choice must be at the Gulf level in carrying out research projects and consulting studies with high quality. It aims at working as an advisory expertise house, publicizing the research and advisory capabilities of the university, assisting the service and industrial sectors in developing their performance through studies and consultations, harnessing the potential of KAU to serve the community, enhancing cooperation between KSU and public and private sectors institutions in the field of consulting and research, and benefiting from the public and private sectors in funding research and scientific studies, and providing new sources of income for the university. The Research and Consulting Institute is distinguished by the presence of a broad base of academic staff at KAU, including more than 7500 doctoral experts, with qualifications from the finest American, European and international universities, and specialized in more than 200 scientific disciplines. This is in addition to research assistants, specialized technicians and graduate students. The institute relies, in providing its services, on the infrastructure of KAU with its various 28 colleges, along with 5 institutes, its scientific departments, its specialized 28 research centers, its laboratories that are equipped with modern scientific devices, and its libraries that are linked to global information databases and its information systems that depend on an advanced IT base. The Institute's most important fields of operation include: Expertise Houses, Scientific Chairs, Central Laboratories, Contractual Research, consulting, educational and academic supervision and training. Figure 2 shows the types of services provided by the Research and Consulting Institute, followed by an overview of each of these services.

6.1 Scientific Chairs

The scientific chair is a research or academic program at KAU, aimed at enriching human knowledge, developing

Fig. 2 The types of services provided by the Research and Consulting Institute

thought, and serving local development issues. It is funded by a permanent or temporary cash grant donated by an individual, institution, company, or legal person. One of the specialized professors known for their scientific excellence, leading experience and international reputation is appointed as its supervisor. A team of qualified researchers with competence and experience in the field of the program works within it, and KAU scientific chairs aim at: disseminating the culture of excellence, creativity, innovation and development; supporting KAU and the Kingdom's position in the map of scientific excellence, research, development and knowledge enrichment; transferring and localizing technology, stimulating it with regards to the support of industry, production and services and raising its efficiency; developing partnership ways between KAU and community institutions; increasing the use of human competencies and resources, facilities and equipment in KAU to serve the community; producing outstanding scientific research; supporting graduate studies programs; and obtaining financial support for spending on scientific research. King Abdulaziz University has started establishing of scientific chairs since 2004, and the number has now reached 36 internal and external scientific chairs, which are still ongoing, in addition to the scientific chairs that have been funded for a few years.

6.2 Central Laboratories

Central Laboratories at King Abdulaziz University do not belong to a specific college, but rather follow the Knowledge and Business Alliance, and provide their services on an investment basis at competitive prices with high quality to be one of the contributors to KAU financial resources. One of the objectives of the central laboratories is to provide scientific and practical solutions for community institutions in the fields of calibration, analysis and tests, and to interpret them according to the latest international professional specifications, as they invest in the distinguished laboratories in KAU, as well as the experiences of its staff members and technicians, while providing the appropriate environment and administrative, scientific, legal and organizational requirements to activate these potentials. The central laboratories place among their priorities the achievement of excellence and leadership in the fields of calibration laboratory tests and analysis, taking advantage of the laboratories, modern equipment and human expertise they possess. KAU provides these services to the public and private sectors, as the central laboratories cover engineering, environmental, chemical, physical, food and medical fields.

6.3 Contractual Researches

The Research and Consulting Institute provides scientific and applied research as to the public and private sectors on a contractual investment basis. Through the human and technical capabilities of KAU, the Institute contributes to finding innovative solutions to various problems of industry and other sectors. Through this service, the Institute contributed to providing scientific solutions and applied studies in various medical, engineering, educational, technical, environmental, social, economic, humanitarian, legal, and urban planning areas…

6.4 Consultations

The Research and Consulting Institute provides the consulting expertise of the staff Members at King Abdulaziz

University to many government and private sectors, on a contractual investment basis. Hundreds of consultations have been provided to various sectors, which reflects the community's eagerness to make use of KAU consulting services due to its distinct benefit represented in the expertise of university faculty. The procedures for requesting consultations have been facilitated in order to speed up the work with flexible and easy procedures.

6.5 Educational, Academic and Training Supervision

There is an increasing growth in the private education sector in the Kingdom, as emerging schools, institutes, colleges, and universities are established in various regions. All of these need a neutral academic body to supervise their curricula in order to increase community confidence in them. So they ask universities to supervise the curricula. Here, the Research and Consulting Institute acts as a mediator between the educational bodies requesting the service and the relevant college in KAU to provide the required educational and academic services such as using KAU curricula, supervising teaching and educational processes, and curricula evaluation and arbitration services. These services also include field visits to inspect equipment and laboratories, and supervising exams.

6.6 Expertise Houses

The Expertise House is a specialized institution, within KAU, established by a member or group of faculty with close or complementary disciplines, to provide consulting and research services and studies to the public and private sectors in various scientific, practical or theoretical fields through studies, consultations, and implementation of contractual projects, to give the faculty an opportunity to provide services to the community for financial returns, and to invest in and develop the capabilities and potential of various university resources. This in turn enhances the university's role in community service, and allows the different sectors of society to benefit from the expertise of the university faculty. The Research and Consulting Institute provides the administrative, scientific, legal, and organizational requirements necessary for faculty to establish expertise houses, in addition to providing the appropriate headquarters to work from, and in exchange, the university obtains a percentage of the returns on contracts between the expertise houses and parties outside the university.

7 KAU Research Endowment Fund

King Abdulaziz University Research Endowment Fund is a modern Islamic economic and charitable system that invests in various assets and directs its returns towards supporting research projects and financing scientific and applied studies and special programs that serve the community and address its economic, scientific, social, health and environmental problems according to the determined research priorities [11].

The endowment generally has a prominent role in the history of Islamic civilization, as the scientific renaissance depended on it. It provided scientists and students of science with a stable climate, and a stable and sustainable resource. This gave Muslim scholars a kind of freedom of research, so they devoted themselves to scientific production, which resulted in this rich heritage of knowledge in various areas.

Providing a fundamental basis for scientific research, today, needs huge allocations, whether to equip laboratories with the latest scientific devices and equipment, or to create a specialized library that relies on regular communication technologies with specialized databases in various scientific fields.

KAU Research Endowment Fund was established in 2005, and it started implementing one of its main tasks in the field of scientific research since 2010.

The objectives of Research Endowment Fund are summarized in several items: Reviving the Islamic Endowment tradition, supporting the applied scientific research needed by the Kingdom, supporting scientific innovations that benefit the country, supporting training, education and cultivation programs, supporting initiatives and activities aimed at developing society, and contributing to the development of the endowment industry in the Kingdom.

The University Endowment Fund has so far adopted a number of initiatives, such as: (Initiative for Supporting Applied Scientific Research), (Initiative of the “Creators” Center for Studies and Research), (Initiative for Sponsoring Scientific Conferences), (Scholarships Initiative), (The Genius Scholars Initiative), (“We Search” Initiative for Undergraduate Students), (Initiative of Graduate Students), (“Horizons” Initiative for Student Clubs), (The Endowment “Research Centers Complex” Initiative), as shown in Fig. 3.

There are several ways to support KAU Research Endowment Fund, such as in-kind donations (land, real estate, property… etc.), cash donations, and monthly deductions from university employees and students provided by donors through permanent orders from their bank accounts. It can also be supported in other ways such as contributing with science, experience and time, free of charge. Figure 4 shows the ways to support the University Research Endowment Fund.

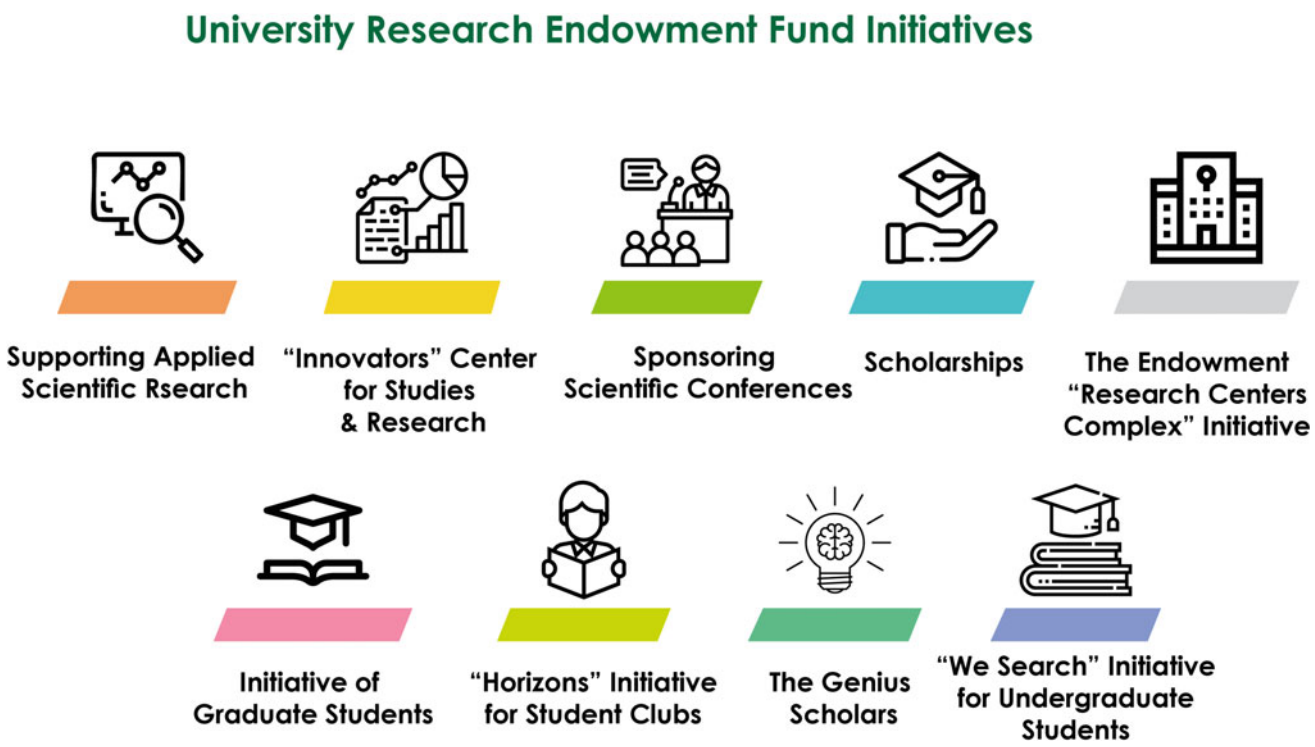

Fig. 3 KAU Research Endowment Fund Initiatives

Fig. 4 Ways to support the KAU Research Endowment Fund

8 Wadi Jeddah Company

Wadi Jeddah is a closed joint stock company wholly owned by King Abdulaziz University. It was established in 2010, and it is based at the university [11]. It is one of the huge initiatives to raise the university research capabilities and participate in the supervision and investment in the knowledge sectors. Its capital amounts to 27 million US dollars, and it has the right to use a land of 510 thousand square meters for the company's investment purposes. The company seeks to make use of promising investment opportunities in health sectors, communications technologies, energy and environment.

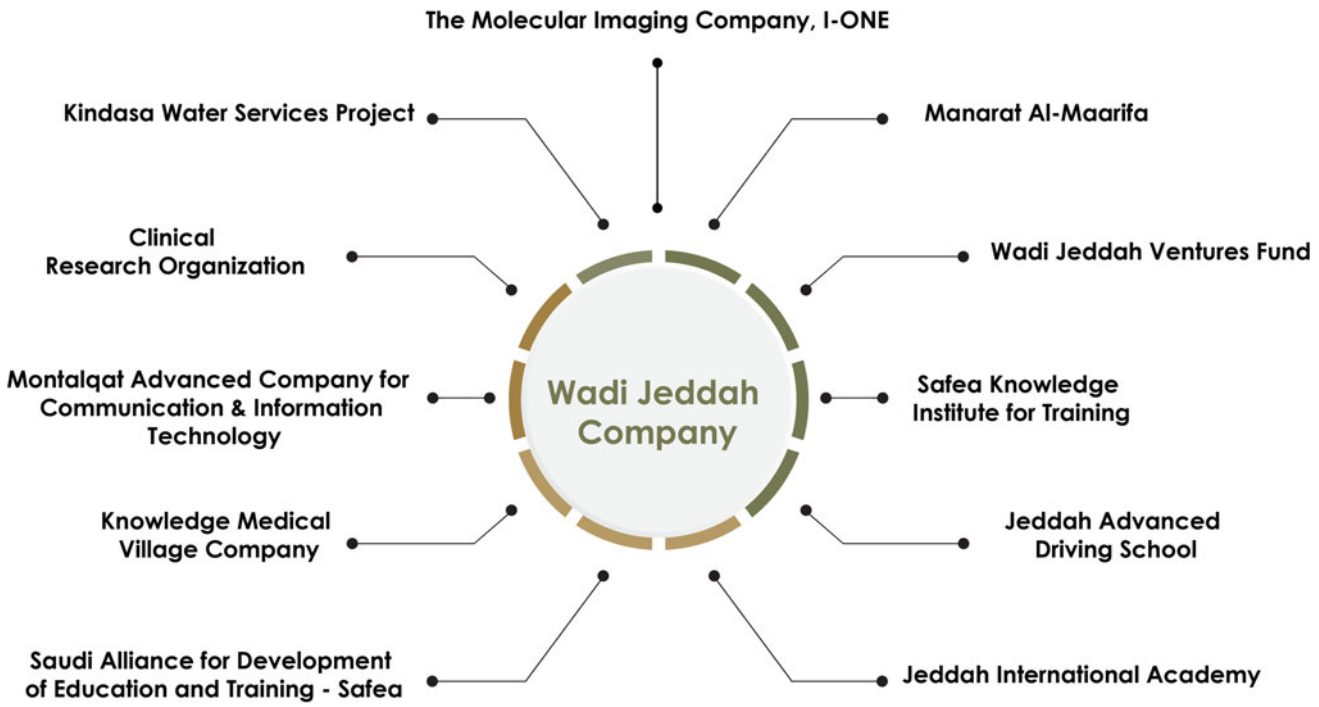

Fig. 5 The companies and investment projects affiliated to Wadi Jeddah Company

The company aims at contributing effectively to the development of a knowledge economy, through partnerships between educational and research institutions and the business and investment community on investment and commercial foundations, by transferring ideas and knowledge to the field of application and transforming them into targeted projects that serve the Kingdom's economy.

The company also seeks to invest in technology transfer and localization, establish business incubators and invest in them, invest patents, intellectual rights, and industrial models; in addition to providing investment opportunities in scientific research and development for faculty, and providing consultations in the field of education development, scientific research and technology industry. The company also seeks to invest in developing allocated lands and available university lands to provide an attractive environment, attract local and foreign investments to participate in supporting the company's goals, and cooperate with bodies, companies and institutions that practice a similar or complementary activity.

KAU has launched four major companies for Wadi Jeddah Company, the first one is (Healthcare sector company, JEDMED), which includes all projects related to healthcare, medical devices, and medical research. The second company is (Energy and environment sector company, JEDPOWER) which covers power generation, agriculture and electricity projects. The third company is (Information technology and communications sector company, JEDTEK), which includes satellite technology and the Internet. The fourth company is (General Investment Company, JEDCAP), which covers all projects that are not included in the tasks of the previous companies, such as the company's land investment projects. Thus, Wadi Jeddah Company is an important contributor to bringing funds to the university in order to carry out its assigned tasks to the fullest.

There are a number of companies and investment projects that are currently affiliated to Wadi Jeddah Company, as shown in Fig. 5.

8.1 Wadi Jeddah Ventures Fund

Wadi Jeddah Ventures Fund is a fund for Audacious Investment [12]. It is concerned with investment in startup companies in the establishment phase only (Seed Fund), which is an early phase characterized by a high risk of up to 85%. The Fund aims to invest in companies which use creative and technical work models only, and seeks to achieve two goals: The first is to support starting technical and knowledge industries companies, and the second is to achieve high revenues for the university against high risk. The Fund recently contracted (Tallah), a foreign technology company working in the field of women's cosmetics, and licensed by the General Investment Authority.

8.2 Manarat Al-Maarifa

The Idea of "Manarat Al-Maarifa" (MARED) Real Estate Development project [12] arose to invest a portion of the lands of Wadi Jeddah Company (within the university Campus) in line with King Abdulaziz University's vision to be a beacon of knowledge, with integrated structure, a pioneer in development, and an attractive environment to companies and investors. The project consists of a group of buildings that have been completed with a total area of 149,887 square meters, in addition to another project, which is still under study, to build a mall with an area of 224,000 square meters. The project aims at providing a variety of modern smart buildings: medical clinics, engineering offices, hotel towers, administrative offices, and shops. It is expected that (Manarat Al-Maarifa) will become a real landmark and a start towards creating future visions aimed at transforming into a diversified, prosperous economy led by the private sector and a knowledge-based society, while preserving Islamic values and cultural heritage of the Kingdom.

8.3 Kindasa Water Services Project

The Kindasa Water Services project [12] consists of a water desalination plant in King Abdulaziz University branch in Rabigh on an area of 210,000 square meters, for the purpose of producing high-quality desalinated water, to provide the university with its water needs, then commercially investing the surplus water by supplying it to the industrial sector and residential complexes in the city of Rabigh. The project consists of a water desalination plant with all its annexes, including a desalinated water distribution station to meet the needs of the city of Rabigh, a water bottling plant, and a water tank with a capacity of 36,000 cubic meters. The project also includes a research center for water desalination, which contains a mini station with a production capacity of 3.50 m^3 per day for the purpose of study and research, supervised by the Center of Excellence in Water Research at the university. The entire project is intended to achieve an investment for the university through Wadi Jeddah Company, in accordance with the strategic plan of KAU, as it contributes to supporting water research, especially in choosing a high-quality technology in the production of desalinated water at low cost, which is the technology of the future.

8.4 The Molecular Imaging Company, I-ONE

The Molecular Imaging Company (I-ONE) [13] for the production of radioisotopes and molecular tomography, is one of Wadi Jeddah companies it was established in cooperation with General Electric, which is now one of the world's leading companies in medical care and providing the latest technologies related to investing in knowledge economy. The company works in cooperation with the Italian company ITEL, one of the leading companies in the field of manufacturing radioactive materials and managing modern medical facilities, to manage the radioisotope production division of the company, and to provide the expertise and efficiency necessary to achieve the company objectives. Its objectives include: producing radioisotopes and developing the production of modern radioactive materials using high technology, providing an appropriate environment for conducting new scientific research for the sake of knowledge and economic returns, and providing the global means and capabilities necessary to diagnose the largest number of patients with cancerous tumors. According to international manufacturing standards, the Molecular Imaging Company is unique in the western region in the Kingdom of Saudi Arabia, and produces radioisotopes using the cyclotron in the injection of patients. The company also works on meeting the growing needs of the diagnosis and early detection of cancerous tumors through positron emission tomography.

8.5 Montalqat Advanced Company for Communication and Information Technology

Montalqat Advanced Company for Communication & Information Technology, Mac Tec [14] is a company specialized in the field of information technology. Its most prominent works include the development and creation of an innovative product for managing media screens through a central network. The company is currently working on patenting the product to its name. This is in addition to its work on developing an enterprise resource planning system (ERP) targeting small and medium-sized enterprises. Work on designing and equipping an infrastructure specialized in investing in big data and analysing it, is currently underway, in addition to its technical supplies and projects supported by agreements with international companies in the field of information technology in order to be able to develop integral solutions that contribute to enhancing information technology industry with regard to local products, and providing a suitable environment for attracting investment in knowledge economy, in addition to reducing the leakage rate of revenues of information technology industry to foreign countries. The company's objectives include: establishing profit associative economy platforms, providing the best of developed technical services and solutions in an innovative work environment, presenting products in providing and developing technology solutions, keeping abreast of the

latest technological developments, innovations and labor market developments, and providing pioneering solutions for information technology services in the Kingdom of Saudi Arabia.

8.6 Clinical Research Organization (CRO)

Clinical Research Organization, CRO, [15] is a company registered with the Saudi Food and Drug Authority and the Ministry of Commerce. The company aspires to enter the world map in the field of clinical research by concluding partnerships with international establishments and educational institutes specialized in this field on one hand, and partnerships with international clinical research companies, on the other. The company submitted a request to the Food and Drug Authority to establish a Center for Bioequivalence Studies.

The company's objectives include: conducting clinical research and experiments, establishing the Saudi network for clinical research, and developing and implementing training programs in the field of clinical research and good clinical practice. The company also seeks to achieve the highest revenue on the investment based on its activities.

8.7 Knowledge Medical Village Company

The Knowledge Medical Village Company (JED MED) [15] is a complex consisting of a general hospital and a 4-star hotel, on KAU campus in Abhur, on a land area of 22 thousand square meters, through which the university seeks to present an integral model which provides distinguished services in line with most recent technological means in the fields of healthcare and hotels. It has a hospital, a medical rehabilitation center, a physiotherapy center, a health club, and a hotel of international specifications, located north of Jeddah in a distinguished area in Abhur bay overlooking the Red Sea, and when it is completed it will be a prominent landmark in the city of Jeddah. An agreement has been signed with an international hospital (InterHealth Canada) to operate the hospital, and another agreement has been signed with Rotana International Company to operate the hotel.

8.8 Saudi Alliance for Development of Education and Training—Safea

The Saudi Alliance for Development of Education and Training, Safea, [16] is an alliance specialized in the development of education and training. The idea of its establishment arose out of the Kingdom of Saudi Arabia's aiming towards knowledge investment and education development, and King Abdulaziz University's striving to contribute to improving education and training, given their importance in helping people improve their professional and academic conditions (Safea) has assumed the responsibility of ensuring good selection of the various programs offered to students, employees, and companies, through cooperation and partnership with expertise houses and international organizations in the field of education and training, in addition to transfering of the latest educational systems and best global practices, followed by their localization in accordance with the social and cultural values of the Kingdom, to promote and develop education and training and improve their outputs. The most prominent projects of (Safea) include: (Jeddah International Academy), (Jeddah Advanced Driving School), and (Safea Knowledge Institute for Training), which will be examined later.

8.9 Jeddah International Academy

Jeddah International Academy [17] is a group of private, for-profit schools located within the Al-Faisaliah campus at KAU, and licensed by the Ministry of Education, with departments for boys and girls. It provides general sub-university education, starting with kindergarten, according to the SABIS global curriculum while adhering to the tolerant Islamic perspective. The Academy relies on the use of modern technology that enhances every aspect of school life for students to enhance their academic success, starting with modern interactive blackboards used in the classroom and even electronic books, a computerized testing and learning center and a SABIS digital platform that allows students and parents to access details about their school performance. The SABIS curriculum enhances the ability and desire to learn throughout life, civic and moral values, as well as maintaining high levels of efficiency and quality in educational and pedagogical outcomes. KAU has established this academy to provide world-class advanced general sub-university education, which qualifies male and female students to join world class universities (whether Saudi or international).

KAU has constructed the building of the academy, and a contract has been signed with an international company to operate it as an international school, independently of KAU administration. Developing the love for innovation in the minds of male and female students is one of the most important things offered by the academy. It is committed to providing education with entertainment that enables students to achieve their highest educational goals through self-reliance. It also directs them to academic and personal development through a comprehensive and motivational program. The academy also explores the areas through which each student can demonstrate his/her talents, creativity and achieve his/her desired goals.

8.10 Jeddah Advanced Driving School

A memo of understanding has been signed between King Abdulaziz University and the General Traffic Department to establish a vehicle driving teaching school within the university premises in accordance with the international specifications and standards. Accordingly, the Saudi Alliance Company for Development of Education and Training "SAFEA" has started to establish the school that has been named (Jeddah Advanced Driving School) [18], in a joint investment project with KAU. This is one of the most promising projects due to the great demand for the services of this school. So far, three driving training fields have been established, and three other fields are under construction. The school offers: simulation driving training, field driving training, electronic driving training, and theoretical driving training. The school seeks to improve the efficiency of driving vehicles by applying the best international experiences and practices to enhance road safety and security.

8.11 SAFEA Knowledge Institute for Training

Safea Knowledge Institute for Training (SKI, SKInst) is an institute approved by Technical and Vocational Training Corporation in the Kingdom of Saudi Arabia and is affiliated to Saudi Alliance Company for Development of Education and Training "Safea", owned by Wadi Jeddah Company. The institute is characterized by a management that has long experience in the field of human resources development, in addition to the specialized academic expertise provided by the university to the institute [21].

9 Research Excellence Centers

In a qualitative step to develop the research structure and the outputs of scientific research at King Abdulaziz University, a number of Research Excellence Centers were established at the university. These are highly-equipped advanced research centers, each of which is specialized in an important research field, with the aim of developing technologies for each discipline according to international standards, and providing innovations to serve the industrial, commercial and service community institutions. These centers are characterized by interest in partnership with international research and industrial institutions in areas of mutual interest. These centers were funded upon their establishment by the Ministry of Education for a specific period. After that, they depend on their research to raise the funds necessary for spending on their research and researchers, and they are thus one of the important funding streams for KAU. Research Excellence Centers are now twenty eight, including four healthcare centers.

10 Center of Creativity and Entrepreneurship

With the increase of global and local interest in entrepreneurial activities and encouragement of ambitious ideas and entrepreneurial projects of young people that contribute to the growth of the knowledge economy, King Abdulaziz University has been keen on having a head start in this field, in completion of what it started in its three strategic plans that focus on quality, worldwide fame, sustainability, excellence in scientific research, community service and entrepreneurship. The Saudi Vision 2030 has had a great role in developing this strategic orientation of KAU, which resulted in a remarkable activity in the university affiliates that are interested in nurturing talent, creativity, and supporting ideas, activities, and entrepreneurial projects. This became evident through the establishment of the Center of Creativity and Entrepreneurship [19].

The Center provides an integral model that includes efforts to educate male and female university students about entrepreneurship, support and sponsorship of innovators, incubation of projects that hold a scientific and economic value, and acceleration of the business of startups, through the two arms of the Center, namely, business incubators, and business accelerators, as shown in Fig. 6. The following is an overview of each of them:

10.1 Business Incubators

Business Incubators are the supportive environment that stimulates ideas and projects, and through them, the appropriate factors for creativity, innovation and transforming entrepreneurial ideas into successful investment projects that build the knowledge economy in the Kingdom are created. King Abdulaziz University has established business incubators [20] to embrace creative ideas of an investment nature for KAU students and graduates of the university to help them transform their creative ideas into real job opportunities and investment projects, with the aim of forming a generation of entrepreneurs who are able to create job opportunities for others, providing an ideal environment for developing creative projects, and establishing successful institutions that have the ability to survive and continue on their own. KAU provides business incubators with technical and administrative consultations to reach suitable business models, in addition to training those who have creative ideas on product design and target market study, while providing equipped

Fig. 6 Units of the Center of Creativity and Entrepreneurship

headquarters for incubated projects, and assisting in building relationships with businessmen and potential clients.

10.2 Business Accelerators

Business Accelerators at King Abdulaziz University [21] provide assistance to the university student and graduate entrepreneurs, and to other people who have mature ideas and ambitious projects, and want to transform those ideas and projects into products and companies that can efficiently enter and compete in commercial markets. The Business Accelerators program aims at providing the entrepreneurs participating in it with the knowledge, skills and experiences that help them to establish and operate their projects and companies, providing necessary training, sponsorship, supervision, and support to entrepreneurs at the hands of academically and practically distinguished local and international academics, coaches and experts in the field of entrepreneurship, in addition to spreading the culture of entrepreneurship within the university community and outside it. The accelerator headquarters includes offices for entrepreneurs, and is equipped with modern means of communication and technology, a lab for computer, its programs and technologies, a hall for training and workshops, a theater for lectures, public meetings and shows, accommodating about 130 people, in addition to the availability of wired and wireless internet service, administrative and operational offices, and other facilities and services.

11 Knowledge Economy and Technology Transfer Center

King Abdulaziz University is working on directing scientific research to serve the societal needs in various industrial, commercial, educational, economic, environmental and engineering fields in a bid to transfer knowledge and scientific research at KAU to an economic value that contributes to supporting the local economy in policies as well as supporting the university's self resources in the long run. Hence, a need emerged to establish a Knowledge Economy and Technology Transfer Center at KAU to work on communication between the private sector and the university in order to benefit from the outputs of scientific research and patents, with the aim of supporting the transformation of knowledge into an economic value which serves the domestic product, creating new jobs together with enhancing the university's self resources.

The work of Knowledge Economy and Technology Transfer Center [22] is based on the Saudi Vision 2030, the Ministry of Education's Vision, and King Abdulaziz University vision to raise the contribution of small and medium-sized enterprises to the domestic product, promote and support the culture of innovation and knowledge economy, as well as transfer and localize technology. The work of the Center is in line with the strategic objectives of the Ministry of Education and KAU, namely, diversifying the sources of funding for education and partnerships, investing in it, and strengthening local and international partnerships.

The objectives of the Center are: Transferring the university's scientific research culture to the development trend which serves the societal needs on one hand and acquaints the researchers with manufacturing requirements on the other hand; Turning ideas into economically valuable commercial products; Supporting the talent, creativity and innovation of university researchers; investing the university's scientific research outputs to diversify funding programs and partnerships; Improving ways of communication between the university's scientific research sector and the public and private sectors as well as directing scientific research within the university to serve their needs; Turning ideas and research into products, programs and services that are marketed to the domestic and international market; Forming partnerships to support startups emerging from the university; Spreading the culture of diligence and persistence in order to achieve innovations and patents; Supporting the creative orientation in the society and linking it to the university; Protecting and registering patents locally and internationally; Protecting intellectual property and trademark rights; Marketing patents locally and internationally; Conducting studies of ideas that can be invested in and turned into investment projects; Evaluating ideas in terms of expected investment risks and returns.

12 Technology Transfer by Marketing the University Research Outputs and Patents

The Intellectual Property Investment Administration [23] was established to make use of the scientific research outputs: regarding documentation, development and investment, and for King Abdulaziz University to be a pioneer in the number of registered intellectual property and the number of investment projects resulting from the rights of such certified property. King Abdulaziz University has a special unit designed to register patents resulting from the research of faculty and all those working at KAU, including students, with international bodies. In this regard, KAU has spared no effort to help researchers register patents, support them in everything related to this goal, and to market these patents. To this effect, KAU bears all costs of the Law Office and the fees related to patent registration whether in USA, Europe or Japan. Moreover, the university has allocated an award to each inventor upon completion of the patent registration. After obtaining the patent, the inventor(s) is (one) given financial rewards of up to $8,000 for patents registered in USA, for example, in order to urge researchers to produce patents so that the university can then invest them to increase its income from scientific research.

13 Future Projects

The third strategic plan of King Abdulaziz University, called (TAZIZ) "Enhancement", has a number of objectives which the university pursues in order to diversify its sources of income. For the time being, we will just mention some projects that are still under study: projects of increasing investment returns; activating partnerships and opening investment prospects with big companies; self-operating some university sectors in a commercial investment manner; establishing "Naqaha" Center for advanced health care and health tourism; privatizing some of KAU sectors (e.g. service and research sectors) and making them available for investment for everyone; establishing private training institutes that provide services commercially for everyone; activating on-the-job courses that can be offered to both public and private sectors; expanding online training programs; providing paid diplomas related to employment and that meet the labor market's needs; marketing the expertise and capabilities of the university, its laboratories and research centers; investing the university property (theatres, sports buildings, lands, etc.); rationalizing expenditures and reducing costs; restructuring and re-engineering administrative and financial procedures to achieve idealism; establishing companies for industries concerned with technology transfer and localization; and last but not least: supporting innovation and encouraging patenting (by giving double weight to the patent on publishing the scientific paper in case of promotion application for academics), then investing these patents by converting them into an investment product.

14 Post-Coronavirus Pandemic University Funding

Coronavirus disease (COVID-19) is an infectious disease caused by a newly discovered virus from the strain of coronaviruses and had broken out in Wuhan, China in December 2019. It was classified by WHO on March 11, 2020 as a "global pandemic", for the virus can spread directly among people, its infection rate is high and it has spread in most countries of the world. In light of the way and speed of the novel coronavirus outbreak, the governments of countries around the world have taken precautionary measures to reduce infection among their citizens and residents. As a result, the global economy has entered a state of severe recession together with a sudden and severe downturn, which will lead to a deficit in the general budgets of all countries, including the Kingdom.

Therefore, it has become necessary to evaluate and to study the effects of the coronavirus (COVID-19) spread on KAU

funding at this stage. Coronavirus pandemic has negatively affected the economy, as indicated by economists from different countries around the world. The Kingdom has spared no effort to control this virus, provide health services and civil protection systems for people, and protect the economy from further damage. Given the impact of this pandemic on economic growth, the Kingdom is preparing to use the appropriate tools to achieve suitable growth and protection from further negative risks, within the general framework that provides flexibility to deal with unusual events, such as the coronavirus pandemic, so that additional expenditure is associated with the pandemic. Things are, now, being re-evaluated to determine some financial policies that can be taken to maintain the well-being of citizens and mitigate the negative effects of the coronavirus epidemic. KAU is studying mechanisms to address the economic repercussions related to coronavirus, taking into account special warnings about the economic impact of the pandemic on the Kingdom, including the need to support the health sector and provide financial support to the most affected entities.

All entities in the Kingdom, including King Abdulaziz University, are studying the economic effects of the coronavirus pandemic and the measures to be taken to mitigate the negative economic effects of the pandemic. The measures taken by the Kingdom include postponing the repayment of loans to small- and medium-sized companies for 6 months, while urging the banks to increase loans to the private sector, especially the most affected sectors, in the coming months. The Saudi Arabian Monetary Authority (SAMA) has reduced fees for ATM withdrawals and POS transactions to encourage individuals to switch to online transactions, instead of cash, as a measure that helps curb the spread of the virus caused by the circulation of bank notes.

For its part, King Abdulaziz University considers these measures to be essential, and help face the pressures, make liquidity available, and ease the economic pressure on consumption expenditure. KAU also believes that the impact of the curfew and the precautionary measures taken by health authorities in the Kingdom led to containing the virus and greatly reducing its spread.

Based on the foregoing, spending on education may fall short of the amount included in this year's budget, which means that King Abdulaziz University must find additional alternatives enabling it to address this decrease in the amount of government funding so that it can fulfil its educational and research mission as well as serve the community. KAU has benefited from the precautionary measures applied in the Kingdom, as it was able to shift to e-learning in record time thanks to its previous experience with e-learning and distance education, with an appropriate infrastructure in place, such as the Blackboard program (Bb) used in (Deanship of e-learning and Distance Education) to provide its educational programs for residents of various regions in the Kingdom. KAU was also able to go "Paperless" through electronic interaction among various departments and organize many awareness-raising events on coronavirus, using the applications available on the internet. Hence, once the pandemic is over, it is expected that KAU will draw on its experiences gained during this pandemic in carrying out a number of scientific and research activities that will enable it to attract additional funding to its budget, such as:

- Providing online courses and making use of the expertise and skills of faculty to offer various training courses benefiting many different members of society.
- Expanding online teaching of some academic programs, and providing educational programs required for the public and private sectors.
- Providing consultations and studies in many fields using the Internet (Online).
- Re-engineering the administrative and financial procedures so that they are all programmed to reduce expenses and achieve idealism.
- Urging faculty and students to build more mobile applications and provide e-solutions to many issues.

15 Conclusion

As the Executive Administration of King Abdulaziz University believes in the capabilities of its employees and infrastructure, KAU, through the implementation of its previous strategic plans, has found out that it can take many steps that are believed by many to be impossible. It has also realized that the path ahead is open to achieve its objective through the efforts of all its employees. Achieving much of what it was aiming for drives it to work even harder, as those who want a bright future have to act now. On the other hand, those who do not work hard, become outdated, as happened to many universities that flourished for a period of time then retreated. The government has, commendably, funded KAU for half a century, and it is high time for KAU to think of new sources of funding. Thus, it took the aforementioned actions in this chapter to seriously explore new income resources based on the participation of all those who benefit from higher education, including public and private sectors companies, institutions and organizations, as well as the local community.

It can be said that KAU has relied on main ideas in developing its financial resources, all of which are in line with what is expected of international universities in education, scientific research and community service. Such ideas include research endowment; establishing an investment arm for the university, i.e. Wadi Jeddah Company; in addition to providing consultations and research to the

public and private sectors through the Research and Consulting Institute; marketing its research products and inventions by transferring technology; encouraging creativity and entrepreneurship; making its research centers available to solve community problems; and providing its services to the community through diplomas in the specializations required in the labor market. This is in addition to the things it considers doing or expanding in the near future, as part of its current strategic plan called (TAZIZ) "Enhancement", as a result of coronavirus pandemic effects on the economies of countries, including the Kingdom, as part of using e-learning methods, or as part of shifting to a paperless university style in educational and administrative matters through electronic interaction among all university sectors.

Since the journey of a thousand miles begins with a single step, King Abdulaziz University has taken this step with the hope of ranking among international universities in the field of diversification of sources of funding and multiple areas of income.

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Monetizing and Growing the Assets of Higher Education Institutions

2

Guilbert C. Hentschke

"The use of money is all the advantage there is in having it."

Benjamin Franklin. United States
17 Jan 1706 // 17 Apr 1790

1 Introduction

Monetizing assets of higher education institutions (HEIs) includes virtually *all* that a HEI can work with to improve itself. This perspective represents a newer, broader (still slightly controversial) view of assets that includes people [1], 2. "Improving itself" takes many forms, but ultimately is reflected in money—from growing net income annually on the way to growing net assets over the years. (Assets reported on typical HEI financial balance sheets will always be referred to here as "net assets" or the difference between assets and liabilities; otherwise "assets" here means "everything" an HEI owns or has use of.) HEI work is reflected in money, or, more accurately, in money that has been *put to work*. To paraphrase Franklin, "How HEIs monetize their assets is all the advantage there is in having them."

To monetize assets is to raise resources, invest them in assets, and to transform them in such a way as to generate increased income and grow net assets. This "raising *and* investing" perspective of asset monetization encompasses all HEI work, including "advancement", "retrenchment", "faculty development", "course and program development", "student services", "technology transfer", "alumni relations", "pursuing alternative revenue sources", "budgeting", "debt and liquidity management", and "sustainability", as well as topics that are more abstract and less overtly financial, such as "brand enhancement", "talent management", "innovation" and "capacity building", "logistics", "governance", and "threat management".

All of these activities are at the heart of making each HEI "better", and all can be incorporated within the six broad categories that HEIs use to monetize their assets: (1) *wringing out* resources to invest; (2) *borrowing* resources to invest; (3) *trading* resources to invest; (4) *soliciting* resources to invest; (5) *selling* monetized assets; and (6) *creating* new assets.

Asset monetization presumes an intimate working relationship between the "academic" and "business" sides of each HEI. This, however, gets ahead of the story. The story begins with portraying HEIs as organizations that, like so many others, seek to raise more revenues than expenditures and to grow more assets than liabilities—all in a rapidly changing, potentially threatening, turbulent environment.

2 Higher Education Institutions as Economic Entities

Extraordinary challenges require HEI leaders to pay ever greater attention to the economic dimensions of their institutions, especially to the productivity of assets that each HEI currently owns, controls, or substantially influences. (Worthy institutional goals are only as achievable as the HEI is financially viable.) Financial challenges, mixed with opportunities, abound. Take, for example, the growing belief of individuals and governments that "the more you learn, the more you earn" which drives increased demand for HEI services, fostering growth while also straining capacity and resources. A closely related HEI challenge/opportunity is over-reliance on legacy business models where unmanaged cost structures are driving up operating costs and prices faster than revenue streams can support. "Quick fixes" to

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increase income and reduce expenditures are becoming insufficient.

Increasing global competition among HEIs forces each to enhance the reach and yield of its marketing efforts to grow consumer interest in its product and service offerings. Non-competitive HEIs are retrenching, merging, restructuring, or closing in greater numbers [3], as many as 200 U.S. HEIs over the coming years [4]. External shocks to higher education associated with COVID-19 are rapidly accelerating financial pressures from all sides, including the most financially healthy and academically prestigious HEIs [4]. In the U.S. alone, a 15% drop in total enrollment is predicted, and no HEI will be untouched.

Long before this pandemic occurred, traditional sources of HEI revenue such as general appropriations from state and national governments, have been declining (as a proportion of HEI income), forcing HEIs to pursue and grow alternative revenue streams, e.g., from other departments of government, households, donors, businesses, foundations, and communities. Even countries with recent histories of generous support for higher education are providing guidance to their HEIs on how to deal with "increasing independence" (a euphemism for "reductions in future financial appropriations"), signalizing further limitations of governmental support [5], 6.

Maintaining balanced budgets is being replaced by survival *and* growth as top of mind goals [7]. Moody's (financial analysts) argues that HEIs need to grow top line (total) revenue by at least 3% annually, just to remain financially stable [8]. For an HEI to achieve a true "transformation" from its current circumstances requires, per consulting firm McKinsey and Company, at least a 20% net surplus of revenues over expenditures, which cannot be achieved by efficiencies alone [8].

While the "core" mission on the academic side needs to thrive, it cannot succeed without the financial sophistication and support of the business side of the HEA. Yet, distrust continues to exist between the two (see, for example, [9]), due in part to opaque traditional HEI financial reports which result in piecemeal recognition and resolution of both problems and opportunities.

Yet, these same financial records serve as a starting point for revealing broad challenges and opportunities, including those that reflect changes in financial status at different points in time (balance sheets). There, assets (what the HEI owns) are arrayed against liabilities (what it owes) and the difference (net assets) does provide a crude measure of overall size and wealth at a single point in time. The positive *difference* between assets and liabilities, ("fund balance" or "equity" or "retained earnings", depending on the HEI) represents one measure of how well off the HEI is at that *point in time*. (Short run *performance over time* is reflected in income and cash flow statements.) *Long run* performance is better reflected in comparisons of these changes in net assets over years and decades [10]. Between 2015–16 and 2017–18, for example, University of Oxford's net assets grew over 23% from 3.0 billion to 3.7 billion pounds sterling [11, p. 23]. Despite the ups and downs of a given year, Oxford's wealth, as reflected in net asset changes, was growing at an impressive pace, not unlike those at Northwestern University between 2001 and 2019 [12], 13. (On occasion net assets can and do decline from one year to the next; reasons range from opportunistic investments to emergency asset sell offs.) HEIs generally succeed in growing net assets over the years, but some are much more successful, and others much less successful, than the rest, due to (1) the size and composition of a HEI's assets, (2) the managerial expertise applied in monetizing its assets, and (3) changes in market conditions affecting demand for those assets.

2.1 Assets—What They Consist of

The assets of a HEI are vastly more than the buildings it owns, although buildings and land provide a physical, concrete point of departure. In fact, assets include:

> . . . *a[ny] resource* with economic value that an individual, corporation, or country *owns or controls with the expectation that it will provide a future benefit*. Assets are . . . bought or created to increase a firm's value or benefit the firm's operations. An asset can be thought of as something *that*, in the future, *can generate cash flow, reduce expenses, or improve sales*, regardless of whether it's manufacturing equipment or a patent. [14, p. 1] (emphasis added)

Besides buildings, the biggest and most consequential HEI assets consist of people, both faculty and staff, which is usually an HEI's biggest expense item and its biggest investment.

> *People can be assets because of the value they bring to a relationship or organization. Things which are assets have value for the owner because they can be converted into cash.* Cash on hand is also considered an asset. [15] (emphasis added)

Buildings, land, money, *and people* head an HEI's asset list, but are only a fraction of the variety of assets that any one HEI is likely to own or control (see Exhibit One).

Exhibit One: Potential Assets of Higher Education Institutions*

Tangible Assets

- Buildings
- Cash on deposit
- Cash on hand
- Certificates of deposit or CDs

- Commercial paper
- Corporate bonds
- Corporate stock
- Debentures held
- Equipment
- Federal agency securities
- Federal treasury notes
- Guaranteed investment accounts
- Inventory
- Land
- Loans to members of insurance trusts systems
- Loans receivables
- Marketable equity securities
- Marketable securities
- Money market funds
- Mortgages (receivable) held directly
- Mutual funds
- Notes receivables
- Repurchase agreements
- "Restricted" cash and investments
- Savings accounts
- Share of funds in governmental investment accounts or pools
- State and local government securities
- Time deposits
- Warrants (to purchase securities) Accounts receivable.

Intangible Assets

- Blueprints
- Bonds
- Brand names
- Brand recognition
- Broadcast licenses
- Buy-sell agreements
- Chemical formulas
- Computer programs
- Computerized databases
- Contracts
- Cooperative agreements
- Copyrights
- Customer relationships
- Designs & drawings
- Distribution rights
- Development rights
- Distribution networks
- Domain names
- Drilling rights
- Easements
- Engineering drawings
- Environmental rights
- FCC licenses
- Film libraries
- Food flavorings and recipes
- Franchise agreements
- Goodwill
- Historical documents
- Joint ventures
- Laboratory notebooks
- Landing rights
- Licenses
- Loan portfolios
- Location value
- Management contracts
- Manual databases
- Manuscripts
- Medical charts and records
- Methodologies
- Mineral rights
- Musical compositions
- Natural resources
- Patents
- Permits
- Procedural manuals
- Product designs
- Property use rights
- Proprietary technology
- Royalty agreements
- Schematics and diagrams
- Securities portfolios
- Security interests
- Shareholder agreements
- Solicitation rights
- Supplier contracts
- Technology sharing agreements
- Title plants
- Trademarks
- Trade secrets
- Trained and assembled workforce
- Training manuals
- Use rights—air, water, land.

*Source: Examples of Assets, Your Dictionary, accessed 2/17/20 from https://examples.yourdictionary.com/examples-of-assets.html.

Costs of maintaining an asset can be tracked, but its overall impact on revenues and the *value* it adds to the HEI are often difficult to measure objectively. Beautifully manicured campus grounds and Nobel Laureate faculty are both examples of assets that create value, albeit imprecise (even if costs can be measured precisely). Buildings, land, and stock certificates are tangible assets, easy to distinguish, but less tangible assets, such as a trained and assembled work force, HEI brand recognition, geographic location, star faculty,

stakeholder relationships, even procedural manuals (academic policies and practices, course syllabi), and regional alumni chapters, are more difficult to measure monetarily but are no less valuable.

HEI assets then include much more than those found in typical HEI financial statements, and their value is *very imprecisely* reflected in those statements. Some assets, e.g., equipment, tend to lose some of their value over time, even as others, e.g., land, may increase. Assets of declining value get written down. Additional investments in assets may preserve or enhance their value though added investment or monetization. Or they may not.

Treating HEIs as bundles of assets to be monetized requires "placing bets" when pulling resources from some sources to invest in others. Elements of uncertainty and risk go hand in hand with the possibility of enhancing net revenues and growing net assets. The fundamental leadership challenge is how best to monetize all of its assets—not *whether* to but *how effectively* to.

Over the long run HEIs increasingly distinguish themselves from each other by the degree to which they have increased their net assets. (A counter argument often heard is that HEIs distinguish themselves from each other by pursuing *distinctiveness* or uniqueness, but HEIs with roughly the same quantum of net assets are more similar to each other than different.) Some HEI financial analysts argue that growth in net assets should be about 3–4% above the rate of inflation on average [16]. HEI net assets in this view represent a dynamic, comprehensive measure of *long run* HEI performance, not just a listing of balance sheet items called "assets".

2.2 Monetizing Assets—What Organizations Do with Their Assets

Monetization is similar for a given asset across different industries. Mineral rights, for example, are monetized in roughly similar fashion regardless of whether they belong to a mining company or to a university. Yes, asset monetization differs between the mining and higher education industries [17]; in one, most of the assets are underground and very tangible, while in the other assets are mostly above ground and are intangible as well as tangible. In both industries, however, converting assets into cash requires material investments and sometimes multiple sources of financial capital to monetize them.

Either way, asset monetization requires the exercise of managerial expertise. Assets, by themselves do not make money; they must be monetized or "put to work" to generate net revenue productively. Monetization entails a figurative "handshake" between wringing money out of some assets (both figuratively and through sales) and investing money in others. Historically, monetizing assets largely referred *only* to selling off or liquidating them in such a way that generated cash. Today, "asset" includes assets such as "human capital", "brand", "operating policies", "operational procedures", "reputation" and the like.

Monetization transactions can also be more complex and include multifaceted exchanges, for example, sale-leasebacks, guaranteed purchase agreements, joint venturing, and subsidized access to capital. For the HEI these transactions amount to a conversion: "converting an asset (anything you own) into legal tender (money)" [18]; or "convert[ing] any event, object or transaction into a form of currency or something with transferable value" [19]; or "turning a non-revenue-generating item into cash, essentially liquidating an asset or object into legal tender [20].

Monetizing here involves converting a good or service into money, including efforts to convert *enhanced* goods or services into *more* money. Because most monetization efforts require added investments to realize monetary gains, efforts to raise investment capital—through cost-saving, debt, gifts, etc.—are intimately associated with most monetizing initiatives.

2.3 Tracking Asset Monetization—Financial Reports and Their Limits

Financial structures, protocols, and analytics in higher education are neither highly sophisticated nor uniformly accepted and applied [9], 21 22, thereby limiting the feasibility of formulating viable asset monetizing initiatives and of determining their impacts. Some may be formally captured by routine financial records, but most are not. As an illustration, the sale of a building is sufficiently large and self-contained that evidence of the sale, both what is sold and what is gained, can be readily formulated from existing data. On the other hand, the financial impact of the long run substitution of instructors for tenure track faculty, including what is gained and lost, is not reported and difficult to estimate, even to formulate.

Like balance sheets, income statements are limited in value: they provide necessary but not sufficient financial information to inform decisions about the flows of funds over time to, from, and within HEIs. Categories of expenditure, such as "instruction," "research and public service", auxiliary expenses", and "academic support, student services, and institutional support" are too crude and cannot help financially inform decisions about which instructional programs or student services should be pared back, enhanced, or better targeted. Similarly, typically broad revenue categories, e.g., government grants, contracts, and appropriations, tuition and fees, investments, and auxiliary enterprises are insufficient to identify which assets, with

added investments, could yield greater net revenues. Unfortunately, the trend in HEI financial reporting is toward less, not greater, detail [21]. Without more customized financial analytics, it is difficult to determine which assets to monetize and what the financial impact of such monetization is likely to be [23]. The relatively opaque and idiosyncratic nature of university systems of accounting and reporting limits broad-based understanding of university fiscal health and leads to distrust, especially by faculty and staff [22].

The measuring problem goes beyond lack of detail. First, the financial sizing and impact of some of a HEIs most important assets, including its people, cannot be measured without factoring in extensive uncertainty. The assets of brand recognition, brand loyalty, faculty quality, customer satisfaction, and goodwill, are very important both in their own right and in the value they add to other HEI assets such as enrollment demand and alumni donations, but it is difficult to even estimate, let alone price, their probable impact. (Being an "experience good" higher education is inherently difficult to "comparison shop" against other HEIs, and therefore "reputation" is even more important than in many other industries.)

Second, long run impacts are difficult to gauge in part in part because new monetization decisions are made on top of earlier ones. Many assets already enjoy some level of historical monetization and derive their current value in part from earlier decisions to invest and market them, and monetization decisions are often conflated with routine "maintenance" or annual budget replacements. Many "maintenance" decisions have unintended consequences. For example, faculty assets are replenished each year as a part of natural turnover, but intentional *changes* in faculty investment and their impacts are seldom recognized. Yet, across HEIs, for example, a 10-point increase in the percentage of full-time faculty not in tenure-track positions was found to be associated with a 4.4 percentage point reduction in graduation rates (at public masters-level institutions). Would HEI senior management consciously decide to move faculty off the tenure track to save money, if it knew it would also cost a 4.4% reduction in graduation rates? Probably not, but the (easily measured) difference in average salaries between full-time lecturers and assistant professors at these institutions was over $10,000 a year (2009–2010 data) [24]. At the same time, HEIs that invest more per capita in faculty face less faculty turnover, especially in the junior ranks [24]. Is it worth investing more in faculty "quality" to reduce faculty turnover or to increase student retention? Alternatively, is it worth the obvious savings of hiring less expensive faculty when it seems to increase student attrition rates? Without detailed analytics the answer is not clear. Typical financial reports are not designed to provide useful information on incremental changes in asset investments, although a wide variety of useful financial metrics exist and have been applied on an ad hoc basis (see, for example, [25]).

Third, market conditions may evolve over time, materially changing the potential value of present *and future* monetizing initiatives. One widely recognized illustration is the 1988 Bayh-Dole amendment [26] which increased the potential value of university research *to HEIs*, entitling them to the financial benefits of the research they generated. This led to the growth of "technology transfer" departments in about 400 of the most research-intensive U.S. universities [27]. From that year on, the potential market value of research and development efforts at some HEIs increased, followed by increased investments in research-and-development infrastructure (assets).

Asset monetization is often a recurring, rather than one-time, set of decisions, and is influenced in part by changes in market conditions, which require customized or "transaction specific" analytics (reports) in order to make informed monetization decisions. This resembles the framework of budget preparation where revenues and expenditures are reset annually, but it differs from typical budgeting in two respects. One, monetization initiatives cut across departmental (traditional budgetary) lines. Two, they reflect explicit, incremental investments in—and expected payoffs from—some assets and not others.

3 The Six Asset Monetization Tactics of Higher Education Institutions

All work in higher education is associated with one or more of only six broad forms of monetization tactics. "Work" here includes: recruiting and housing students, staffing, offering and teaching courses, collecting tuition and related revenues, conducting research, building, maintaining, upgrading, and occupying buildings, recruiting, deploying and managing faculty and staff, cultivating and soliciting potential donors, creating and hosting cultural and athletic events, creating and distributing a perpetual stream of HEI communications, keeping track of expenditures and revenues made by hundreds or thousands of individuals, and more—a very broad umbrella. In each HEI, these tactics entail pulling resources from some assets and applying (investing) them in other assets.

A foundational presumption of this chapter is that variations of all six tactics are integral to each HEI and to an extent are interdependent. At the same time, given each HEI's unique bundle of assets and circumstances, its monetizing behavior is idiosyncratic and context dependent. The smallest HEIs are about 1/1000 the size of the largest HEIs. They also range from very wealthy to very poor financial health. Existing HEIs are going out of business and new

HEIs are being created with increasing frequency, while still others are steadily growing their net assets.

What *has* evolved, despite these differences, are similar asset monetization specializations within HEIs. Some have become commonly recognized *organizational entities*, e.g., departments of advancement, offices of technology transfer, admissions offices, alumni relations, and business services, student housing. Others take the form of one-off and more comprehensive *initiatives* undertaken by senior management, e.g., strategic planning, long-range planning, retrenchment, capital campaigns, ad hoc task forces, and, recently, COVID-19 Responses. Asset monetization is reflected in six broad forms across these commonly recognized organizational entities and initiatives: (1) *wringing out* resources to invest; (2) *borrowing* resources to invest; (3) *trading* resources to invest; (4) *soliciting* resources to invest; (5) *selling* monetized assets; and (6) *creating* new assets.

All six tactics reallocate capital from presumably lower performing assets to hopefully higher performing assets, i.e., those which show promise of yielding increases in net revenues and, over a longer period, increases in net assets. Estimates of the costs and benefits of asset monetization include those which can be measured in financial terms as well as those which are difficult to measure financially or even to quantify. All monetization initiatives have market consequences, positive, negative, or both, due to factors such as population demographics, availability of information analytics, and changes in transaction costs [28].

3.1 "*Wringing Out*" Resources to Invest: Liquidation, Cost Reduction, and Efficiency Promotion

Efforts to extract resources from current assets focus more attention on freeing up resources than on reinvesting freed up resources. The unstated use of most cost reduction initiatives is "to balance the budget", which, while important, is not so much an investment decision as a survival necessity.

3.1.1 Cost Reductions to Balance the Budget

The early, more limited, use of the term "asset monetization" directly applies here: converting assets to money by selling off the asset (liquidation), reducing the costs associated with maintaining and operating the asset (cost reduction), and seeking to achieve cost reductions without impairing asset functioning (efficiency promotion).

Concrete examples illustrate this efficiency perspective. The Ohio State University monetized its ("multi-billion dollar") parking facilities by turning over control to a private corporation under conditions of a long-term lease, complete with an upfront payment to the university and a period of no fee increases for parking [29]. The business model of the private corporation likely included lower operating costs than under Ohio State as well as increases in fees after the moratorium ended. Without these opportunities to recoup its investments, the corporation would not have been interested. In return, Ohio State gained ready access to near-term cash without impairing the functioning of its parking structures.

Monetized assets can bring new revenue to the table not only from the outside (per the Ohio State example) but also by reducing operating its own operating expenses, as at nearby Kent State University. Kent State closed its 18-hole golf course and club house, in effect mothballing the property for some future use while, by doing so, eliminating the half-million dollar per year operating loss from its budget. The "higher use" of the freed-up resources is not specified, but operating costs were cut immediately [29].

3.1.2 Costs Incurred as Well as Costs Saved by Economizing

Too often the tactics of cost reduction, efficiency promotion, and liquidation are portrayed as unfortunate ends in themselves, unconnected to any presumed benefits from monetizing—inflicted on the HEI to the detriment of morale and *ipso facto* with reduced service quality. The following one-sided lament is illustrative.

> [HEI economizing measures] constitute a special kind of "relative deprivation"—removing or charging for things that were previously free or less expensive. Such economies . . . . are *symbolic of a general tightness and meanness* and perhaps signify *degradations of employees* who have professional or quasi-professional expectations. This effect is one of a larger range of consequences that arise when administrative decisions are guided solely by economic or managerial considerations without taking into account important human dimensions [30] (emphasis added).

Frequently overlooked in these characterizations are the less visible benefits associated with the use of those resources that are freed up, i.e., how they are redeployed as investments in more highly valued assets, including people. The most visible parts of efficiency-producing tactics are the cuts or reductions, but only when linked to reinvestments of those resources into other assets does a fuller asset monetization picture emerge.

Wringing money from assets can vary greatly in feasibility ("low hanging fruit" to "holy grail") and materiality ("chump change" to "home run"). See the list of money wringing tactics in Exhibit Two, collected from HEIs by the National Association of College and University Business Officials.

Exhibit Two: Initial Thoughts On Wringing Out Resources*

Information Technology

Dim the brightness of computer monitors.

Keep PCs a year longer before replacing them.

Share training on administrative software with similar institutions.

Use a third party for hosting your server, which could save a staff position.

Switch to virtual servers.

Education and Research

Increase general faculty workload.

Require every administrator with a master's or doctoral degree to teach a course.

Find new classrooms with larger seating capacity and increase productivity by increasing class size.

Suspend or close: all undergraduate minors; graduate and undergraduate special-emphasis programs; up to 25% of all undergraduate majors; nonprofessional master's/doctoral programs that are not signature programs or not ranked among the top 50 in the nation.

Ongoing review of key student affairs programs to ensure retention.

Examine decentralized and specialized student affairs programs.

Scrutinize faculty space allocation.

Examine academic programs with small participation.

Review all centers and institutes. Demonstrate they are serving the university's core mission.

Personnel

Ask the president to forgo a salary increase; ask the president and other top administrators to take a salary cut.

Reward performance with a one-time bonus instead of increases to base salary.

Reduce retirement plan contributions (zero effect on salaries).

Offer employees temporary or partial leave without pay but with full benefits.

Pool support staff members in clusters of four and five departments.

Consolidate common functions that have become dispersed (e.g., advancement activities).

Shut down between Christmas and New Year's Day to save utilities; ask employees to either take leave or comp time.

Implement 4-day week with extended daily hours for summer and operate only required buildings on Fridays (dining halls, residence halls, health center, etc.).

Conduct analysis to closely examine how each staff person's work contributes to the institution's mission.

Defer state approved salary increases for nine months.

Budget for zero new positions, zero departmental budget increases.

Closely examine all vacancies before filling.

Freeze hiring of temporary employees, consultants and independent contractors.

Consider voluntary retirement incentive plans.

Approve travel based upon funds and reduce travel.

Freeze salary levels for administrators making more than $150,000, while giving modest raises to staff on the lower end of the pay scale.

Reduce all salaries by a certain percentage.

Benefits

Examine tuition remission programs for faculty and staff.

Examine health care benefit levels of spousal and dependent health care coverage.

Finance

Discontinue printing or mailing paper student registration receipts.

Collaborate with other institutions to share faculty members, facilities, registration and records functions, security, and parking.

Reduce debt-service payments by renegotiating long-term debt, seeking a lower interest rate, extending the term of the loan, or changing banks.

Require direct deposit for employee and student payroll.

Use purchasing cards to better track procurement.

Use cooperatively bid contracts to reduce spend.

Hold off for now on financing any new debt.

Ask donors to accelerate pledge payments.

Employ mid-year budget reductions.

Plan for budget cuts at 3–10% levels.

Sell off assets.

Facilities

Recommend computer, printer, monitor, light, and accessory item shutdowns.

Consider a longer winter break to save energy.

Add outside lighting timers and classroom light timers.

Eliminate excess storage facilities for food and supplies.

Switch to compact fluorescent bulbs.

Purchase energy efficient equipment when new equipment is needed.

Lease prime ground-floor spaces in campus buildings to retailers, professional firms, independent nonprofit organizations, and other revenue providers.

Increase rental revenues by encouraging local entities to use campus recreation areas, music venues, meeting rooms, etc.

Close and lease remote campuses and unused buildings.

Fill office, buildings-and-grounds, and custodial staff positions with student workers who will earn tuition credits.

Lock in utility contracts now for the next few years while the price of energy is significantly reduced compared to just months ago.

Consolidate classrooms and schedule all summer classes in only two buildings to save on utilities and custodial staff in all other academic buildings.

Clean buildings at night when the job can be done faster.

Slow construction projects and reexamine capital projects that can be delayed or deferred.

Other

Review of property risk management with outside consultant and hire a certified risk manager.

Negotiate with service providers for lower management fees.

Establish a committee to collect and review cost-saving suggestions.

Establish an ongoing independent campus-wide task force to find operating savings with three-year horizon.

*Source: National Association of College and University Business Officials, accessed 8 March, 2020, from: https://www.missouristate.edu/assets/longrangeplan/cost_reduction_strategies.pdf

Increasingly cost reduction is framed as only one side of a necessarily two-sided coin—cost reduction *and* revenue enhancement. Budget reductions pull resources from existing operations and assets, and budget *re*allocations include finding new ways to fund existing operations and invest in other assets.

Reallocations often yield improvements in net income, but even material changes and their financial impacts are not always reflected in traditional financial documents. For example, consider the difficulty of determining the financial value of eliminating and consolidating small or moribund academic programs without knowing the costs and revenues associated with these programs and the costs and revenues associated with new departments, programs, or courses. The impact can be major, but don't look for it in traditional financial reports or budgets. Over a 15-year period The Pennsylvania State University closed or merged 244 academic programs and majors, including 14 academic departments [31], 32. The net financial impact of pulling resources from these and investing in new initiatives may be great, but how great is not clear from available data.

"Savings" also accrue when an administrative unit is made to become more self-sufficient, i.e., paying for its operation from the revenue it generates instead of from appropriations from above. Such was the case with Penn State's technology transfer office. Other cost reduction initiatives there *have* been more amenable to detailed cost and revenue tracking, such as in energy procurement ($11.8 million annual savings), voluntary retirement programs ($14.4 million one-time savings), and negotiated contracts with new third-party administrators for health care and prescription plans ($70.9 million over 3 years).

The multi-year effects of both reducing operating costs and capping expenditure increases can be problematic, setting up larger issues in the future [33]. For example, at one HEI under new cost control procedures, hiring managers were asked to consider creative alternatives to filling vacant positions to determine if the essential functions of the position could be accomplished in a more efficient and effective manner without hiring a replacement. Those managers did not benefit from these efficiencies, because their departments did not benefit from any saved money. Instead, they had to bear the increased per-capita load of work. With these negative incentives in place, this "cost saving" initiative had little positive impact.

3.1.3 Future Look: Closer Ties to Investments and More "Routine" Cost Controls

HEIs are increasingly routinizing cost controls by investing more resources in digital information systems that more effectively track spending behavior across departmental units. These newer systems encompass the broad area of "spend management" which involves upgrading, centralizing, automating and routinizing internal cost controls, in effect monetizing the assets that HEIs devote to financial control [34]. Specific areas of focus include procurement, travel-related expense, contract life cycle management, accounts payable, and outsourcing. *External* financial pressures are forcing HEIs to address *internal* "spend management" problems, including:

Inconsistent procurement process throughout organization
Outdated/inadequate technology
Paper-intensive processes
Disjointed/non-integrated procurement systems
High maverick spending
Lack of visibility/control over spending
Data inaccuracies for suppliers, orders, payments, etc
Frequent over-contract or over-budget spending
Poor communication or transparency between procurement and AP
Onboarding vendors
Unclear or lengthy requisition or approval process
Matching POs to invoices.
(Source: [35] p. 14)

As these problems get addressed, additional resources can be wrung out of HEI operating systems to invest in higher priority assets.

3.2 "*Borrowing*" Resources to Invest: Acquiring and Restructuring Debt

Borrowing resources brings in cash, not unlike wringing out resources (discussed above) and selling monetized assets (discussed later). Several features of debt, however, make it different from other monetization tactics. It brings cash to the table, not by cutting expenses or through increased sales revenue, but by monetizing the credit worthiness of the HEI. When monetization requires substantial near-term resources and promises long-term financial benefits, debt is a potentially viable tactic, especially when the cost of borrowing is low.

Like other monetization tactics, debt has its own set of challenges and potential benefits, and its cost depends in part on existing HEI financial health. Financial health, measured by complex formulas administered by external credit rating agencies, greatly influences the size and terms of the debt that a HEI can reasonably pursue [36]. (The old guideline in lending still applies—"We only lend to organizations that don't need the money.") Debt is both a source of capital as well as a vehicle for managing liquidity.

3.2.1 Borrowing to Survive Versus Borrowing to Thrive

Two major financial "bookends" enhance the utility of debt as a source of capital: the overall financial health of the HEI and the value of the assets being invested in with debt-secured resources. HEIs with poor financial health must pay more for the debt they acquire, and HEIs that invest in assets that do not promise enhanced value within a "reasonable" time are not aggressively monetizing those assets. HEIs can find themselves spending increasing amounts of operating capital to service debt that will not simultaneously increase revenues. The experience of Bard College (New York State) illustrates these interactions between debt, credit worthiness, income, and cash flow [37].

First, debt gets expensive when it is relied on to survive, rather than to thrive. In 2016 Moody's Investors Service downgraded Bard's credit rating "edging it farther into junk territory." Moody's justification for the Bard downgrade included declining total cash, increased dependence on lines of credit, and heavy borrowing from its endowment. Its relatively liquid financial assets shrank as it ran up higher debt, increasing the likelihood of a shortage of operating capital. That in turn put more pressure on the college to collect donations to fund its operations. In the words of a Moody's analyst:

> The college is dependent on its endowment and cash flow from borrowing to pay its debt . . . . They are not making enough through their core operations to pay their debt service. That's fairly uncommon. [37]

Second, the value of incurring debt is limited to the extent that the resulting newly acquired investment capital does not yield "reasonable" asset monetization or growth. At the time (2016) Bard's debt was going faster than its revenue (17% or $203 million in debt, vs. 1.6% or $190.3 million in revenues.) Chief among Bard's non-income generating debt obligations was an $18 million 380-acre estate with historic mansion, financed with a $13 million mortgage. Although this acquisition may ultimately have been strategically (and financially) wise in the long run, it was not generating any operating revenues in the short run. Was that monetization transaction "reasonable"? A reasonable return on investment is to some extent in the eyes of the beholder. Bard felt it was a wise strategic move, despite its lack of near-term revenue-generating capability. Some HEI financial analysts, however, were more skeptical.

> When you talk about buying land, ... you need additional capital to turn that into an asset that's actually generating revenue . . . . *Just buying the land and holding onto the land is an expense.* Turning it into dormitories or something that's going to have a revenue stream, that makes sense as part of a strategic plan. [37] emphasis added

The ability to incur debt enables some HEIs to undertake and pay for major new initiatives which, without access to debt, would not be feasible. Debt provides access to money and other scarce resources necessary to initiate large scale projects, often as a part of public private partnerships (discussed below).

3.2.2 Future Look: Making Debt a Part of More Complex Transactions

Debt remains a means to invest in large projects, to address short term liquidity challenges, and to balance budget shortfalls. Debt for large investments, however, will increasingly get incorporated into more complex financial arrangements with firms that play active roles in asset *operation* as well as *finance*. In these arrangements HEIs are giving not only a promise to repay a loan; they are often giving over rights to operate assets as well. This involves trading resources to invest.

3.3 "Trading" Resources to Invest: Joint Ventures and Public Private Partnerships

"Partnering" covers an overly broad array of HEI relationships today, and travels under a variety of pseudonyms such as collaboratives, co-operatives, shared services, and alliances. The more limited focus here is on those partnerships which are largely financial in form and purpose, especially those which explicitly pull resources from some assets to invest in the development of others through exchanges or trades with other organizations.

3.3.1 Trading to Enhance HEI Value

The newest asset monetization transactions are referred to as public–private partnerships, or P3s. A public–private partnership is a long-term agreement between a public entity and a private industry team that is tasked with designing, building, financing, operating, and maintaining a public facility [38]. The past decade has seen a steady increase in the use of P3 structures by HEIs, both public and private. P3s range from relatively small partnerships, resembling typical leasing or outsourcing with third parties, to very large, complex arrangements whereby the HEI trades *access* to its assets to partners who provide financing, managerial and technical expertise on project design and development, and often *the right to operate* and profit from the asset as well.

Consider first some smaller asset monetization partnerships at one HEI (Virginia Wesleyan University) where modest levels of cost reductions and net revenue generation occurred. As summarized by its president:

> [We set out to] . . . *Develop public-private partnerships that increase efficiency and, in many cases, generate revenue*. . . . [We] partnered with the area's largest health-care provider for student health services and athletic training. Joint-use facilities can [now] be funded through private dollars from interested, committed parties. . . . . [We] outsourced the physical plant and endowment management and established a campus conference and catering office that contributes to our 12-month facility [utilization] model. A shared-staff partnership with . . . [another organization] benefits . . . our . . . landscaping priorities. [39] (emphasis added)

The difference between "trading" and "selling" is sometimes elusive. Several of Virginia Wesleyans' monetizing transactions appear at first glance to be a series of land and facility leases to other organizations. These arrangements, however, bring in more than "rent" to the monetization initiatives. These partners were "respected nonprofit, like-minded groups [that] bring added prestige and programming to the campus" [39].

Many HEI assets require much more technical expertise than is involved in solely leasing and maintaining buildings, e.g., designing and operating residential complexes, bookstores, and power plants. Monetizing them requires more than an external source of capital, including a wide variety of specialized high-value external expertise. The primary HEI argument against relying solely on *internal* expertise for monetizing complex HEI assets is straightforward:

> A lot of universities are asking themselves, 'Why are we in the business of owning and running our own power plants? That's

> not our bread and butter . . . . We have some highly qualified folks that work for us internally that manage our assets now, but their job is not to create new things every day. . . . Their job is focused on doing a really good job of maintaining what we have. [40]

HEIs often seek resources to monetize large complex assets through soliciting gifts (capital campaigns, etc.), but assets *not* associated with an HEI's core mission are not attractive to potential donors. It is particularly difficult to interest donors in funding "underground pipes or the power plant" or parking structures.

One basic form of P3 asset monetization involves HEIs leasing out systems to private companies that will operate them in exchange for significant upfront payment: the HEI trades access to its assets to partners who, for a price, operate them to generate revenue. The HEI then makes regular payments to the partner which invests in the asset, while at the same time the HEI invests its newly acquired cash into academic (core mission) priorities (assets of another type). For example, The Ohio State University entered into a 50-year contract with an energy company and investment firm to run its utility system. It received $1.1 billion at the outset which it invested in academics as well as energy-related research and facilities [40].

3.3.2 The Role of Incentives in Long Term Trades

The long-term, high-stakes nature of these contracts necessitates inordinate focus on the incentives built into the contracts. If the HEI is obligated to pay for certain aspects of the arrangement (operations, debt service), the partner needs to be incentivized to guarantee reliability and improve efficiency. P3 projects have resulted in several different types of contracts, all seeking to align the expected costs and benefits of each party with the realities brought about by uncertainties of large-scale risks and multi-year time horizons [40], 41.

Another type of P3 contracting arrangement, analogous to one used for toll roads, is where the private company recoups its investment in the HEI project by charging user fees. The ability of HEIs to monetize their aging college dormitories is illustrative. To monetize these without partners an HEI would need a lot of available capital and specialized expertise in up-to-date student housing design, development, marketing, and ultimately operation. Wayne State University, instead of self-managing its dorms, sought to lease beds from a third party and off-load some of the associated risk and responsibility for housing students to other firms:

> [Wayne State] sought out . . . .partners to demolish an existing 407-bed apartment building and replace it with new and renovated residential space. It went from issuing a request for proposals to obtaining financing in . . . . record time. . . . To expedite construction, the private partner secured bridge financing . . . . , enabling the project to tap into generally favorable financing for the larger private placement of debt. The university . . . . locked in favorable financing terms and paid off existing debt, . . . [and] moved much of the worry and risk from operations onto the private partner . . . . includ[ing] design, construction, financing, operations and maintenance of the project over a 40-year life cycle, freeing up university resources to focus on academic and other needs. [38]

Historically P3s have been particularly useful to HEIs in the non-academic core areas, including physical infrastructure, areas requiring a deep bench of expertise, large investments of capital, long-time frames, and potentially large risks. One of the largest US examples to date is the Merced campus of the University of California, covering some 219 acres and almost two million square feet of new facilities. The $1.2 billion project includes classrooms, offices, research facilities, residences, and utilities [38]. It employs an "availability" method of payment whereby the university compensates a firm directly according to a predetermined formula and schedule for postconstruction operations and maintenance of the facilities over a 39-year life cycle, plus 50/50 splits among partners for any future monetary gains resulting from refinancing and or cost-saving measures introduced by the developer.

Trading resources through P3s, as with other asset monetizing tactics, can serve differing purposes. Those HEIs with few financial challenges tend to pursue partnerships as *opportunities*, including developing a "strong niche" through differentiation or enhancing size and operating margins. On the other hand, those with many financial challenges tend to seek *survival* through partnerships as a new strategy or survival through efficiency [42, p. 4].

3.3.3 Future Look: Moving Toward Core Academic Assets

Historically P3 arrangements to upgrade *core academic* assets had been avoided in part due to faculty resistance and in part due to in-house faculty expertise which has been sufficient to upgrade these academic assets. Going forward, however, these academic assets are being considered as P3 possibilities due to growing expertise required to upgrade them (e.g., online platforms, learning management systems, and instructional performance analytics) and the changes in faculty hiring practices, e.g., from (broadly skilled) "professor" to (narrowly skilled) "instructor" [42].

3.4 "*Soliciting*" Resources to Invest: Gifts, Grants, Endowments

A fourth tactic for HEI asset monetization entails asking for resources (gifts and grants), usually through advancement offices, affiliated university foundations, and departments of contracts and grants. Unlike "wringing out" and

"borrowing", "soliciting" entails a close connection between investable resources and specific assets being monetized. Third parties are being asked to provide the resources to invest in targeted, pre-identified assets, be they buildings, research projects, academic programs, faculty positions, or student scholarships. These "giver-gift-asset" connections exist regardless of whether the gift ends up in the HEI's operating budget or in its endowment.

3.4.1 The Cost of "Free Money"

Among HEIs that solicit resources, the publicity surrounding very large gifts creates the impression of great revenue opportunity for HEIs, all "for the asking". This is true for some HEIs, but not so much for most. Of the US $4.7 trillion spent on all education worldwide recently, donors' contributions accounted for just 0.3% of total spending, which is barely visible in absolute amounts [43]. Higher education's share of the $4.7 trillion is only about $1.9 trillion [44]. In the U.S. recently (2018), 3700 HEIs surveyed raised a total of $46.73 billion in gifts, or an average of $1.26 million per HEI. Some do vastly better than others. Twenty HEIs, less than 1%, captured 28% of that total amount, and they were not all previously well-endowed private universities [45].

The most widely recognized HEI solicitation tactic is a widely publicized, multi-year "campaign", complete with aspirational goals, announcements of major gifts, and descriptions of the assets that benefit from these gifts, such as endowed faculty positions, buildings, and research programs. Less well advertised are the costs required to secure these gifts. Gift solicitation is compelling in part because it requires few resources relative to the dollars raised [46]. Furthermore, revenues from donations can increase the amount of *discretionary* dollars available to institutional leaders. Even though only a small share of gifts is technically unrestricted, many restricted gifts are "effectively unrestricted", i.e., restricted to activities that the institutions would perform anyway, or at least be willing to perform if funded externally.

Solicitation works only when the assets which HEI leaders want to monetize are the same as those which donors want to support; individual gifts are usually targeted in response to donors' wishes. For example, most of gifts from UCLA's 2014, $5.5 billion multi-year campaign were directed by donors to support student scholarships, endowed faculty positions, research projects, and building needs, all associated with its "core mission" [47]. HEIs that solicit private resources also seek to continue to secure as much traditional government support as possible. As UCLA's Chancellor argues:

> The vast majority of donations are restricted to donor desires and cannot be used for ongoing operational expenses. . . . People don't generally donate to keep the lights on or keep the physical plant in good shape . . . Philanthropy is not a substitution for state support. (quoted in [47])

Ironically, HEIs that receive more governmental appropriations are more, not less, successful in raising private gifts from other sources [48]. Donors are often more inclined to make gifts to well-off HEIs rather than to HEIs that desperately "need" the gift; and increased state support adds to the "well-off" perception, especially if it helps the HEI to increase benefits available to donors.

UCLA's $5+ billion in gifts monetized many assets over the years, but the cost to secure them has been substantial. To raise each dollar of gift, how much will/can/should each HEI spend—30 cents? 50 cents? 70 cents? On route to securing $5+ billion, UCLA had to secure contributions from more than 220,000 donors from all 50 states and 99 countries. This required the work of more than 400 fundraising officials on UCLA's payroll plus 1500 unpaid but university-supported volunteers, a sizeable commitment, and UCLA's staffing for solicitation was not uniquely high for its size [47].

The salaries and benefits of advancement staff are only the most direct of costs associated with HEI solicitations; additional indirect costs include facilities usage, travel-related and entertainment-related expenses, food service, information technology support and accounting. The number of cents an HEI spends to raise a gift of $1.00 is not easily calculated, let alone publicized. On top of these costs of *raising* and *securing* the gift are the costs associated with *administering* the operational, financial, and legal conditions associated with each gift. Both the total costs and often the total benefits of gifts tend to be underreported, but, either way, it is difficult to estimate whether UCLA would have been better off pulling resources from its advancement initiative or investing additional resources.

3.4.2 Potential Donors as HEI Assets

HEIs do not "own or control" potential donors, but HEIs do possess a modicum of potential donor goodwill, inspired either by what HEIs *do* or what they *are*. Potential donors are, therefore, HEI assets, but it is difficult to estimate individual donor giving proclivities prior to asking. How much are HEIs willing to invest up-front and on-going in both money and time in the hopes of raising future dollars from some people they have not even met yet? Like most HEI gift campaigns, UCLA pursued and secured a small number of very large gifts and many smaller ones. Gifts ranged from $1 to $100 million, but 81% of the gifts were under $1000. The donor of a large gift is a usually a donor who has already made one or more smaller gifts, so all small gifts create a pool of people who are candidates for larger gifts. Not surprisingly, "periodic" capital campaigns now virtually perpetual.

The most obvious target populations for giving are students—past, present, future—and their families. Yet, all students/alums are not equally likely givers. Likely givers to HEIs are those who "do so as a part of an overall pattern of prosocial behaviors to improve society... behaviors and dispositions... formed early in life and are nurtured before, during, and after college" [49, p. 3]. HEI leaders, then, potentially boost giving participation among alumni if they engage them as partners in tackling key societal problems that mirror their own civic and philanthropic interests.

3.4.3 Gifts to Endowments Versus Current Operations

Endowments represent the treatment of a gift, locking up capital from which only earnings can be spent annually. Apart from fulfilling stated philanthropic goals, endowments serve as a hedge against future uncertainty and help fulfill aspirations of HEI immortality. They also appeal to prospective benefactors in its durability [50], "donor immortality" of a sort. The benefits of permanence (keeping the gift intact and spending only earnings annually) are compelling, but also work against the benefits of putting all the money to good use immediately. All else equal, donor preferences lean toward endowments, while HEI preferences lean toward operating funds.

In return for large gifts, HEIs often promise naming opportunities, i.e., placing the donor's name on a building, program, etc., plus other benefits such as tickets to events and access to research, athletic, and artistic venues. HEI naming practices include, in addition to donors, famous people whose name itself creates positive feelings toward that HEI. "Value" to an HEI can be more than "cash" and can include something as nebulous as enhancing the HEI's brand. Naming some HEI asset after a famous person has the same risk as naming it after a donor, i.e., that in the future the reputations of either could be reevaluated and downgraded as history gets reinterpreted.

3.4.4 Future Look: New Competitors, New Business Models, Old Uses

If the primary role of trustees is to sustain the mission of the institution in perpetuity, they must be concerned with all expenses and all sources of income, not just those associated with endowments. Recently, spending and fees at colleges and universities have been rising faster than family incomes. If this trend persists, increasing emphasis will be placed on endowments as a source of operating income [51].

University alum and donor markets are increasingly national and global, and HEIs are competing for gifts with other philanthropies, including other HEIs. This requires that HEIs somehow expand the number and yield of donors without increasing unit costs. This pressure is encouraging pursuit of donors, not so much with more expensive personal visits around the world but with increased use of social media for relationship building [52]. HEIs will continue to globalize their solicitation capacity, not just because of financial returns but also due its contribution to brand awareness and reputation building.

3.5 "*Selling*" Monetized Assets: Course, Degrees, Research

The *central* asset monetization tactic of HEIs is *selling* the services they have created, e.g., courses, programs, degrees, consulting, and research, all of which are produced through the deployment of its primary assets, e.g., people (in all kinds of roles), buildings, libraries, and technical infrastructure. Although "selling" is a part of all monetization transactions, that term is used here in a more limited sense, i.e., where prices are publicly posted, and there are many potential customers. Academic programs (courses, certificates, degrees) constitute by far the largest source of revenue for most HEIs (along with patient fees at HEIs offering patient care services).

3.5.1 Limits to Selling Mainstream Services

Many public HEIs, like their private counterparts, are becoming increasingly reliant on tuition charges relative to government appropriations. FY 2017 marks the first time in U.S. history, for example, that more than half of all states relied more heavily on tuition dollars than on government appropriations to fund their public higher education systems [53]. Globally households are picking up on average about one fifth of the bill for education, a share which rises to almost 50% in less well-off countries. This share currently ranges from a high of 63% of total education spending in the poorest countries to a low of 1% in the richest [43].

Most HEIs believe they are near the upper limit of their tuition price setting capacity. Raise fees too little and the added revenue from higher prices is not captured; raise fees too steeply and demand falls, losing potential revenue from fewer sales. (The time has passed when a HEI's price was seen as a proxy for its inherent value.)

Different services yield different margins (the difference between a HEI's cost to produce and its selling price). HEIs with large enrollments have the advantage of spreading their fixed costs over more students. Regardless of volume, however, the margins of different services are rarely known or considered, even to the point of not knowing whether a positive margin exists. Consider, for example, tuition charges for *courses* and *majors*. Different courses and different majors require differing levels of resources to produce, even though the prices charged are largely the same; the margins can vary significantly.

HEIs are more discerning, however, when it comes to pricing *degrees*. They seek to maximize top line income

through price discrimination, charging different prices for the same degree, thereby capturing the "consumer surplus" of well-off families but also discounting tuition, sometimes deeply, for families of low-income students. Those discounts drive down the average tuition price, and HEIs that use extensive discounting (somewhere in excess of about 13% of tuition revenues), top-line revenue may not fully cover the cost of degree production [54]. Well-endowed HEIs can cover these losses, but not many poorly endowed HEIs can.

3.5.2 After Selling, Collecting

A sale is only as good as the revenue it generates, and the costs associated attempting to collect outstanding debts can be time and resource consuming, unprofitable, and reputation tarnishing. HEIs are reluctant to exert inordinate pressure on financially struggling students and their families. Receivables, however, can be monetized by selling them to agencies which specialize in collecting on past due accounts. As advertised by one such firm:

> Our team of [accounts receivable] professionals excels in monetizing assets immediately very often using our own capital. This means we can quickly purchase your delinquent signature loan portfolios as well as NSF [not sufficient funds] checks, installment agreements, emergency loans and tuition in order to help you improve [the accounts receivable portion of] your balance sheet. [55]

As is the case with so many potential monetization decisions, without credible estimates of cost savings or revenue enhancement from monetizing accounts receivable, HEIs are inclined to continue their current collection systems even though outsourcing them may free up resources.

3.5.3 Capturing the Market Value of Faculty Research

Selling faculty *research* is different from selling faculty *teaching* in part because of the differences in value that faculty research generates. Unlike faculty teaching, faculty research at most HEIs is difficult to value and to monetize, and it is treated only as an indirect contributor to overall reputation.

The research of *some* faculty is being monetized. For purposes of analysis, partition faculty and their research into three groups: (1) most faculty, (2) grant-getting faculty (a small subset), and (3) faculty who can monetize their intellectual property (IP) (an even smaller subset). Most faculty, including those that produce publications from their research, are usually credited with any resulting income, not their HEIs. This is largely because there is little economic value directly traceable to the publications, except reputational value to the author. Grant-getting faculty contribute a portion of their grant funds to the incremental costs associated with HEI fund administration and, indirectly, contribute to the HEI scholarly reputation. IP-generating faculty members, producers of research worth protecting by patents or licenses, pay overhead to their HEI like other grant-getting faculty, but in addition split any income from the sale of research three ways—between themselves, their academic departments, and the central administration of the HEI.

Revenue-generating faculty research comes from a very small fraction of total faculty, even at research intensive HEIs. These high-value IP faculty "assets" require sizeable investments of resources to recruit and to support. At the same time, these few faculty generate a sizeable return on the HEI's investment in them—in money, in prestige, and in future donors. The spillover effects of these returns on HEI drawing power for students and faculty can be great, but for most of what is considered faculty research, institutional impacts are ambiguous. In contrast to selling various forms of instructional services, monetizing faculty research requires a substantial commitment of resources just to participate, and potential returns, other than reputational, are unclear.

3.5.4 Future Look: Micro-analytics for Pricing Macro-services

Because expenditures and revenues from producing and selling faculty services is a large fraction of HEI budgets, initiatives to monetize them will continue, but with increasingly finer-grained analytics to better understand the margins (both positive and negative) of individual courses, programs, degrees, and even research. These are the parts of the HEI house that have not been routinely examined *financially*.

Historically HEIs charge the same sticker prices across differing courses and degrees, but then vary that price through various forms of student aid with no consideration given to the courses or majors that individual students are taking. In fact, margins vary significantly across courses and programs, even if they are not priced accordingly. Uniform course and degree pricing significantly reduces the fraction of tuition revenue that can be applied to HEI fixed costs. (One crude analogy would be using the differentiated pricing scheme of selling airline seats and then randomly assigning passengers to any seat on any plane going to the same destination.) This practice, plus mounting pressure to increase enrollments, severely limits the margins that HEIs can earn from student tuition. This legacy pricing problem is being addressed by differentiated tuition pricing of courses and degrees based more on (1) market demand and (2) public (HEI and state) priorities [56, p. 323].

The highest margins are associated with programs that are (1) least expensive to produce and/or (2) serve students whose effective tuition price is the highest. As HEIs seek to monetize programs and courses, they will have to consider combining the effects of targeted tuition subsidies,

differential program pricing, and decentralized budgeting. With flexible tuition and targeted subsidies, students with a high willingness to pay and those choosing low-cost programs will contribute more toward shared fixed costs, and there will be less inefficiency. Several HEIs already have several years of experience with differential tuition pricing [56, p. 325].

3.6 "*Creating*" Monetized Assets: New Businesses, Programs, Services

All services and goods that HEIs sell, trade, solicit money for, or borrow money on had to be first created and at some cost. Creating monetized assets requires basic innovation; pulling resources from some assets to apply to *the creation of* other assets—creating, enhancing, and growing them as innovations. Most innovations are what Clayton Christensen called "sustaining innovations", i.e., those which improve upon the services that HEIs already offer, but don't "disrupt" the firm or the industry [57]. Each HEI innovation has two properties: (1) it is new, meaning there is something about it that is different than what has come before; and (2) it creates value, meaning that it has some sort of practical benefit or impact (as distinct from "pure creativity" which may not have any practical benefit) [58].

3.6.1 Innovations Big and Small, Core and Non-core, Easy and Difficult

Innovations can be big and dramatic, e.g., Purdue's incorporation of Kaplan add a law school and a large-scale distance teaching capability in one transaction [59], or they can be focused and incremental, e.g., adding a micro-biology major within the biology department. Courses, programs, majors, and degree requirements are routinely created, upgraded, or otherwise changed, as are student services, teaching methods, inter-institutional articulation initiatives, and, well, all asset monetization initiatives described in this chapter. Type cast as tradition bound, many HEIs pursue more innovations than they are given credit for, innovation defined here as "the implementation of new initiatives in order to drive growth, increase revenue, reduce cost, differentiate experience, or adjust the value proposition" [60].

This last monetization tactic—*creation* of new businesses, programs, and services and, thus, assets—represents in effect the flip side of the first tactic—*reductions and cuts* from existing assets. One emphasizes productivity enhancement (reducing costs relative to benefits gained) and the other emphasizes creating and marketing new initiatives. Together they reflect a broad incremental shift in investments *from* some legacy assets *toward* the creation and enhancement of emerging assets. If the subtext of traditional budgeting is *maintaining* prior resource commitments, then the subtext of monetization is *shifting* prior resource commitments.

3.6.2 The Special Case of Monetizing Faculty Research

Seeking to monetize faculty research beyond current levels presents a special challenge; only HEIs with already substantial research capability and infrastructure are likely to entertain further monetization. Although research constitutes a critical leg of the historical three-legged HEI stool of teaching, research, and service, comparatively few HEIs have developed the capacity to commercialize their research (intellectual property) through licensing, patents, and joint-venturing, and start-up businesses. ("Technology transfer" is examined much more thoroughly in Chap. 5 of this book.) The high barriers to entry and profitable participation in this monetizing tactic require: a critical mass of highly trained faculty engaged in potentially market-relevant research and development, a technically qualified office of "technology transfer" staff tasked with harvesting and selling faculty IP, the requisite facility infrastructure (labs), an ample supply of highly capable graduate students, and an ideal location in a region with concentrations of relevant firms (potential partners), all globally networked to relevant entrepreneurs and technical experts.

The vast majority of HEIs are not "research intensive", or more accurately, do not produce sufficient quantities of market-relevant research to warrant the intensive investment in those assets necessary to monetize with faculty research. This is not to say that the perception of faculty expertise, as reflected in their research, is not important in *teaching*-oriented HEIs. Rather, "research" there translates into broad, entrepreneurially-oriented initiatives, separate and apart from licensing and selling intellectual property. They include activities, characterized by Abreu [61] as "problem-solving activities" including consultancy, contract research and joint research with external organizations; participation in research consortia, providing informal advice, prototyping and testing for external organizations, hosting personnel from external organizations and taking temporary leaves-of-absence to work in those organizations. (Research-oriented HEIs do more of these as well.) Monetizing the research of faculty in *teaching*-oriented HEIs requires much less incremental HEI investment, and the potential gains are, correspondingly, less.

Among for-profit HEIs, the value of faculty research expertise is marginal compared to the value of faculty experiential, vocational, professional, and instructional expertise. Other HEIs are inching toward this for-profit model as they replace tenure track faculty positions with fixed-term contract instructors (sometimes referred to as "clinical" faculty). These innovations incrementally shift faculty resources from research expertise to teaching

expertise, creating in effect, a different business model, pursuing different markets, with different cost structures. For example, while the research university professor designs her class, teaches it, and then tests the students for comprehension, these three tasks are often performed by three separate individuals in for-profit HEIs [62]. Instruction has been separated from the research and service components, thus significantly reducing its cost, while focusing more on customer service and convenience and less on historical notions of faculty roles.

Another innovative feature of for-profit HEIs involves a narrowing of the traditional undergraduate curriculum found in so many HEIs. They are investing primarily in small numbers of career-relevant, low-cost, high demand instructional programs and avoiding the majority of majors found among HEIs in the other two sectors. To achieve this, for-profit HEIs aggressively excise programs that are in low demand, due either to regional or overall obsolescence ("wringing them out") [63].

At the time of this writing, most HEIs are seeking to monetize their online teaching (and many other) assets in response to COVID-19, creating new modalities for existing programs, inventing new laboratory experiences for science courses, and, more generally, seeking to reorganize campus life to accommodate external health-related risks and mandates. The tragedy of the pandemic illustrates the "two-sided" nature of asset monetization, i.e., that HEIs are responding to this external threat *only to the extent* that they can secure sufficient resources needed to invest in innovations. Unfortunately, the same pandemic that is requiring major (costly) innovations is also simultaneously causing serious shortfalls across most major revenue sources. HEIs are thus securing resources through most, if not all five, of the other monetization tactics to cope with it: wringing out, borrowing, soliciting, trading, and selling.

Innovations are constrained not only by a lack of freed up resources, but also by inherent preferences for more of the same (not "too innovative"). The pursuit of reputational "excellence" fosters homogenization, which in turn reinforces the *status quo* [64]. Accreditation policies and government regulations also retard internal HEI change processes. Research suggests that most organizational change in any sector originates not from internal pressure, but from external pressure, and HEIs are no exception [64, p. 11]. The HEI creation or innovation problem is not getting new ideas and adopting them; it is challenging old practices with new conceptions and getting rid of the old practices.

3.6.3 Future Look: Monetizing Innovation to Include Faculty

Monetization initiatives are expanding more into instructionally related assets, e.g., cutting out or restructuring old programs, courses, and course formats and replacing them with new, more cost effective, offerings and instructional modalities [65]. Monetization here has been difficult due to existing faculty prerogatives (they govern curriculum) and incentives (a lack thereof). With increased financial pressures plus recent developments in data analytics [66] and responsibility-centered management [67], instruction and other academic work will increasingly be subject to the scrutiny of monetization.

Specific questions about course and program redesign include:

- How much will it cost to adopt a new instructional model for an existing course, such as active learning in an introductory science class, or to add a new course such as a senior seminar to an existing curriculum? What changes to existing offerings and formats would be needed to free up enough resources to make such an adoption revenue neutral?
- If we want to increase enrollment in a relatively expensive major (i.e., one that requires subsidy), how much do we need to increase enrollment in a relatively inexpensive one (e.g., one that produces a surplus) to keep the budget in balance?
- If we need to boost overall enrollment, what are the options for increasing offerings within the increased tuition that will be generated? [65], p. 3].

Applying monetization to courses and programs differs from simpler cost reduction tactics (wringing out resources), which asks "What resources can I free up to invest?" Instead, it asks a more complex question, "[Can we] gather and use information about [instructional] costs that allows us to maximize the quality we get for any level of spending" [65, p. 3]?

3.7 Conclusion and Discussion: Process Versus Purpose in a New Environment

Survival and growth are eclipsing maintenance in higher education. As increasingly intense financial pressures are revealing, HEIs require more assets to be monetized, more places from which to draw resources, and more places to advantageously invest those resources. That "bad news" of financial pressure is also the "good news" of focused attention. Balanced annual budgets are no longer a sufficient goal; heightened aspirations for margins and growth combine with significant revenue shortfalls to become the perfect storm of a "new normal".

Asset monetization is a process for pursuing this new normal. It provides the means to pursue net income annually and net asset growth continuously. No single monetization tactic, including that of creation/innovation, can serve as the

"silver bullet" to solve HEI financial challenges. Changes in markets are now happening too rapidly, and the scale of required responses is too large to rely solely on the very small (often non-existent) discretionary resources that show up in traditional budgeting processes.

Today's HEI leader is compelled to (1) *assess* the *full* array of HEI assets, (2) *identify* investments that are most likely to return the most net income and (over time) growth in net assets, (3) *determine* which resources can be marshalled from where, with the least loss in overall HEI value, (4) *fund* those investments, and still (5) *maintain* HEI stability and continuity. HEI work is a recurring process of acquiring resources and putting them to work—not a new view in that money-related concerns have existed as long as higher education itself has existed [68].

What *is* different is an increased emphasis on the immediacy and scale of HEI responsiveness, demanding increased interdependency between the academic and business sides of each HEI. Increasingly sophisticated *financial* practices and analytics will enhance, not diminish, the pursuit of HEI *academic* purposes. Short-term (annual) financial performance is intimately tied to long run net asset growth, both in the service of pursuing HEI purpose. Achieving net revenues and net asset growth is not achieving HEI purpose, but achieving HEI purpose cannot exist without net revenues or net asset growth.

HEI's six monetization tactics require widely shared, intimate, and simultaneous knowledge of financial means and institutional ends and a governance structure which is responsive and responsible across them. Decisions to pull resources from some assets and invest in others should not be made without intimate knowledge of the implications of *both* the academic and business dimensions. All forms of monetization require assumptions about the value of where resources come from *and* where they are applied, across all organizational units.

Historically, HEIs have divided academic and *business* functions, starting at the top. Today, the division is being erased. *All* HEI expenditures are increasingly quite sensitive to changes in revenue patterns based on changes in demand for what is sold [69] and the cost of inputs to produce what is sold [24]. For these reasons alone, HEI governance structures will continue to evolve toward increased alignment between authority and responsibility for monetizing assets closer to the differentiated markets that HEIs pursue.

Neither promising tactics nor slavish adherence to a particular strategic vision will ensure the long run success, even survival, of an HEI. What *will* foster, indeed define, success will be the long run growth in net assets, especially relative to "peer" (competitor) HEIs. The questions are straightforward. By what percent (and by what amounts) have the net assets of my HEI grown over the previous twenty years? How does this percentage compare with the performance of those HEIs with which we compare ourselves? Based on these numbers, do we consider ourselves successful?

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Prof. Guilbert C. Hentschke Serving for more than 50 years in administrative, academic, and advisory positions, all focused on education, Hentschke is currently dean emeritus at the University of Southern California's Rossier School of Education, where he served as dean (1988–2000) and professor. In 2010 Hentschke was awarded a Fulbright Scholarship to serve as visiting professor at King Saud University. In 2014 he joined EY-Parthenon, the newly formed education division of Ernst and Young, as Senior Advisor. Prior to joining USC in 1988 he served as dean of the (now) Warner School of Education at the University of Rochester. He has also served in academic and administrative capacities at Columbia University's Teachers College, Chicago Public Schools, and Eastside Union High School District (CA). His research and writing focus on the finance, governance, and policies of education organizations, resulting in numerous books (e.g., Strategic Mergers in Higher Education, New Players, Different Game: Understanding the Rise of For-Profit Colleges and Universities) and other publications (e.g., "The Business of Education: Social Purposes, Market Forces and the Changing Organization of Schools"). Many of these publications have been co-authored with numerous colleagues.Throughout his career Hentschke has served on multiple commissions and boards of directors. Current active service includes: WestEd (past president), California Credit Union (Chair, Supervisory Committee), and Excellent Education Development (ExED). He earned his bachelor's degree in history and economics at Princeton University and his masters and doctorate in education and business at Stanford University.

3 Making Choices: Matching Sustainable Funding with Strategic Priorities in Higher Education

Feridun Hamdullahpur

1 Introduction

Universities around the world—small, large, old, new, regardless of their country of origin—are in a consistent quest to differentiate themselves for global recognition and impact. While almost all of these institutions share a common vision for education, knowledge generation and service, many will characterize themselves as either "education heavy" or "research intensive". These differentiations have created divisions of institutions at a national and global level, attracting certain researchers and students, while their missions for "public good" have not changed since the establishment of the first university nearly 1000 years ago. This public good has only broadened during that time to include their economic, scientific and social impact that have become integral parts of their institutional purpose.

Universities ultimately serve to push society forward. What we have seen in recent decades in that role has broadened exponentially as universities are educating the world's leaders across all sectors and driving the creation of technology, scientific discovery and policy developments to deliver prosperity and advance society.

There is a growing concern in many parts of the world on the short and long-term implications of funding allocations to universities, and also what the short and long-term returns will be of these investments and how they can best maximize economic and social impact. The implications of the COVID-19 pandemic have only exacerbated this evaluation of how to fund vital university operations during a time of economic and societal uncertainty.

This chapter intends to provide an overview of existing models of funding, new trends in expanding resource providers, considerations for how to establish a better understanding of strategic allocation of funds, and explore, briefly, some of the challenges and opportunities COVID-19 has created for funding research and operations at universities.

2 Existing Funding Models for Most Common Types of Universities

Universities around the world are unique in their own ways based on their community, institutional priorities and size.

Regardless of the source or origin of revenue streams, internal allocation of resources can be undertaken in several ways ranging from incremental increases to critically reviewed performance budgeting, depending on the administrative and academic structure of the institution. Here are six of the most commonly used funding models within universities:

- Incremental Funding
- Zero-based Funding
- De-centralized Funding
- Activity-based Funding
- Performance-based Funding
- Centralized Funding.

Each funding model has its advantages and disadvantages that must be weighed by a university and the governing body that both funds and/or oversees the funding of said institutions.

2.1 Incremental Funding

Incremental Funding was once the most predominate model for post-secondary funding in the middle of the twentieth century. This model is based on an institution's previous year's budget with a predetermined incremental increase or decrease across the top-level budget [1]. Funding levels in this model are determined through a number of mechanisms

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based on government budget formulas or based on another economic factor, such as the rate of inflation.

Despite its drawbacks, Incremental Funding is widely used because of its simplicity in the budgetary process and predictability within an institution. It does not require long, labor-intensive preparation every year.

While this simplicity has its benefits it also promotes reliance on maintaining the status-quo as opposed to creativity and innovation at the institutional and departmental levels. It further promotes accumulation of unused funds usually spent on non-strategic expenditures. Simply, it provides incremental (usually inflation plus certain percentage) increase on top of the previous year's funding. If an institution decides to implement budget cuts because of a decline in its revenue streams, it is done across the institution applying to all units as opposed to a select number. Special cases of budget allocation requests outside of this process are acceptable, but usually handled on an ad-hoc basis in order to maintain unit equity across the budgetary process.

2.2 Zero-Based Funding

Zero-based Funding (ZBF) is perhaps one of the most thorough and also labor-intensive processes that requires more time to build new budgets for every organizational unit with no history to previous budgets. It stresses a clean slate budget with everything from previous years of budgets questioned and forced justification [1].

This process further necessitates itemizing and justification of every salary, on-going, one-time expenditures with no possibility of carry over. For some organizations that have the dedicated resources, this is an effective way of curbing cost escalation as well as ensuring high level of accountability. This approach completely eliminates the entitlement expectation of academic and administrative units and ensures that all allocated funds are fully spent and spent appropriately according to the plan.

The inherent benefit of the ZBF model is in its flexibility to shift priorities year-to-year, allowing for better service outcomes. A study comparing the ZBF model to the traditional Incremental Funding model deduced that the former created higher quality outcomes in providing services [2]. This study, however, was performed at the unit and departmental level, not an institutional level. There are innate challenges to the ZBF model, as well. Using a funding model that is limited in time and receives a complete overhaul annually makes it difficult to develop long-term, multi-year goals, projects and initiatives.

2.3 De-Centralized Funding

The De-centralized Funding and budgeting model is based on an institution's overall academic/management structure. This model gives significant autonomy to the university's academic units to allow them to design their own academic plans and priorities so long as they are congruent with those of the university (as is the case here at the University of Waterloo). This model, for an institution's funding, is perhaps closer to a management philosophy than a budgeting strategy. This approach enables the academic units to plan and operate in a federated system with autonomy while being fully accountable for the performance measures and deliverables and allows for a budget which closely follows those priorities.

Thus, the funding an academic unit receives is a reflection of this management structure. While there may be a formula-based variation as to how the tuition and grant revenues are distributed, units receive a total sum of funds at their disposal. They can plan for annual undergraduate and graduate numbers and corresponding faculty recruitment in collaboration with the Provost's office, but, mostly, they do so independently. These units are responsible for their own expenses, in some cases, including space and utility charges. Interdivisional teaching revenues are based on a formula administered through the Provost's office on a fairly even platform to avoid, as best as possible, competition and duplication of resources among academic units.

This approach creates incentives within academic units and non-academic units, in different ways, to strengthen institutional impact and/or meet their strategic goals [3]. For example, Faculty deans and schools are incentivized to explore other revenue sources and philanthropic fundraising, such as alumni and industry donors to meet their specific strategic goals. It is important to note that, budgeting of non-academic and academic support units is done differently because of their inherently different focuses.

While academic and non-academic funding and internal budgeting are done—for the most part—independently, this relies heavily on an understanding of institutional strategic goals.

2.4 Activity-Based Funding

The next type of funding model is the Activity-based Funding (ABF). The ABF model is utilized by a smaller number of institutions as they prefer a model where revenues are aligned with activities with an expectation of maximized

returns. There are countless ABF formulas that are created within each organization that leverages the ABF funding model that are unique to their specific needs.

For example, not all academic or non-academic funding will be tied to an "activity". This includes Faculties or Schools who are sometimes dependent on allocated revenue from tuition that is then divided and distributed. There has been some evidence that the ABF can offer a degree of financial accountability within the units [4]. It allows the reallocation of resources to those areas that are growing, but as a unifying funding model on its own, ABF often does not meet the complex needs of a 21st-century university.

2.5 Performance-Based Funding

A much larger number of institutions prefer the Performance-based Funding (PBF) model instead of ABF. As opposed to incremental adjustments to budget levels or those based on activity, funding within the PBF model is instead based on a number of performance measures.

This is especially critical in jurisdictions where government grants require strict accountability measures coupled with performance expectations, such as employment and graduation rates. Many institutions carry these performance measures into academic units in the form of enrolment targets with entry GPA to SAT scores, retention and graduation rates, external research revenues, publication rates, new startups, and more being common examples.

Studies have shown that although this model of funding can create added benefits around incentivizing change within an institution, its overall, long-term effects are limited [5].

2.6 Centralized Funding

Centralized Funding (CF) sits on the opposite end to the de-centralized model in the realm of university funding models. While it removes many benefits of aspiration and strategic thinking-based budgeting, it may be a preferred option in places where the stability and continuity of external funding, predominantly from tuition and government grants, is not sustainable.

Senior administration, in the case of Centralized Funding, is in charge of making all budgetary decisions, including infrastructure, faculty and staff hiring, program expansions, and other resource allocations. This model is usually, with the exception of the de-centralized model, combined with one of the other models to provide flexibility and control at the same time. The rigidity of the Centralized model makes innovation and adaptability difficult and doesn't always allow for the individual strengths of academic and non-academic units to flourish naturally.

Strengths and Weaknesses of Funding Models.

Model	Strengths	Weaknesses
Incremental funding	• Simple to implement • Budget predictability for institutional units	• Stifles creativity and innovation at institutional and departmental levels • Promotes the accumulation of unused funds usually spent on non-strategic expenditures
Zero-based funding	• Can curb escalating costs • Ensures high level of accountability to justify each item	• Labor intensive to create new model every fiscal year • Limits ability for institution to do long-term planning
De-centralized funding	• Creates autonomy and individual unit accountability to maximize funds • Accounts for unique differentiations between units, while not punishing them • Allows institutional units to contribute to institutional strategic goals while maintaining individual strengths • Allows for unique, unit-based projects to develop more freely	• Positive outcomes for the institution depend on units to understand and have buy-in to institutional strategic plan • Budgeting for academic and non-academic units will require different formulas
Activity-based funding	• Preferred model for smaller institutions • Can produce a level of financial accountability within an academic and non-academic unit	• Does not meet complex needs of a modern university • Can be difficult to quantify certain activities, in turn stifling innovation and growth
Performance-based funding	• Can create incentivization for activity and positive growth in the short-term	• Long-term benefits of model are not definitive • Incentivizes units to meet centralized performance factors as opposed to its own unit growth

(continued)

Model	Strengths	Weaknesses
Centralized funding	• Good for institutions that are not focused on stability or continuity	• Rigid and can be a roadblock to change • Usually requires additional funding models to enable flexibility in time of high needs

The models summarized above are intended to give institutions an overall understanding of what exists as financial modeling options, but, in reality, every institution uses a combination of these models best suited for their own special circumstances, strategic objectives, culture, and history. At the heart of which combination/hybrid will be best fitted will depend on eagerness and willingness to bring in and implement change, especially in these times of significant disruption mainly due to COVID-19.

It is also worth noting that while the COVID-19 pandemic has necessitated the renewed need to look at operations differently, it is not the cause of many changes that we need to consider. COVID-19 has only removed any excuses and barriers that previously prevented us from not recognizing the need to change institutionally. Universities that aspire to greatness must eagerly embrace change. In the future, successful universities will be defined by the ability to meet emerging challenges. In this regard, such institutions will add to their record of success by mobilizing their strengths—research and scholarship and purposeful in-depth teaching and learning—in new ways and with a clear and accurate understanding of the world. Relevance is defined in global terms, not regional or national. Impact is measured against higher standards not just of academic learning, but also of contribution to society's well-being. Our ability to recognize those strengths and areas for improvement, then align them with the needed funding and flexibility will remain paramount. To do this, research universities need to understand and build out their strategic objectives—regardless of budget model—and implement the funding model that allows for that growth in the short-term and long-term but empowering an entire community.

3 Budget Model for a Growing Modern University

An institution can allocate funds in a way that maintains the status quo, seeks incremental growth, or dedicated to continuous growth for global impact.

The following principles are an important guide that administrators should adhere to in the development and implementation of their model.

3.1 Principles of the Model

Academic excellence: Consistent with the University and Faculty strategic plans, academic excellence and quality learning experiences for students will be at the forefront of every decision made within the budget model. This necessarily implies that students will learn in the Faculty that makes most sense to their overall academic program.

Clarity: Methodologies, record keeping and key processes in the new budget are clearly communicated and understood.

Collaboration: The budget is developed, implemented and supported through collaborative and consultative relationships and structures.

Efficiency: Revenue will be allocated and used to support existing and new resources, structures and processes, and all Faculties and Academic Support Units will be mindful of reducing and containing costs.

Long term budget planning: The budget model will incorporate budget planning at all levels of the institution with a longer-term outlook.

Risk management and flexibility: The budget model will include mechanisms to minimize negative impact from changing funding, enrolment or costs and be able to allow an optimal and nimble response to unanticipated or unfavorable funding conditions.

Strategic alignment: The budget model will support the approved overall strategic direction of the university and will align with the academic support required, Faculty and strategic plans.

Support for strategic initiatives: The budget model will ensure that there is a reserved portion of revenues available to stimulate and develop strategic initiatives and institutional priorities guided by clearly articulated academic and business plans.

Transparency and accountability: The University will have a transparent resource allocation process across the Faculties and Academic Support Units with clear data analysis and evidence to support decision making.

It is advisable for the university to use an accounting principle known as "Fund Accounting" where money is segregated in several different Funds, depending on their source and purpose.

Most Funds, including Research, Trust and Endowment, have very specific purposes attached to them instructing administrators on the way that the University must spend that money as prescribed either by legislation or by agreements with the granting agency or donor.

The Fund that is the largest, and the one where the university has the most flexibility on spending, is the Operating Fund. Because of its size and flexibility, this is the fund where the university must develop its funding model.

3.2 Description of Funds Within a Budget Model

While there is a dedicated Operating Fund that oversees the majority of university expenses, there are several Funds that help universities categorize their budgetary and resource needs.

Operating Fund: The Operating Fund is used for the majority of expenses including faculty and staff salaries, utilities, student support, and supplies. The two major sources of revenue that contribute to the Operating Fund are the government grants and student tuition fees. The student fees are mostly applicable to undergraduate fees as for many research intensive universities, given significant research and scholarship support for graduate students, the tuition income from graduate studies, at best, can be neutral.

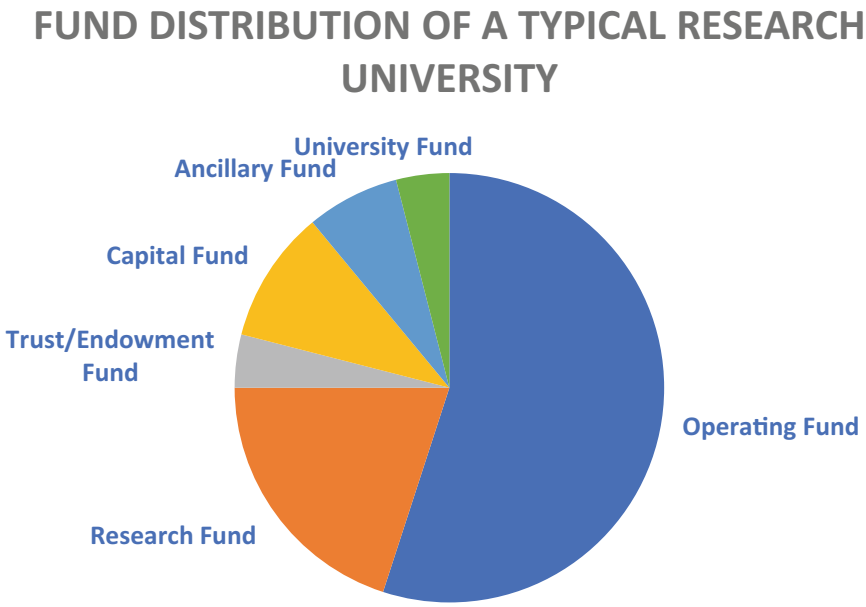
Research Fund: The largest Fund, after the Operating Fund, is Research. When money is given to the university for research purposes, the terms of use are very clearly spelled out; the university ensures that the Research Fund is spent for the purposes intended by the granting agent.

Trust Fund and Endowment Fund: The university has many trusts and endowments, most of which support scholarships, Chairs, and student activities. As with the Research Fund, the university acts as a trustee for these monies, and must ensure that spending is in accordance with the specific Terms of Reference for that donation.

Capital Fund: Outside of operating and research fund, money is set aside specifically to support building repairs and related maintenance and alterations.

Ancillary Fund: Ancillary enterprises include non-academic sources such as Housing and Residences, Retail Services, Food Services and Parking; revenues earned are placed into this fund. The ancillary enterprises pay the university for space, utilities, administrative services, and maintenance from the revenues they receive.

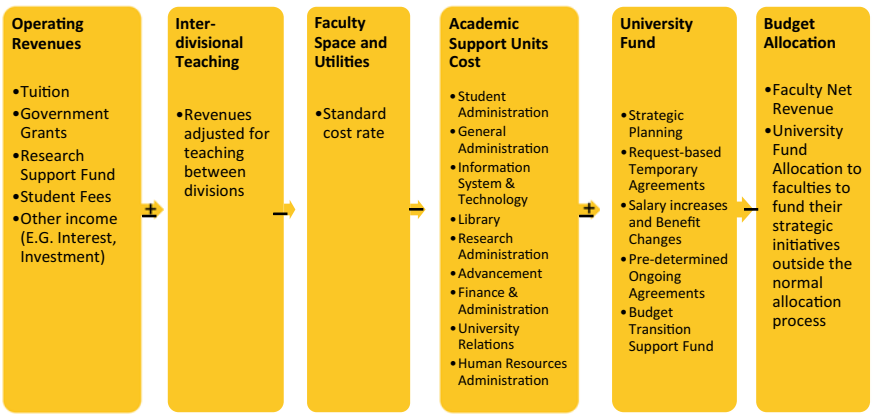
University Fund: A special pocket of funds, raised through a taxation process for each Faculty, is used to fund strategic initiatives proposed by deans. The decision for the allocation of these funds are made by a committee comprised of the President, Provost, Vice President Finance and Vice President Research through a transparent process held twice a year.



Allocation of Operating Fund: In this Budget Model, the process describes how the Operating Fund revenues are allocated to Faculties, Academic Support Units, and the University Fund. Within a given Faculty, the model does not describe how money flows to Academic Departments or Schools; the internal allocation of funds is at the discretion of the Faculty which is congruent to the principles of de-centralized funding model. The following chart illustrates the process, from source to sink how funds are allocated.

4 Strategic Objectives and Plan for Research Intensive Universities

Implementing the funding model of choice is only the first step for universities in making funding decisions. Before injecting money and resources (i.e. expertise, logistics support, etc.), governments and institutions themselves first need to assess their strengths and areas for growth in order to build strategic objectives. At the heart of any university



should be a guiding document of a strategic plan that aids in making key choices by setting short and long-term priorities.

We will detail the process for developing a comprehensive strategic plan as it will act as a guide for a research university. Before going in depth into the process of developing a plan, it is important to stress the importance of utilization. For funding decisions to have the effects they are intended to have, they must be made with a coordinated and long-term view. While small and large internal and external shifts in institutional, national, and global economics will occur—as we are currently experiencing with COVID-19—having an active strategic plan will inform university leaders and their governing bodies of where their funding priorities should lie. Without those overarching pillars of focus an university may be susceptible to swings in priorities with every disruption that may come about.

A well-developed strategic plan that is actually implemented and evaluated at regular intervals allows for continuous improvement and consistency.

4.1 Building with Your Community

The development of a university strategic plan is not something that should be done with a top-down approach. The size and scope of a modern university is too complex and too diverse for a one-sided plan to properly address the needs of an entire community. To do this, every institution must engage with their entire university community.

As laid out in a study of university strategic plans comparing Hong Kong universities with elite institutions in the United States of America, many strategic plans are developed from the view of senior academic administrators [5]. While engaging discussions at the highest levels of authority is important, this severely limits the scope and possibilities of ideas that can be added to the strategic plan.

Students, faculty, postdoctoral researchers, staff, alumni, governing bodies (i.e. Boards of Governors, Senate), and the broader community of partners and supporters (i.e. industry partners, local government) all should have a voice in the plan and also see themselves inside of it. For example, during the recent development of the University of Waterloo 2020–2025 Strategic Plan, *Connecting Imagination with Impact*, the university set out on broad consultations that included participation and feedback from more than 3,500 members of the university community making it "everybody's" plan.

Building a broad base of collaboration brings with it a commitment of time and resources, but it ultimately results in a sizable range of institutional and community support to implement the plan. As Chan argues in their study of university strategic plans, "strategic planning needs resources to support and develop."[6]. Once that plan is developed that includes key performance indicators (KPIs) to track, an implementation plan is needed to gauge when and how an organization will need their targets and what resources need to be committed and where across the university.

4.2 Implementation of Plan

A plan, while vital to long-term growth, is only as strong as its implementation plan. Developing an implementation plan depends on the goals it has set out. We will delve into the process of crafting those goals, first.

Strategic plans can come in many different shapes, sizes, and level of complexity. Typically, they are formed around a set of themes or pillars. For example, these themes could revolve around research, teaching, and entrepreneurship. These themes are meant to be broad yet will focus an organization on these core ideas.

It is, again, important to recognize that many strategic plans end up sitting on a shelf never utilized if there is no university-wide buy-in, continuity, and reporting on progress through sound accountability measures. Building KPIs, an implementation plan that is appropriately funded, and creating an accountability framework that is designed into the plan makes achievement more likely.

4.3 Empowering Academic and Non-academic Units

Utilizing a funding model across a university that incentivizes innovation and personalization is essential to avoid institutional stagnation. As previously discussed, there are several budget and funding models—including a combination of more than one—that can be utilized. What we have observed at several institutions (and, most directly at the University of Waterloo) has strengthened outcomes is the de-centralized model that funds each academic and non-academic unit based on a formula that combines needs, research objectives, and enrollment with an ability to have access to additional funds for "out of the box" strategic initiatives. The unit controls those funds and uses them as they see fit to achieve their own goals.

What is important in this de-centralized model is how the academic unit uses their budget to also meet the goals of the university's overarching institutional strategic plan. This encourages the academic unit to utilize the institutional goals to help develop and guide their unique objectives in a cascade fashion and the creation of their own strategic plan. An example of this can be found at my institution where Faculty of Engineering developed their own strategic plan on the basis of the institutional plan [3]. The Faculty uses similar language and areas of focus as the central plan, but have

crafted five key priorities that are unique to their needs and they have the control of the resources to achieve their research, teaching, and impact goals.

Select non-academic units can also opt to develop their own strategic plan, but given their smaller scale, some choose to develop a mandate letter with the core administration to ensure their budget commitments align with the core strategic goals of the university.

Funding the needs of the unit should not be dictated line-by-line like the centralized funding model, nor by the limiting incremental model or the unpredictable zero-based model. With that said, there must be financial accountability designed within the de-centralized model tied to milestones and the incorporation of institutional strategic goals [7]. To meet the objectives of an ambitious 5-year strategic plan, the academic and non-academic units need consistency, a healthy degree of autonomy, and the incentivization to push forward and grow exponentially.

To spur growth, however, a university must continue to explore new funding sources outside of tuition and government subsidies as this will encourage long-term partnerships and innovation by encouraging universities to collaborate.

5 Aligning University's Key Differentiators with External Funding Sources

Every university has unique differentiators that set them apart from other peer institutions. Strengthening and expanding those differentiators is important for any research university but doing so means acquiring the resources to do just that. Universities also cannot expect or anticipate public funding for all of their needs. For more than a decade funding for universities in places like those in the United States has declined by 28% [8]. This challenge will only be exacerbated in the coming decade with the sharp rise in national deficits due to COVID-19. To help close that gap for research universities, the development of external funding sources is more essential than ever to meet organizational goals and increase impact.

It is important to first align those differentiators with external funding sources, such as industry partners, alumni donors and general non-government investments in research. This section will outline a few of the core areas of consideration when assessing the alignment of differentiators, funding sources, and expected outcomes.

5.1 Aligning Priorities Between Partners

There are several layers to assessing an institution's research priorities from a centralized view and also that of a single academic unit. As mentioned previously, a university can set out ambitious strategic goals for the entire university and empower their academic units to develop their own targets and areas of interest, and fund said targets with a measure of latitude. Studies of external research funding, however, have shown that without proper alignment between strategic, research priorities, confusion and the loss of productivity/impact of the external funding partner can ensue [8]. This makes the assessment of research priorities from top-to-bottom before funding decisions are made, vital to overall success.

Research priorities are not just focused on the disciplines or subject areas of a university. Funding for biomedical, mechatronics engineering, and other core areas of research impact are important to assess, but also too is the spectrum of what projects to include at the fundamental research level and all the way to commercialization of intellectual property (IP) level. Funding each of these areas is important to the overall strength of a university as they have the potential to display the innovation pipeline possibilities from beginning to end. How much and in what fashion a university funds these areas through external funds will often determine what external partner would be interested and willing to support.

Reaching out to industry partners to begin exploratory discussions around specific needs in the sector is the first step in discovering solutions that can be offered and the funding available. This is valuable in the efforts to glean industry trends that university researchers may not be privy to in their day-to-day work. This synergistic view of university differentiators allows for a larger offering to potential external funders that complement the research priorities of the university.

It should also be recognized that key differentiators are not exclusive to a research discipline, piece of equipment, or facility. A university's students-at the undergraduate and graduate levels—are unique in and of themselves that can offer strength to bringing in external funding.

5.2 Entrepreneurship, Commercialization, and Intellectual Property

An additional factor that must be considered when developing external funding partners is the role of commercialization, intellectual property (IP), and the broader entrepreneurial possibilities. For a modern university to ignore the practical applications of the new knowledge, discovery, and innovation being created by its researchers is a loss to society and the global community. A challenge to seeking research partnerships often stems from ownership of the IP being developed.

Many universities in the United States, Canada, and around the world use an IP policy that inserts the institution

right in the middle of the ownership of the research. The logic of the university is that if the IP was developed using their facilities by those employed at the institution, the university has ownership rights to said research. In these examples, the university is inserting itself into a partnership between the researcher and the external funder, disincentivizing the commercialization of the IP for the researcher and the partner. This does not have to be a conflict.

Implementing a creator-owned IP policy takes the university out of the equation. It allows for a continued expansion of industry partnerships due to increased incentivization to work with a university's researchers and even for those researchers to launch their own ventures.

While a creator-owned IP policy makes it so that the university does not financially benefit from an ownership stake in the IP or business being developed, it does break down barriers that allow students, researchers, and industry partners from commercializing their research. In turn, the businesses that are created can become dedicated donors to the university, future employers of students and graduates, and an economic engine for the region and nation.

5.3 Importance of External Funding Sources

External sources of funding have long been an important part of a research university's revenue. This is for many of the reasons above, but also for the simple need of having diversification of funding to hedge against shifts in societal or economic norms. For example, changes in government, national and global recessions, and geopolitical shifts that hurt trade all have impacts on the ability of state-supported universities to sustain their research activities, let alone grow them.

Two separate reports from Springer point to the importance of incorporating external research funds to the ongoing strength of universities. An analysis of project-based research funding found that "the success and prestige of university are increasingly linked to its ability to garner external funds" [9] and at the same time the university's ability to garner outside funds shows that it enhances the external view of the institution without sacrificing academic freedom or university autonomy away from national support [10].

Universities need to incorporate external funding sources such as industry partners, but to do so effectively they need to do so with internal alignment of priorities, strategic goals, and their unique differentiators or risk limiting growth and impact.

6 Making Choices in the Time of COVID-19

The COVID-19 pandemic has been mentioned several times throughout this analysis of funding models. It is an unavoidable, disruptive force that will have short and long-term impacts on research universities, regardless of size. It will impact the number of students who attend university. It will impact the number of graduate students and their scope of projects due to diminishing funding opportunities. And, it will simply mean fewer resources from both public and private sources.

COVID-19 has put enormous financial pressure on governments and businesses of all sizes, stunting the ability to invest the needed resources into research and scholarship. Two aspects of funding and budgeting for a modern, 21st-Century university have been discussed in depth—internal models and aligning with external funding sources—and it is important to assess what further impacts COVID-19 will have on decision making around both.

6.1 Internal Models During COVID-19

Those institutions that were utilizing more rigid or dynamic models of funding, such as centralized, incremental, or zero-based funding will be faced with many difficult decisions in the coming months and years. COVID-19 will be changing the research priorities for nearly all research-intensive universities, regardless of whether they have a medical school or not. Health care and health related scholarship will be a primary focus for many institutions for the simple fact that this research is now more essential than ever. The United States alone has committed $1.25 billion (USD) to research institutions as part of the first stimulus package [11]. Similar investments in health care research have been made in Canada and the European Union.

A funding model that allows flexibility to change at the macro and micro level will provide universities and their academic research units with the needed agility to respond to shifts in research demands without a draconian shift from the top, thus alienating those researchers who feel left out from the shift. Each academic Faculty can be empowered to find their own way to develop their own view of how to address the ripple effects of COVID-19 across our society.

6.2 External Funding for Research During COVID-19

Research funding will need to come from collaboration now more than ever. Resources at the government level will likely face significant restrictions in 2021 and beyond as

national budgets adjust to record-breaking deficits. Corporate budgets, too, will face similar restrictions as many continue to grapple with cash-flow issues of their own. This will mean that national and international collaborations will become even more important to develop, even as they become logistically more challenging.

The natural inclination for nations during times of disruption and restriction, like now, is to become enclosed. Research universities must fight this inclination and instead embrace new forms of partnerships. This can include cross-border research projects, such as the ones in which KAU and its partners are involved. Each party sees an alignment and also the benefits of pursuing a cross-border collaboration, even as borders become harder to physically cross.

It is impossible to avoid the effects of COVID-19, but now is the time to build flexibility and exploration into budgeting and funding. Ensuring there is an agreement on strategic direction internally and reaching out externally to new possibilities, both in research and in development of new discoveries, the time during and after COVID-19 will continue to be productive.

7 Conclusion

Ensuring a university is appropriately funded will always be vital to the success of an institution, but it is also important as to how those funds are dispersed internally and aligned with overall strategic objectives. Making those choices comes down to the series of choices at the disposal of administrative leaders. It is their duty to build trust amongst their academic and non-academic community or risk the challenges that comes from a disconnected or centralized university.

There must be a balance and that balance is dependent on establishing and building trust, empowerment, and ultimately accountability within the institution. Without these three factors a modern, 21st-century research university will remain a step behind, regardless of how much money is committed to its success.

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Prof. Dr. Feridun Hamdullahpur has served as the President and Vice-Chancellor of the University of Waterloo since 2010. Dr. Hamdullahpur earned an M.Sc. (1979) in Mechanical Engineering from the Technical University of Istanbul and a Ph.D. (1985) in Chemical Engineering from the Technical University of Nova Scotia (TUNS). He was appointed Assistant Professor (1985) at TUNS at the Center for Energy Studies, Associate Professor in TUNS's Department of Mechanical Engineering (1990) and later full Professor of Mechanical Engineering (1995). Dr. Hamdullahpur is currently a Professor in the Department of Mechanical and Mechatronics Engineering at the University of Waterloo, while he serves concurrently as President.Throughout his career, Dr. Hamdullahpur has been an active researcher in thermo-fluids and energy engineering, a passionate teacher and an academic administrator. He has authored hundreds of scientific and academic publications and supervised over 50 graduate students. He was named a Fellow of the Canadian Academy of Engineering in 2014.As President of the University of Waterloo, Dr. Hamdullahpur has devoted his tenure to fostering excellence in academics and research, with a dedication to developing an innovative culture committed to experiential education. Through President Hamdullahpur's stewardship, the University of Waterloo has remained Canada's most innovative university for 27 consecutive years.His current focus at the University of Waterloo is expanding its lead in innovation, building on Waterloo's long-standing and emerging strengths in co-operative education, research, entrepreneurship, and equity.The President continues to serve in many roles on committees and boards. He has been Chair of the Waterloo Global Science Initiative since 2016, an active member of the Sorbonne Université Strategic Orientation Committee since 2014 and a member of the King Abdulaziz University International Advisory Board since 2017.The President is one of ten global university presidents named a United Nations HeForShe IMPACT 10 x 10 x 10 champion selected to engage boys and men in the cause of gender equity. In acknowledgment of President Hamdullahpur's leadership in education and innovation, he was awarded the l'insigne de chevalier des Palmes Académiques by the French Republic in February 2019, the Queen Elizabeth II Diamond Jubilee Medal in January 2013, and a Fellow of the Royal Society of Canada in 2018.President Hamdullahpur is a member of the KAU IAB.

The Constant Search for New Sustainable Funding Sources for Public Universities

4

Peter William Mathieson

Abstract

Although publicly-funded universities receive financial support from governments for teaching, research and infrastructure, they require additional sources of income in order to survive and thrive, and particularly to allow innovation and strategic development. It is amongst the responsibilities of the university leadership to ensure financial viability and to seek novel sources of funding, tasks for which they are not always well-trained. In this chapter, the author draws on his experience as a university leader on two continents to illustrate the possibilities as well as some of the hurdles and challenges. The chapter includes sections on philanthropy; alumni relations; industry/business relationships; commercialisation of research; and digital technologies & future horizons. Universities need to diversify their income streams, invest to succeed and get better at demonstrating their societal worth. Education is one of the most powerful tools of social and economic mobility. The world needs us to succeed!

1 Introduction

The recent designation of King Abdulaziz University (KAU) as one of three in Saudi Arabia to enjoy autonomy in academic, financial and administrative affairs under the new University By-Law is an exciting moment in the history of the university. It gives the University greater independence in conducting its duties. It also brings a significant challenge: to flourish as an autonomous organisation in a time of great economic, social and political uncertainty. The world is wrestling with the consequences of the SARS-CoV2 pandemic, which is far from over at the time of writing, as well as recent complexities in global geo-politics including deteriorations in the United States-China relationship; Brexit, requiring the United Kingdom to re-define its place in the world; population demographics which combine ageing populations with longer life expectancy plus falling birth rates in many parts of the world including the Middle East. Population growth is most marked in the African continent, with the projection that Nigeria will be the world's second most populous country by 2050, overtaking China. I will return to the significance of the African continent towards the end of this chapter. Universities seeking to succeed in this complicated and challenging world, with the growing pressures of climate change and seismic shifts in energy consumption, will need to diversify their income sources, develop flexible and adaptable policies on recruitment, alumni relations, philanthropy, engagement with industries and businesses, communications and marketing and be more effective than ever before at explaining their strengths and their contributions to society. I will draw from my experience to address these issues from the viewpoint of the member of a KAU's International Advisory Board. My remarks are intended however not to be for just one university but to be for universities and schools more generally.

2 The Role of a University Leader

One of the ironies of academic career progression is that university leaders have typically risen through the ranks based on their achievements in research and/or teaching rather than primarily because of their management expertise. Few university leaders have received formal training in finance or human resources, areas which will take up much of their time when in leadership positions. Some will have received training in communications, marketing and/or media interactions but as with finance and personnel matters, university leaders often have more "on the job" experience than formal pre-emptive training. This was certainly

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true for me: in the early years of my professorial career I steadfastly avoided administrative responsibility, preferring to concentrate on research, teaching and clinical medical practice. It was only when my research group had established its international reputation, and the long-term funding of the group was more secure, that I felt able to take on a broader leadership role. I was therefore experienced at finance and personnel on a relatively small scale, leading a research group, but needed to rapidly acquire knowledge and experience in larger scale leadership and to take responsibility for subject areas very different from my own. Perhaps one of the responsibilities that weighs most heavily on university leaders is the one under discussion in this chapter: securing resources for the continuation, development and (hopefully) expansion of one's university. The careers and livelihoods of so many others depend on the success or failure of university leaders in this domain, so that this can be an onerous responsibility and one of the most troublesome issues which can keep university leaders awake at night. This is true for university leaders all over the world: whether in a public or a private system, whether in a comprehensive or a focused university, whether in a developed country or a developing one. If asked to define the role of a university leader in a single phrase, I say "to protect and enhance the university's reputation". The harsh reality is that now and increasingly into the future, the role is also to ensure the university's future existence. Finding sustainable finance is a key part of this: money isn't everything but it is certainly impossible to run a university without it! Therefore the university leader of today must be a communicator; fund-raiser; capable of interacting successfully with governments, media, alumni, philanthropists, industrialists, business leaders, venture capitalists and the general public as well as with their own students and staff. There isn't a training course: maybe we should start one.

3 International Variations in the Funding of "Public" Universities

Universities in the UK are predominantly public organisations, that is they receive some funding directly from government, derived in turn from public taxation. Whilst this has been true throughout my career, in the last 22 years, since university tuition fees were first introduced by the Labour Government in 1998, there has been a progressive shift from public (Government) funding of universities in the UK to a mixed economy where an increasing proportion of income comes from students and their families and other supporters, and a reducing proportion comes directly from Government in the form of block grants. The situation in Scotland has been different from the rest of the UK since 2007 when the Scottish Government, whose devolved powers from the Westminster (London) Government include responsibility for education, decided that Scottish-domiciled undergraduate students should not pay tuition fees and their tuition costs would be under-written by government funding directly to universities in support of a capped number of undergraduate places. Therefore at Scottish universities there is a complex fee landscape for undergraduate students: "home" students (domiciled in Scotland) pay no tuition fees; students from the rest of the UK pay the same as they would in England; international students pay more. In other parts of the UK there are also some differences: in Northern Ireland, undergraduate fees are capped at less than half the level in England; in Wales there is a modest reduction in fees compared to England.

Research funding in the UK includes substantial levels of Government funding, much of it under the auspices of United Kingdom Research & Innovation (UKRI) but also some funding schemes from other government departments (Health, Foreign Office, Business etc.). Non-governmental research funding comes from industry and businesses, from charities and from diverse non-governmental organisations. For a large research-intensive university like the University of Edinburgh, a rough estimate is that one third of our funding comes directly from tuition fees, about 20% from government grants and almost 50% from other sources including research funding, philanthropy, industry, service provision (accommodation, catering and events) [1]. Similar universities in England would receive a slightly higher proportion from tuition fees and a slightly lower proportion directly from government, because of the difference in government attitudes to "home" tuition fees outlined above.

There is a key point to note here: research funding in the UK does not cover the full costs of the research, and therefore the research requires cross-subsidy from other sources of income. This is mainly from international student tuition fees, which are not capped in the same way that home fees are capped, and from activities such as accommodation, catering and events where universities can generate surplus (not "profit" as such because we are non-profit organisations, but financial surplus which can be re-invested into the activities of the university). It is also a fact that research funding is "money in, money out": it is spent entirely on the costs of research, topped up as necessary by the cross-subsidy described above, and does not contribute to the "bottom line". Therefore in consideration of the funding that is available to the leadership of a university to invest into new buildings, new staff or new activities, research grants are largely irrelevant. Research excellence contributes very substantially to reputation, not least because most of the international league tables are very heavily weighted towards the recognition of research excellence, but it does not help the finances of the university directly. It is my firm opinion that these facts are poorly understood by many

academic staff as well as by the public and until recently also by governments. One "silver-lining" of the recent SARS-CoV2 pandemic is that the fragility of a research funding system which depends so heavily on cross-subsidy from international student tuition fee income as well as on external events such as conferences has been clearly exposed. The UK Government has now recognised this and is trying to respond, although public finances will clearly be very difficult for the next few years as a result of the economic recession which will follow the pandemic, super-imposed on the uncertainties created by Brexit. University leaders will need to look for new and different sources of funding with even more urgency than before.

The university system in Hong Kong is predominantly also publicly funded, in fact to a greater degree than in the UK because tuition fees charged to home students remain relatively low and almost all research funding comes from governmental sources. There are a few small private universities in Hong Kong but the majority of higher education provision is in eight government-funded universities. Competition for places is intense and many Hong Kong students either have to go abroad to seek university education or attend a community college or similar tertiary organisation in Hong Kong, many of which have articulation pathways into universities. When I was President of the University of Hong Kong (HKU), the oldest and highest-ranked of Hong Kong's universities, about 10% of our income came from philanthropy, reflecting the extreme generosity of benefactors, both alumni and non-alumni, towards HKU. Other universities in Hong Kong also benefited from philanthropy during that period, although to lesser extents than HKU. By contrast, although at the University of Edinburgh we have just completed our best ever year in terms of philanthropic income, it still "only" represents about 3% of our total income. The university system in Hong Kong is intermediate in its dependence on philanthropic income between the UK, where philanthropy even in the most successful universities still represents a small proportion of income, and the United States of America (USA) where this type of funding is so crucially important.

I have never worked in the USA system, but I do have some knowledge of it based on my work as a Trustee of CASE, the Council for Advancement and Support of Education, a global organisation based in Washington DC [2] and also from visiting US universities and colleges and talking to university leaders there and at numerous conferences and events over the years. There are over 4300 degree-awarding institutions in the USA, including around 3000 "4 year colleges" which equate to universities elsewhere in the world. 38% of the institutions are public, 39% are private not-for-profit, 23% are private for-profit. Therefore the tertiary education system is much more heterogeneous in the USA than it is in UK or Hong Kong. There is much that universities elsewhere in the world can learn from the USA, both in how to do things and how not to. CASE has changed its remit in recent years from being a predominantly USA-based organisation for the advancement profession to one with a much more global perspective. One of the primary motives for this has been the recognition that educational institutions elsewhere in the world can learn a lot about what works well in the US system and what does not, and can apply this learning into testing new initiatives and ideas in their own settings. Private American universities do receive some government funding, particularly for research, but public universities generally receive a higher proportion of their core funding from state (especially) or federal governments. Tuition fees are higher in private universities, which also tend to have higher endowments, the income from which is critically important to their sustainability. For example Harvard has an endowment of over 40 billion US Dollars which provided 35% of the university's total revenue in Fiscal Year 2019 [3]. In addition, 9% of Harvard's revenue came from philanthropic gifts. By contrast, the top ranked public university in the US is Michigan-Ann Arbor at number 21 in the world [4] and it receives an estimated 14.1% of its funding from the Michigan state government and 73.4% from tuition fees [5] leaving only 12.5% for other sources of income including endowment income, philanthropy etc.

4 Lessons for Universities Elsewhere in the World

It is a source of regret that universities world-wide are progressively less able to rely upon government funding. As the number of universities has increased, and the proportion of people attending university has risen, it was inevitable that governments would be less able to support universities. This was true even before the deep global recession which is predicted to follow the SARS-CoV2 pandemic, but will be even more the case now. It takes many years to build up endowments, and few universities in the world are as fortunate as the large private American universities like Harvard (funded in 1636 and the oldest institution of higher learning in the United States) to be able to rely on huge income from a massive endowment. Most of the rest of us live in a world where our existence is more fragile. The endowment of the University of Edinburgh is 460 million GBP, equivalent to 601.8 million US Dollars, about 1.5% of the size of Harvard's endowment, and an amount of money representing less than half of our annual operating costs whereas Harvard has over 7 years' worth of operating costs in its endowment. Edinburgh is one of the most secure of UK universities and yet is financially poor compared to Harvard. How can we ensure the sustainability of our public universities? (Table 1).

Table 1 Alternative sources of income

Philanthropy
Industry/business
Commercialisation of research
Digital technologies and future horizons

5 Alternative Sources of Income

5.1 Philanthropy

I have mentioned philanthropic income above. This is a major potential source of additional income, but requires investment in fund-raising infrastructure and expertise and also shows marked international variation. In the UK, where education has traditionally been paid for out of general taxation (albeit no longer substantially the case, as outlined earlier, this is still very much the public perception) and people feel that they have already paid for education, so why should they pay again? Isn't it the government's responsibility to pay? These are comments that I have heard from potential donors in the UK. It is interesting that although the same is true in Hong Kong about public funding of education, wealthy people there seem to need less persuasion that education, especially universities, are worthy of further investment. Some of this might be because of the very powerful intrinsic belief in the importance of education that undoubtedly characterises the Hong Kong population. This is also true in some other East Asian cultures, although the distribution of wealth in some parts of East Asia makes it more difficult for large numbers of people to contribute significant sums. American universities, both public and private, do an excellent job of creating and maintaining a sense of community in their populations; one friend remarked to me that from the first moment that a student speaks on the telephone (or these days online) to an American university, they become a member of the university community that will be nurtured and incubated so that they are motivated to contribute to that community for the rest of their lives. This led me to a concept that I developed during my time at HKU and have continued at Edinburgh: think of students not just as students but as "future alumni". Help them to feel that they are members of a lifelong community. Encourage them to support future generations in benefiting from a university education in the same way that they have benefited. Another very wise remark made to me, by the Provost of a major private American university, was that when speaking to potential donors, he says "someone that you will never know contributed to the costs of your university education. All that I am asking you to do now is to do the same for someone else". This is a very powerful tool: university education transforms lives and the people whose lives have been transformed will often become wealthy and/or influential themselves and can form a pool of willing and able contributors to their university's future. One aspect of the United States system that intrigues me is that the system allows mobility, credit transfer, switching allegiance between one college or university and another, multiple degrees etc. and yet this phenomenon of alumni loyalty remains strong. Wealthy Americans will often donate to more than one alma mater (although it does seem perverse that sometimes the larger donations are to the wealthier or more-established universities rather than to the smaller, younger or less-established institutions that need the support even more). Harvard, the wealthiest of all American universities as well as the oldest, didn't achieve an endowment of 40 billion USD without being able to persuade donors that despite its wealth, it can still benefit from further investment. One mechanism is to ensure that wealth is used to support those that are less wealthy: large private universities in the USA use their endowments to provide a lot of support for applicants from less wealthy origins, in the form of scholarships and bursaries. In my opinion, this is one of the best uses of philanthropic income: levelling the playing field for less advantaged people and at the same time creating opportunity for new successful alumni, who will in turn themselves likely see the transformational power of education and be prepared to invest in it for others.

A striking feature of the philanthropy that I experienced in Hong Kong was that many of HKU's major donors were not alumni. In many cases they were not alumni of any university, not having benefited from tertiary education themselves, or in some cases even from secondary education, but able to appreciate the power of education so that, having become wealthy, they were prepared to invest in universities for the future. My major learning from that period was that donors need to believe in a vision. University leaders must be able to describe a future where universities will contribute to new knowledge and new societal development. For some donors, the subject area will be tightly focused: medicine and healthcare is probably the most frequent example, or within that, cancer or stem cells or cardiovascular disease or suicide prevention. Finding out what the potential donor is most interested in, and aligning that with what your university can contribute, is absolutely at the centre of the advancement professional's job. I have also found that additive or synergistic motivation is also very powerful: with current funding (e.g. from government or tuition fees) we can achieve $\times$ but with additional investment we could achieve $2\times$ or $3\times$. Donors generally like to see matched funding or at least a contribution from government and/or from the university itself, so that they feel that their donation gives additional impetus to something that has already inspired confidence from others.

A particular phenomenon in philanthropic giving to universities, very important in Hong Kong and also often so in the USA, is the power of naming. Assigning one's own name, or the name of a family or Foundation, or (especially in Hong Kong's case) of a revered relative, often a father recently or long-deceased, to a building or lecture theatre or monument, is a powerful desire and wealthy people are prepared to pay for it. In the USA, such naming agreements are often time-limited: say 20 or 25 years, sometimes in the expectation that buildings will only last that long (an interesting concept to the Principal of the University of Edinburgh, where some of our buildings are hundreds of years old!) and this is a good way of managing expectations and also possibly of encouraging a further donation to maintain or renew a naming if the donor or successors so wish.

The complete opposite is the wish of some donors to remain anonymous. There are numerous possible reasons for this: my view is that donors' wishes should be respected but of course anonymity does not mean that the due diligence applied to the propriety of any donor and their motivation should be any less than for a named and publicised donation.

If a university wishes to enhance its philanthropic income, it must be prepared to invest in advancement professionals and expertise, working on alumni relations, on relationships with non-alumni individuals and Foundations, and closely linked with communications, marketing, branding, merchandise etc. There is much to be learned from American universities, although I have frequently encountered strong feelings amongst American alumni that some universities overdo the asking, and there is donor fatigue. Getting the balance right is an art.

5.2 Industry/Business

The relationship between universities and industry is a patchwork: in some subject areas, for example engineering, the interaction often seems natural, comfortable and well-established. Staff move between sectors or are sometimes jointly employed between a company and an academic institution. Training programmes are shared, with university students spending time gaining work experience at the industrial "coal-face" and business executives providing teaching in universities and often contributing to research programmes and maybe even studying for further qualifications themselves. In other subject areas, the relationship is not so successful: in my own field, medicine, for example, in the early years of my research career it was not common for researchers in the UK to directly engage with industrial partners and there was a sense that universities saw funding from pharmaceutical companies as somehow tainted or less desirable than funding from government agencies or charities. This has seen a welcome change in recent years: medical researchers and drug or device companies often want the same thing and are more powerful if they collaborate. Some of the sensitivity that I have seen in the relationship has undoubtedly been because of money. Industry was seen as wealthy and powerful but motivated by profit. Universities were seen as aloof and snobbish, only interested in industry as a source of funding. Neither stereotype was probably ever true, but the realisation that universities and industrial partners can have a synergistic collaborative relationship is relatively new in my field, for example in drug design. I mentioned earlier that research in the UK is generally under-funded and requires cross-subsidy; an exception is industry-funded research, where a commercial partner is often better able to understand the full costs of research and to be prepared to pay them. Therefore, while industry-funded research is rarely a source of major surplus, it can at least cover its costs so that enhancement of reputation does not need to be cost-subsidised. Contract research, advisory agreements and consultancies can all form useful sources of income for universities and I see the relationship between the business sector and universities as a potential growth area. This is helped by geographical proximity: for example Siemens AG is the largest industrial manufacturing company in Europe and has co-located major activities with university partners in Darmstadt, Germany and in Lincoln, UK. By contrast, Hong Kong has very little manufacturing industry now, so that universities there need to look further afield for industrial partners, often in Mainland China or other parts of East Asia. Physical distance should not be a barrier to industrial collaboration in these days of excellent digital communications, but distance does make it all the more challenging to build new relationships. Universities again need to invest: they need people that understand business and the commercial sector, who can bring together areas of expertise in universities with routes to application and marketing in industry. As with so many things, communication skills are important. The social sciences and humanities must not be marginalised in this thinking: they play vital parts in the understanding of the world's problems and the development of solutions. The recent pandemic is a striking example: although the immediate impact is one on health, the effects on economies, poverty, inequality and social cohesion seem likely to be even greater, long-lived, deeper and harder to solve. Universities must learn from the subject areas where a relationship with industry and the commercial sector seems more obvious, natural and mutually beneficial, and then extend the thinking to other subjects and areas of expertise. Genuine multi-disciplinarity will be the way of the future and this applies to cross-sectoral links as well as to cross-subject links internally in the university sector.

5.3 Commercialisation of Research

This is an area in which in my opinion universities have not yet generally found the right approach. There is a tendency to wish to ensure that if a university researcher makes a major new discovery or innovation, the university will profit accordingly. This can lead to bureaucratic risk-averse processes which actually serve to stifle creativity rather than encourage it. Universities should recognise, reward and incentivise research commercialisation in their promotion and pay procedures. Keeping a share of intellectual property rights for the individual researcher and for the employer obviously makes sense, based on the small chance that a university is sitting on the next Google or Alibaba, but if the legal, governance and regulatory framework that is put in place to cover that small possibility is too oppressive, both individual researchers and the university itself will lose out.

Cultivating a relationship with venture capitalists, using internal or philanthropic funds to "pump-prime" spin-out companies or start-ups, encouraging the development of entrepreneurial skills amongst students and staff, all play a part. In my experience this is best developed at Stanford University's so-called "d.school", full name the Hasso Plattner Institute of Design, whose website [6] encourages donors to give $5 million for a Directorship or $2 million for a Fellow. Every student is expected to start at least one company. The "design thinking" is brilliant: students are encouraged to go out into the community and talk to people, find out what problems get in the way of their daily life or cause them insurmountable problems, then come back to the university and work on a solution. This is such a better approach than the traditional "invent a gadget and then think of an application for it".

5.4 Digital Technologies and Future Horizons

Universities do not have a monopoly on digital technologies, but we must be major exponents of their application and their improvements, as well as the location of debate on their ethics, regulation and law. I have never believed that the advent of digital education, with Massive Open Online Courses (MOOCs) etc., would spell the end of conventional university education. Universities are also home to research and innovation; to communities of scholars and experts; to experts of the future, learning, growing and developing together. MOOCs provide an alternative form of education for those people, often older, in employment or in parts of the world with less access to conventional university education. Much of their content and delivery will depend on universities themselves. However, the world has changed with the recent SARS-CoV2 pandemic. Universities worldwide have been forced by circumstances beyond their control to rapidly switch to online provision of education and assessment. Researchers have been forced to find new ways of working. Our reliance on digital communication has been greater than ever. What does this tell us about the university of the future and how we should seek to fund it? Will we need fewer office buildings if people (for reasons of health safety, minimisation of travel or personal preference) work from home more extensively in the medium to longer term? Will there be a shift away from research that requires particular facilities or locations, towards research which is more flexible, theoretical or based "in silico" rather than in vitro or in vivo? Will governments wish to see more focus on healthcare, both in terms of research and also in the education and training of healthcare workforces? How will these be conducted in the new digital world? This should be seen as an opportunity not a threat. Parts of the world, including but not limited to the African continent, which have previously had less access to conventional university education can in theory be brought into the fold more easily in this new world. Addressing "digital poverty" will be crucial: access to devices, to broadband or wireless connectivity, and to the time required free of caring responsibilities, working duties or the mere act of survival cannot be taken for granted. These workstreams can form income-generating activities for universities, although sensitivity on pricing to take account of affordability in different regions will need to be carefully developed.

Universities can enhance their relevance, and therefore their sustainability because of demonstrable value to society, by turning this latest threat into an opportunity. My mention of the African continent is deliberate, not least because of the population demographics to which I referred in the Introduction: of the next 3 billion people to be born on our planet, 2 billion of them will be in Africa. Areas including Europe and the Middle East will see increasing migration from Africa whilst their own indigenous populations shrink. The ways in which other regions of the world interact with Africa and its population explosion in the next few decades will have a major impact on the world. Surely we can persuade governments, philanthropists, industries and businesses of the logic of active engagement with those parts of the world where the development will be fastest and most urgent? It could be argued that universities are sometimes too inward-looking, too concerned with their own internal woes. My assertion would be that by raising our gaze and seeing the extent to which we can and must influence the future of our world and its inhabitants, we will directly address our own future sustainability.

6 Conclusions

Universities need to diversify their income streams and they have plenty of material with which to do so. Targeted investment will be required to strengthen capacity in fund-raising, alumni relations, branding, marketing and communications. Building industrial links requires effort, investment and lateral thinking. Universities must harness local strengths but also look further afield for suitable partners. Examination of international best practices, a few examples of which I have cited in this chapter, is worthwhile to highlight possible approaches but obviously each university must set its own priorities according to its own social, political and economic context.

Universities must improve their ability to demonstrate their societal worth: solving problems, creating new knowledge, forming new companies which can create new jobs and contributing to local, regional, national and international prosperity. We must harness the brilliance and conscientiousness of our students and staff. We must be hotbeds of innovation and invention. We must collaborate across disciplines, sectors and national and international boundaries to address the existential challenges facing our world: climate change, pandemics, inequality, food security, water, cyber-security, conflict, renewable energy, access to education and healthcare. These are the ways to ensure our future. Universities are highly resilient organisations; some in Europe are many hundreds of years old and have survived wars, social disturbances, political upheavals, famine and disease. However we cannot be complacent, passively holding out our hand to governments and expecting them to underwrite our future. We need to seek new applications of our excellence. We need to convince the small number of wealthy individuals and Foundations in the world that investment in us will yield benefits for society as well as for them. We need to engage with industry and commerce and see them as allies not as threats or competitors. We need to be flexible and innovative in the face of external challenges. We need to collaborate, to foster inter-disciplinarity. We need to focus on our strengths. The collective societal desire to succeed and to improve is best addressed through education. If we are pro-active, finding ways to ensure our future should not be insurmountable. The world needs us to succeed!

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Prof. Peter William Mathieson was born in the United Kingdom and educated in the state school system. He was the first member of his family to go to university. He studied medicine in London followed by a Ph.D. at the University of Cambridge during a fellowship funded by the Medical Research Council, who also funded his post-doctoral fellowship. He was appointed as Professor of Renal Medicine at the University of Bristol in 1995 and led the development of an internationally-recognised research group studying the molecular and cellular basis of proteinuria, a cardinal sign of kidney disease. He secured programme grant funding from the Medical Research Council as well as major support from the Wellcome Trust, Kidney Research UK and other funders. For his last six years at the University of Bristol (2008–2014) he served as Dean of the Faculty of Medicine and Dentistry. It was in this role that he had his first substantive experiences of university fund-raising, including during Bristol's Centenary Campaign. He then served (2014–2018) as the 15th President of the University of Hong Kong, the oldest of Hong Kong's eight public universities and the only English-speaking comprehensive university in Greater China. His responsibilities included delivery of the annual operating budget (turnover 9.2 billion Hong Kong Dollars, equivalent to 1.2 billion US dollars or 800 million GB pounds) and major involvement with philanthropy which contributed about 10% of that income annually. Since 2018 he has been Principal of the University of Edinburgh, one of Scotland's "ancient" universities and ranked in the world's top 20, see: https://www.topuniversities.com/university-rankings/world-university-rankings/2022. The University of Edinburgh has an annual turnover of £1.1billion, equivalent to 1.4 billion US dollars. In his second year in office he led the University to its highest annual income from philanthropy in its 438 year history. Of the awards he has won in his professional career, he is most proud of the teaching prizes he won in Cambridge and Bristol, and he has continued to contribute to teaching whilst undertaking all of his senior leadership roles. Professor Mathieson is a member of the KAU IAB.

Public Universities, in Search of Enhanced Funding

5

Jozef M. M. Ritzen

1 Introduction: Public or Private

This chapter is written for university administrators to offer them an overview of the international practices of financing public universities, and its evolution. We also pay attention to the context of the funding of universities and its impact through education and research on society.

University finance has been a topic of interest from the earliest times of the existence of universities.[1] The interests came from the administrators of the university (how should I run the university?), from the participating students (what do I pay and what do I get?), from the staff (how am I paid for teaching and research?) as well as from the Government (how much budget should we make available, for what purpose and how should this budget be allocated?). In fact, finance was the dominant topic in the economics of education before the advent of "human capital theory", pointing out that education is in investment in people which makes them more productive.

One of the first books on university funding (in 1922) in modern times[2] is by university—and college-administrator and—trustee Trevor Arnett (University of Chicago) [1] from the perspective of a private university. Compared to present times, the world of university finance then was a wonder of simplicity: it is about receipts, disbursement, endowments, the physical plant (buildings and research equipment and accounting). All these elements are present today but in a far more complex and international setting.

In many respects the complexity of the funding of *public* universities (our focus) is even greater, particularly in those countries in which universities are encouraged to seek for other public funds than those of their prime funder (the Ministry of Education).

Universities, all over the world, private or public, they all crave to enlarge their resources. For private universities this is self-evident: their existence depends on resources acquired from private or public sources. Yet increasingly also public universities strive to improve their financial position by acquiring funds either from private sources or from public sources outside of the direct funding from Government.

In this respect the difference between private and public universities is then—depending on the country-less relevant. However it remains of importance in view of the different Government regulations that apply to public and to private universities.

In this chapter we consider the pressing dilemma's around university finance, world-wide. Forced by international competitiveness Government are reducing taxation and shifting resources to other sectors (like health and social security). As a result they retreat from university finance, while enrolment and the costs[3] per students keep rising.

To gain insight in the dilemma's we give an overview of the different sources of funding, their purposes and how they have developed over the past decades, with a focus on public universities, so as to inform university administrators and

This chapter has benefitted greatly from comments on an earlier version from Nick Bos, Vice President Maastricht University; Holger Burckhart, Rector, University of Siegen; Judith Kamalski, University of Maastricht; Daniel Munich, Professor University of Prague; Harry Patrinos, World Bank and Pedro de Teixeira, Professor University of Porto.

[1]We use the term universities to indicate tertiary education institutes.

[2]Universities—as we know them today—were in existence in Europe since as early as the year 1088 (Bologna). Their funding was very much along the lines as later described by Arnett.

[3]We equate per student expenditures with costs. The research on the true costs in relation to output (in terms of additional learning) is still in its infancy.

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policy makers on their context and the options before them. There are in the world some 17.000–30.000 universities depending on the definition used. More than half are public universities.

The backdrop of our presentation on funding is that globally enrollment in higher education has more than tripled in the last 30 years or so. At the same time, the financial returns to a university degree (as additional income earned with a degree) have remained about the same, both for the individual as for society. The likely explanation is that university graduates are directly or indirectly contributing to economic innovation that pays out in higher national income.[4]

Let us first dig a bit deeper in the public–private distinction in universities in the following subsection.

1.1 Developments World-Wide in Public Versus Private

Public universities are by the end of the Second World-war (1945) the norm in most countries, with very few private universities, the US being the exception. However, in many countries the increasing participation of youngsters to universities (in the period till 2000 in Western countries and 2000–2010 in Central and Eastern Europe) cannot be accommodated with sufficient quality by public institutions, because of financial restrictions in the form of the Government budget: enrolment grows faster than Government budgets, while the claims of other sectors on Government budget, in particular from the health sector also keep increasing. This is not only the case in higher income countries, but also in the lower and middle income ones [2]. Private universities spring up, sometimes as places with top-quality (like the Bocconi University in Milan), often as places made available to those who are denied entry in the public universities [3] or who want to combine work and study. When public per student budgets decrease, public universities are nudged by Government to acquire private funds. Student demand for private universities is substantial as potential students are aware that the benefits of such education are likely to exceed the costs by far.

Until approximately the year 1990, public universities are subject to strong government regulation and provision, at least in Western Europe. In the Anglo-Saxon world (US, UK and Australia) universities enjoy more autonomy, but still substantially less than private universities. In some countries they are almost part of Government. In the 1990's the awareness grows that also for public universities more autonomy and more room for acquiring private funding or public funding from other sources than direct Government funding may strengthen their impact on economic and social innovation [4, 5]. More autonomy is assumed to give rise to a better connection in education with the (regional) labor market and in research to (regional, national and international) economic and social development. Central and Eastern European universities enjoy extra-ordinary autonomy after the newly acquired independence of the countries in the 1990s.

In contrast to public universities, private universities are free in the way they conduct their business, except that they are generally held to common, national or state, quality control, through accreditation, to create a minimum of transparency and in this way to satisfy the clients, the students, that the product (education) is sound.

The notion of autonomy of public universities has several dimensions: managerial autonomy (self-determination of the leadership), financial (being able to save and borrow money, charge tuition—and other fees), content (curriculum), the types of degrees being offered (most countries limit for example the number of universities that can grant a medical degree), organizational (can the university itself determine, for example, the ratio of professors to all teaching staff?) and staffing (can the university itself determine whom to appoint?) and promotion of staff [4]. Public universities differ across the world in these dimensions.

1.2 Some Figures on Private Versus Public

One of the richest sources on facts and figures on education is OECD's Education at a Glance [6]. It is not limited to the 36 OECD countries, but includes also information on Argentina, Brazil, Costa Rica, PR China, India, Indonesia, the Russian Federation, Saudi Arabia and South Africa. Furthermore, UNESCO Institute of Statistics and the World Bank Ed Statistics have data on other countries than the ones included in "Education at a Glance". All data show the tremendous variation across countries in the ratio of public to private funding with hardly any connection to the level of per capita income in the country. In OECD countries on average 32% of funding is private (of which the majority −23%—from households (tuition fees) and 9% from other private entities). The highest level of private funding is found in Japan (70%), the lowest in Finland (0%) [6, p. 290].

Interestingly enough it appears—although no data exist to the best of our knowledge—that the percentage of private *funding* does not seem to run parallel to the percentage of private *institutions*, because also public universities have been able to receive private funding, while at the same time some private universities can also apply for Government funds. We do know that South Korea has a substantial private

[4]It also means that expanding education no longer leads to less income inequality as was thought in the 1970's: an abundance of university graduates would reduce their relative wage.

university sector (perhaps even the largest one in the world). In 2012 some 87% of the approximately 430 universities were private, enrolling 76% of the university students. Central Asian universities are also mostly private. Most private universities are found in lower and middle income countries, with the exceptions in OECD countries mentioned above. In Latin American countries one finds side by side tuition free public universities with hardly any private income with private universities without any Government support [3].

Funding for universities has developed strongly in the 36 OECD countries, not only to keep up with the number of students, but also on a per student base: "between 2005 and 2016, spending on tertiary institutions increased by 28%, on average across OECD countries, more than double the rate of increase in student enrolments (12%).[5] However, both the number of students and total spending has increased at a slower pace since 2010. In 2016, expenditure per tertiary education student amounted to US$15,556,[6] approximately one-third of which was devoted to research and development. While private sources financed more than 30% of the expenditure, on average, tuition fees for bachelor programs increased by more than 20% between 2007 and 2017 in half of the countries with data", according to "Education at a Glance" [6]. To be sure, the increase in spending was devoted to higher salaries, as the student-staff ratio did not change. It also turned out that the economic crisis of the period 2008–2013 has hurt university funding severely, even more so in the US than in Europe [7]. This is perhaps a foreboding of what we may expect after the Covid 19 crisis is over, as we discuss in Sect. 7.

2 Funding Matters

"Craving to enlarge their resources" is not the right way to point out the motives of the university leadership in its search for more resources. The university leadership is responsible for continuity of the university and may aim—as most organizations—for growth. It may also be convinced that more resources per student enrolled can bring about better outcomes of universities, both in terms of new knowledge (through research, as in Subsect. 2.1) as in terms of student learning (as in Subsect. 2.2) which leads in turn to enhanced economic growth. Budgets then matter for a university to be able to contribute to society (Subsect. 2.3). Society (students, taxpayers, Governments) then can rightly ask why university costs per student have been rising, while the costs of products in other areas are decreasing (Subsect. 2.4).

[5]There are notable exceptions, like the Netherlands, which has seen a decrease in Government per student allocation.

[6]The range is between a maximum of $30,000 in the US (with Luxemburg with one single university as an outlier on $50,000) and a minimum of $8,000 in Columbia as the lowest.

2.1 Research Funding Matters for Innovation

I make two steps in this section: first that research funding matters for research outcomes and second that research outcomes matter for innovation. University research is an important source for the creation of new knowledge which in turn has a substantial role to play the increase in productivity of the work force through the innovation of production processes or new products. Research in a country may take different shapes or forms: in the laboratories of private firms, in separate Government research institutes (like in Germany: the Max Planck institutes) or in universities. Most countries show that they put not all research eggs in one basket, but that there is substantial cooperation between different partners in research, not restricted to country borderlines (see: [8]).

University research funding in public universities is generally a combination of a "first" flow of money, directly coming from the Government together with the funding of students, a "second stream", which is competitive with the framework of a national science foundation, and a "third stream" which includes international competitive funds (like in Europe the EU funds) but also funding from business (research contract with private partners). The total of research funding for a university is generally an indicator for the ranking of the university within the international ranking systems [9], like the Shanghai one [10]. This is because the rankings reflect proxy-indicators of the contribution of research to new knowledge, like the impact through citations. Hence, university administrators seeking larger funds for research can be said to seek to increase the impact of their university on new knowledge and through that knowledge on innovation in the economy.

The room for maneuver for the public university in seeking research funding is clearly limited by the legislation of the State of the country. More autonomy means, according to all evidence, better research funding and better research-outcomes [5].

Research in universities serves two goals simultaneously: the creation of new knowledge, as well as the contribution to creative and problem solving oriented learning on the part of the student population. Some would say that research will also serve to bring knowledge from abroad to the country.

2.2 Education Funding Matters for Economic Growth

Once again I relate first education funding to education outcomes and second I look into the relation between education outcomes and economic growth. Does funding per student have an impact on learning outcomes? This question has been widely debated *for primary and secondary*

education under the heading of "educational production functions [11]. These studies are based on extensive data on pupil's performance (as an output) and on education inputs (like the teacher, the school building, learning materials). When analyzing statistically the (generally linear) relation between output and inputs, the researchers find that the impact of the teacher (qualified as "teachers' efficacy") on student learning is overwhelmingly the most important factor [12]. New international comparable data (Project International Assessment of Adult Competences, OECD [13]) have allowed for a further appreciation of what competences make a teacher more or less effective in contributing to pupil's learning [14], by constructing country-level measures of teacher cognitive skills using the PIAAC assessment data for 31 countries. They find substantial differences in teacher cognitive skills across countries that are strongly related to pupil's performance. So far, so good, but what does this have to do with funding, with per student expenditures?

Hanushek et al. [14] make it plausible that teacher competences run quite parallel with teachers pay (in relation to other professionals with a higher education degree). Teacher salaries form by and large the majority of school expenditures. Hence we see a direct connection between higher per pupil expenditures and better student learning outcomes. Note that there are many other factors which determine learning outcomes, like the autonomy of the school [15]. This is a general case for improving teacher's pay as a means to improve pupil's performance (with the notion that this will increase the attractiveness of the teacher's profession for highly qualified university graduates.

Do these relations between learning outcomes and budgetary inputs also pertain to universities? There are no measures available on student learning outcomes of universities, in the same way as the data of the Project International Student Achievement [16] give for 15/16 year olds. The only available info comes from PIAAC on the competences of 20–34 year old graduates of universities by country, as shown in Fig. 1. PIAAC average competencies of graduates differ between countries as the Figure shows. Moreover, the average competences of graduates are closely related to per student expenditures in the country. This is all the impressionistic evidence we have on student outcomes and funding for education, realizing that there are many factors which determine the efficiency of the resources allocation in universities [17]. The ample literature on cost functions in higher education (relating total costs to the three outputs—graduate and undergraduate students and externally funded research) is not relevant in this respect as the quality factor (for university graduates) is not taken into account.

The PIAAC rank of Fig. 1 also closely resembles the innovation rank of the countries [18]. This should not come as a surprise since time and again it has been shown that educational outcomes of students are closely related to economic growth [19].

2.3 Budgets Matter

The summary of the two previous subsections is that budgets are important for the public university leadership and for the Government, in view of realizing the best possible contributions to research and learning outcomes according to the strategy they follow for their university. In turn this leads to more innovation and higher economic growth. Yet, there is the caveat. Some universities have had little or no contribution to learning [20]. The relation between on the one hand the budget and on the other the outputs in terms of research or learning is a statistical one. It is statistically significant, but with a great variation around the line. Also it should be observed, that it is likely to be causal to a limited degree: universities with a better performance in learning or research tend to find it easier to acquire funds.

University administrators in search of enhanced funding have then strong arguments to plead with their prime financier (Government) for more funding: it pays off in research findings, in innovation and in particular in student competences developed during higher education. However, at the level of Government, these claims have to be balanced with those of other sectors. The weakness of the university claim is then that its reward is only visible at the longer run, while often the claims of other sectors (in particular of the health sector) are on the short run. Governments often are quite myopic to the short run as this ensures popularity and political support for the next election. This is particularly problematic in the aftermath of economic crisis, as the 2020 Covid one, as generally the budget cutting axe will hurt education more than other sectors.

2.4 Why is University Education Not Becoming Cheaper?

Students, their parents and Governments all grapple with the rising per student costs of university education. While all around us products become cheaper, university costs keep rising. Economists often will refer to "Baumol's law": the rise of salaries in jobs that have experienced no or a low increase of labor productivity, in response to rising salaries in other jobs that have experienced higher labor productivity growth. This "law" applies to many services (including health care). But what is the potential in universities of on-line learning to reduce costs? The Covid crisis has given rise to (forced) massive on-line learning. At the same time the MOOCs (Massive Open Online Courses) have sprung up where a student has access to excellent learning materials.

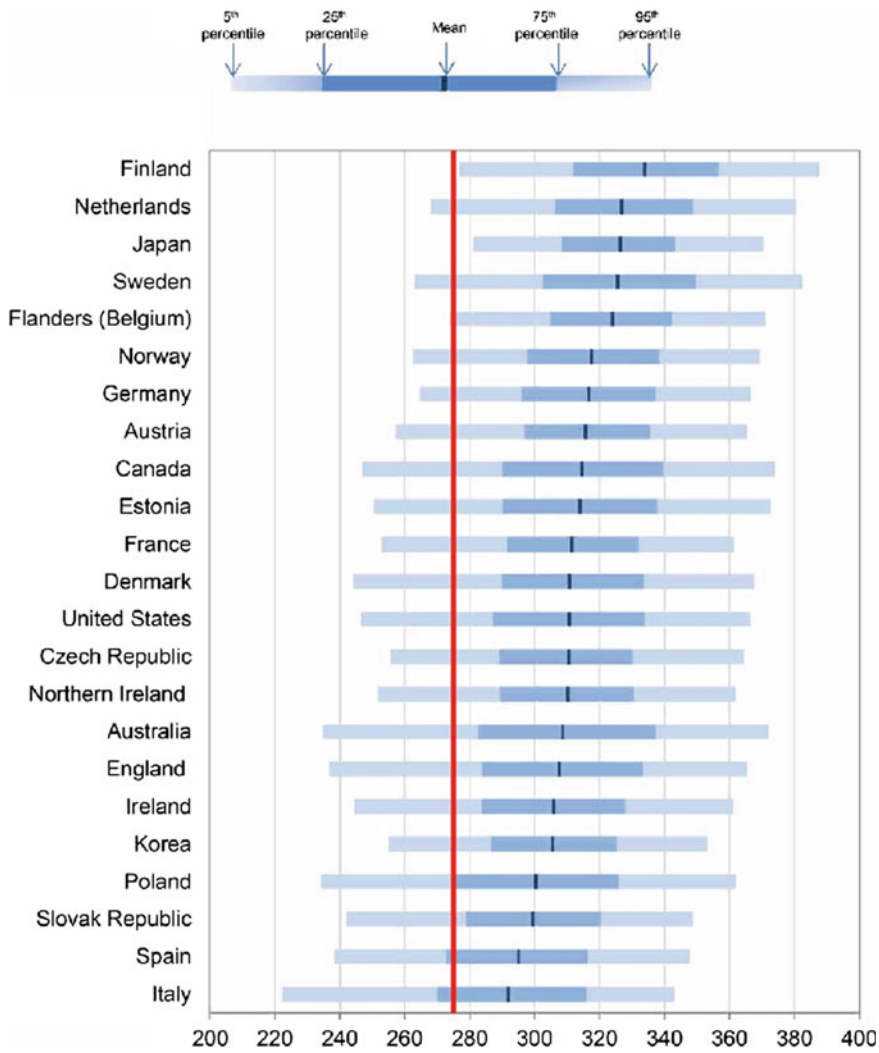

Fig. 1 Distribution of literacy among graduates 20–34-year-olds

Also, universities are engaged in technology enhanced learning. It is clear that there is a future ahead of us with technology enriched university learning which is likely to reduce the financial burden of universities on Governments and students and their parents alike. The limits of such forms of blended learning are in the social component of learning, in the interaction between students and teachers and among students themselves, required for high quality education.

3 Resource Acquisition

3.1 Potential Sources: Government

The most important potential source of income of a public university is the funding by the State of students and of research. That may sound simple for the university administrator if it were not that the most countries are not satisfied with simple input funding (according to the number of students or as block grants for students or for research). Government like to fund in such a way that the tax payer (the ultimate funder) will get a return according to the goals set for the university. This will be considered in the following, after a general exploration of resource allocation of Governments to universities.

3.1.1 Government Funding for Education

Many Governments rely still heavily for funding university education on simple methods: either a block grant or a funding per student (possibly differentiated between medical students, technical and science students and all others). Yet, many add-ons have been developed, like in the Czech Republic additional funding for developing the teaching staff of the universities which is allocated in a competition between the universities.

Yet, increasingly the notion of "performance funding" has been explored by Government. Ultimately this would mean for education, that universities should be paid for the

value added in the competences of students, if this were observable or could be proxied. However, up to now all efforts to come up with a methodology to measure competences acquired in the academic process, like in the OECD Project Assessment of Higher Education Learning Outcomes, have stranded [21], mostly presumably of political opposition of the UK and US. It is rumored that these countries objected because of uncertainty on the outcomes for the university systems. At the same the OECD notes in the analysis of another assessment[7] (of young adults with a university degree who are at work) that there are significant differences in the competences of young university graduates among the countries who participated, as is shown in Fig. 1.

In the absence of measurements of competences, some Governments, like that of the Netherlands (1995) and Denmark (2003) have decided to focus on or the completion of exams (Denmark, the taximeter system) or graduation (the Netherlands) as an output measure for funding, while safeguarding the quality by a strict system of accreditation. This is assumed to incentivize universities to do their utmost to guide students towards their degree.

In the Netherlands (presumably the first country to introduce performance resource allocation) this system was brought in line with the incentives for students to complete their studies within the allotted time period, through the availability of provisional student grants in the forms of loans, which would be transformed into grants at graduation, but have to be paid back in case of dropout. It is difficult to evaluate these measures in their effects, as there is no comparison available to a situation without these measures. The overall impression, however, is that the measures have worked out favourably on students competency development, on retention and on transition, as well as on graduation. There appear to be no negative effects on equality of opportunity, as was expected, because of the tracked secondary school system. Once a student has completed the pre-university track, the social background is unlikely to play a role in the choice whether to go to university or not, when ample loan facilities are available. At the same time it is felt by students that the stress associated with studying has increased.[8] More students have sought the support university psychologist than before.

In the US the debate about performance funding of students at public (State) universities has also been raging [22]. Several states have instituted performance funding, in response to the quest for greater accountability. The approach has generally been tied to funding to specific input measures (like student teacher ratios) or throughput measures (like retention/prevention of drop out) or progression, or output measures like graduation). In [22] an evaluation is presented of the results of this funding policy for three US States: Indiana, Ohio, and Tennessee. They conclude that the outcomes of performance funding are ambiguous: there is no statistically significant impact of performance funding on student outcomes, while it appears that colleges were tempted to resort to weakening academic quality and to restricting the admission of less-prepared and less-advantaged students in order to improve their apparent performance.

In our view, the first should be a matter of strict oversight on the part of accreditation institutions, while the second might be intended by policy. If the intention of policy is to help less-prepared and less-advantaged students, then this should be part of the funding formulas.

The notion of performance funding is now finding its way throughout Europe, not so much through funding formula's (except for the Netherlands where in 2020 a weak remnant applies of the strict output oriented funding), but through agreements between Government and each individual university on improvements in retention, throughput and graduation (like in Denmark and also in the Netherlands). If these agreements are honored, then the university receives extra funding.

3.1.2 Government Funding for Research

Government funding for research in public universities generally used to be in the nature of a block grant sometimes in combination with per student research funding, often called: the first research funding stream, enhanced with funding from the National Science Foundation and/or Science academies [23] (the second stream). The latter was from the beginning characterized by some form of competition, albeit originally highly informal and without an organized process or a jury. Increasingly the second stream has become part of an organized process, based on a competition around research proposals around topics selected by National Science Organizations. In most countries it has also grown relative to the first stream. The UK has also introduced in the first stream some elements of performance, allocating funding to the universities which have demonstrated the ability to produce results as measured in publications in peer reviewed, recognized journals or in the form of citations. This might be called: Performance-based University research funding [24]. The difficulties in its application are in the balancing of peer reviews and metrics, accommodating differences between fields, and involving lengthy consultation with the academic community and transparency in data and results [24]. Countries differ considerably in terms of the efficiency of turning (financial)

[7]This is the PIAAC project: project international assessment of adult competences, http://www.oecd.org/skills/piaac/.

[8]This might also be the result of peer pressure to participate in university as well as to social media pressure to conform to the "perfect student's life".

input into bibliometrically measurable output [25] presumably as a result of differences in funding schemes.

There is also the third stream of research funding for universities, which does not come from the Ministries of Education or Science, but from other ministries, from international organizations (like the EU) or from business or non-Governmental parties. In Europe the EU has become a major source for funding research under the innovation umbrella, covering a sizeable percentage of some 10% of all research income of the top 100 European universities.

Many research funding organizations require "matching" of their contribution with funds which the university itself brings to the table and comes from the Government. This makes it difficult for public universities to increase their revenue from other sources than Government.

3.2 Limits to Acquisition: Mission and Money

Most well-known rankings of universities, like the Shanghai one [9] depend strongly on research performance. It was early on recognized that this does injustice to the many universities which fulfill important functions in the region through education or in research connected to the region. The EU decided to develop a "U-multi-ranking", so that universities could compare themselves to others in *the same league* [26], increasing in this way the transparency of relative performance of universities, to policy makers, potential students and society at large. U-Multirank takes a multi-dimensional view of university performance; when comparing higher education institutions, it informs about the separate activities the institution engages in: teaching and learning, research, knowledge transfer, international orientation and regional engagement. Also, U-Multirank invites its users to compare institutions with similar profiles, thus enabling comparison on equal terms, rather than "comparing apples with oranges". From thereon, it allows users to choose from a menu of performance indicators, without combining indicators into a weighted score or a numbered league table position, giving users the chance to create rankings relevant to their information needs. Thirdly, U-Multirank assigns scores on individual indicators using five broad performance groups ("very good" to "weak") to compensate for imperfect comparability of information internationally. Finally, U-Multirank complements institutional information pertinent to the whole institution with a large set of subject (field-based) performance profiles, focusing on particular academic disciplines or groups of programs, using indicators specifically relevant to the separate subjects (e.g. laboratories in experimental sciences, internships in professional areas). Whereas transparency on individual fields is particularly important to, e.g., students looking for an institution that offers the subject they want to study, other users (such as university presidents, researchers, policymakers, businesses and alumni) may be interested in information about the performance of institutions as a whole [26]. U-Multirank is an excellent basis for Governments to decide on funding, depending on the mix of objectives Government has for universities in specific categories.

4 Endowments and Gifts

Endowments have caught the eye of the university administrator with the image in mind of Harvard and other "Ivy League" universities in the US with endowments in the order of billions of dollars (Harvard in 2019: more than 50 billion US$). These universities rely heavily on income from their endowments, to maintain their academic excellence, by salaries attracting the very best teachers and researchers, by supplying ample opportunities for research and reducing effective tuition fees for the selected few of the brightest students who are admitted [27]. Universities are usually endowed by private individuals, but sometimes also by Government, as was the case with the land-grant university in the US. By the end of the nineteenth century US states began to fund educational institutions by granting federally controlled land to the states for them to sell, to raise funds, to establish and endow "land-grant" colleges.[9] Later some of these became private, but most remained public universities. Public universities in the US have a substantially lower endowment (order of magnitude of the mean endowment: 60 million US$).

Endowment can be invested in the business world and yields a return that can be used as operating income for education and research. Often endowment is dedicated to a specific function of the university: to a discipline, to education of a specific type or to research of a specific type. Endowed professorships (chairs) are an example. In this respect the returns to endowment are quite comparable to gifts. There is also endowment in the form of buildings, made available by private donations to the university. Universities all over the world receive unrequited gifts from private individuals or companies for research and sometimes for education. The medical field, business administration and science [28] are the top runners.

Across the world alumni are increasingly involved in the alma maters (the universities they have graduated from) as a source of feed-back, as a potential target for recurrent education and as a potential source for "pay-back" towards the university. There is a culture in the high income English

[9]The first Morrill Act that led to the establishment of land-grant colleges is from 1862. It led to the creation of some of the most important Universities, namely MIT, Cornell, and several State Universities.

speaking countries (US, UK, Australia, Ireland) for alumni to "give" to their alma mater. In Canada this culture has only recently (in the period after 2000) been developed.

5 Tuition Fees and Access

When considering funding it is easily understood that this applies to the direct costs of education and research. However, on the part of the full time student there is also the cost of income foregone by full time participation. This amount generally is in excess to the costs of education and research (on a per student base).

The high private returns to university education [29] have led a number of countries to expect a greater financial contribution from the participants (or their parents) in the form of tuition fees. Tuition fees might be a threat to equality of opportunity: it is easier for well qualified youngsters with rich parents to study at university than for poor parents. Therefore countries have implemented financial support mechanisms to ease the burden on individuals when tuition fees are raised. Sometimes this is done by grants (depending on parental income), sometimes by loans. To reduce the trap of "loan aversion" [30], i.e. a negative attitude to loans for education, in particular among youngsters from lower income households, Governments have engaged in income-contingent repayment. This is an arrangement for the repayment of a loan where the regular (e.g. monthly) amount to be paid by the borrower depends on his or her income. This type of repayment arrangement is mostly used for student loans, where the ability of the new graduate borrower to repay is usually limited by his or her income. There are a number of important parameters in in these loans, in order to make them successful for equality of opportunity: the interest rate and the amortization period. In the Netherlands an income contingent loan system was introduced in 1994 with an interest rate of the Government borrowing rate (low) plus 2% (for defaults and deaths) with an amortization of 20 years and a pay-back scheme limiting pay back to 10% of income above a threshold. It turned out to be fully self-funding. The trap in such schemes is the party who provides the loans and bears the risks: the Government (or a semi-Government institute) or a private bank. In the latter case the terms for income contingent loans might be exorbitantly high for students from low or middle income families to consider entering university. The positive aspects of income contingent loans are substantial. They would also have helped in the 2020 Covid crisis.

In some countries differential tuition fees (nationally determined) are used to encourage students to choose studies which are deemed more relevant for societal development (like medicine and sciences) in contrast to liberal arts studies. In other countries there are *numeri fixi* (limitations on the number of students to be admitted) to steer the choice of students.

5.1 International Students as a Source of Income

In the 1960's and thereafter, gradually the flow of foreign students going for studies in the US increases [31], mostly in response to the generous availability of scholarships. Other rich countries follow suit in providing scholarships for international students. This is the start of gradual rise of international students. A new stage is reached in the 1980's and 1990's. The pool of potential foreign students who were able to pay tuition at US, the UK and Australia colleges and universities expands markedly, with a notable increase among potential undergraduate students from China and India.

At the same time, substantial declines in state support, driven by contractions in state budgets, have occurred at public sector universities. For such universities, declines in state appropriations force a choice between increasing tuition levels, cutting expenditures, or enrolling a greater proportion of students paying full out-of-state tuition. Foreign, tuition paying, students became part of a business model for universities: "For the period between 1996 and 2012, we estimate that a 10% reduction in state appropriations is associated with an increase in foreign enrollment of 12% at public research universities and about 17% at the most research-intensive public universities" [31]. Later studies [32] confirm this finding. Australia is the country where higher education is the third most important export product with a value of $32.4 billion (or 3% of GDP) [33]. In this way Australia earns more from foreign students (relative to its GDP) than any other country.

There is definitely a flip side to this development. Many foreign students decide to stay in the country which has welcomed them as a student, resulting in a brain drain which not always results in "brain circulation" (i.e. that graduates return with work experience after a while to their home country). The generosity of the US, for example, was amply returned by the large number of medical doctors and engineers which choose to stay after their training.

5.2 Selling Education

There is a huge market for retraining and further education. It is then but a small step to go from tuition fees covering part of the costs of education towards a full cost plus coverage for education and training which is not supported by Government funding. In most countries, universities have embraced further education and retraining on an academic

level as a means to contribute to the resources of a university. The retraining is done with the expertise in education and research used for regular academic education. Examples of recurrent training are in the medical field, providing the needed training to retain the physician's license, in economics and business with courses on management and governance of companies and in the legal field. In many countries alumni of universities are actively engaged in setting up and maintaining the framework for such courses, in order to ensure that these courses are as much rooted in academia as in practice.

6 Income from Research Alliances, Patents and from Start-ups

Income earned from successful research alliances, from patents and from start-ups generated by the university might be a substantial source of revenue for the university. However, it generally takes decades to develop the entrepreneurial spirit in a university, once the Government has allowed this and the university leadership has embraced this as a task for the university. These activities can be seen as true contributions of the university to society [8]. Yet, they need to be carefully monitored, so that ethical principles of correct representation of data and analysis are not violated because of commercial interests [34]. Generating money from university research alliances, from patents and from start-ups requires substantial incentives to be put in place in the management of the university, so that individuals feel that their efforts to earn money for the university are rewarded. Individual staff members realize that these efforts take time away from publishing in top journals, which is important for their individual career. University incentives should balance with the loss of opportunities in scholarly publishing.

Income from research cooperation, inventions and start-ups can be substantial. In the US universities reported US$1.8-billion in earnings on inventions in 2011 (155 responding universities) [35], collecting, for example, royalties from new breeds of wheat, from a new drug for the treatment of HIV, and from longstanding arrangements over enduring products like Gatorade.[10] Average earnings are 11 million per university, which means generally less than 5% of the total budget. In Europe there is some evidence that university licensing is not profitable for most universities, although some do succeed in attracting substantial additional revenue from inventions [36].

[10]Sporters' nutrition.

7 Post COVID 19 and University Resources

World-wide COVID19 has put a thick fog over the old normal of social and economic life. There are at least three elements of serious concern for public university resources:

- funding from Government and from other sources is likely to decrease;
- "purchasing power" from individuals is likely to be under pressure;
- university funding from foreign students is likely to decrease due to travel restrictions.

In April 2020 some expected that COVID19 would imply a temporary dip (a V shaped) development, leading to "business as usual" with a delay of one year, and a one-time loss of GDP. The expectations half a year later are less optimistic: the loss of GDP might be ten times the annual loss in 2020 [37].

The lock-down measures of Governments have caused a major recession, much stronger than the global financial crisis (2007–2008), and perhaps the worst economic crisis since the Great Depression of 1930, with major economies losing 5–10% of GDP in 2020. The down-sizing and closure of companies can cause unemployment that may—depending on the country—run up to 25%. Tax revenues will fall and governments are going into debt on a large scale, with a subsequent pressure on government budgets.[11] Countries with substantial export earnings from minerals are severely hurt, as prices for minerals, especially for oil are likely to remain low for a substantial period. Social safety nets, as well as public funding for health care and education, will be severely constrained.

This is not the place to dwell on the dilemmas of long run strategies of Governments. Yet, public universities could benefit from a strategy in which the solution to Government deficits is not primarily found in cutting budgets, but rather in raising taxes, in particular on the profits of international firms (which now mostly find refuge in tax heavens) and on wealth. Such a strategy does not stand in the way of international competitiveness and favors intergenerational mobility.

A second dilemma is the trade-off between different Government sectors when budgets are cut in order to restore the fiscal balance (Government expenditures and Government income). The general experience from other crises is that the position of (university) education is weak, when compared to health or to other sectors. The substantial

[11]The long run effect on interest rates is uncertain. Some expect an international credit crisis and rising interest rates. Others believe that the decrease in the demand for borrowing for investment will keep interest rates down.

economic return to education is on the long run, while policy makers often care mostly about benefits from Government spending in the short run.

Government resources for research may be under less pressure as the public has become aware of the tremendous need for good science to understand the impact of the virus on the human body, the way it is spread and the possibilities of vaccine.

Whatever happens, there will be increasing pressure on public universities to look for other resources than the Government ones. At the same time public universities will have to demonstrate more clearly their contribution to society, through the skills and competences of their graduates and through the importance of the knowledge they produce to society.

There will also be increasing pressure to take on "technology" to reduce the costs of education. Technology encompasses a broad array of fields, ranging from on-line instruction, to online pre-programmed modules, to computer assisted instruction including the use algorithms to enhance teachers' effectiveness.

Not only Government revenue to universities is likely to decline. Also private contributions (tuition fees) will be under pressure, if indeed incomes decrease with the decrease in GDP. Income contingent loan schemes might be helpful in the process to keep student—demand on the level which works for society.

The number of students pursing university education globally has grown continuously over the past two decades and was expected to continue growing to 2030 [38] from some 213 million in 2015 to 332 million in 2030.[12] This increase reflects on the one hand the substantial rise in demand for skilled labor creating bright prospects for university students and on the other increased household incomes and the growing number of Government financial support policies to promote access to tertiary education. In this process the number of students studying abroad was assumed to grow from some 4.5 million to 6.9 million [38]. Until the COVID crisis came and made international travel far more difficult. The first signs are that 2020–2021 of enrolment of international students has not decreased, presumably due to "pipeline effects": students had already decided for international studies long in advance. Longer run development is highly uncertain.

[12]The world population is expected to grow from 7.4 billion people in 2015 to 8.6 billion in 2030.

8 Conclusions

Public universities (tertiary education institutions with a substantial degree of research) are faced today with a complicated set of issues regarding their funding. They are aware that good funding is important to provide education of high quality and high quality research, which in turn are formidable factors for economic growth on the longer run and may contribute to social cohesion. This applies equally to top universities as to regional universities which may be less research intensive. This puts them seemingly in an excellent position to negotiate with Government: the average public rate of return to university education is 9% in OECD countries [6, p. 110]. This is much higher than market interest rates. However, the claims on Government budgets are manifold including claims with a short run impact, like claims for health or social services. Government in the electoral cycle may prefer the short run above the longer run and may want to reduce per student funding, in particular when student enrolment is increasing, as is still world-wide the case. This is widely recognized as a threat to the potential contribution universities can make to social cohesion and economic growth [39, 40].

Traditionally Government funding for education was either in the form of a block grant or based on the number of students (sometimes differentiated between medical, science/technical and other). Increasingly Governments have attempted to bring resource allocation in line with the performance of the university, in terms of throughput (successfully concluded exams by students) or output (successful graduation). Some European countries have tied this funding to student financial support and tuition fees, so that there is a match in incentives for the university and for the student.

Governments worry about the increased costs of university education and explore with universities ways and means to reduce the per student costs, by means of more distance and more "Ed Tech". It is likely that blended forms of learning will emerge which could be slightly more effective (same quality, less costs). However, education is a social activity in which the meeting of students among each other and the meeting between teachers and students matter.

In research, there is generally in most countries still a block grant of the Government for universities or/and a research funding based on the number of students. The part of Government research funding which has been acquired through competition has in most countries been increasing. Competition can be in the form of an application through a research proposal or through bibliometry. In many countries national science organizations will consider proposals for funding, selecting the "best". Such funds often require for their contribution matching by the university. This puts a limit to the potential for universities in the competition for

research funding. Some Governments rely on a national comparative assessment of research output (in the form of publications in peer reviewed journals and their impact, and through citations) for allocating research funding across the universities in their country.

Endowments and gifts are important for public universities, even if they are substantially smaller than for private universities. The role of tuition fees in public universities is subject to intense political debate, centered on the question whether the level of tuition fees will discourage social mobility, i.e. the participation of students from lower socio-economic strata whose parents have not a university degree. Income contingent loans schemes (with a pay-back of loans for study based on income earned) are likely to mitigate or fully compensate the impact of tuition fees on participation from students from lower and middle income groups.

Increasingly international full-cost-plus-fee paying students are viewed as a source of income of universities in Anglo-Saxon countries. In particular in Australia, university education is an important "export" business. Selling education as a service for those who want to improve their career can also generate funds for the university.

Research funding is increasingly found in universities from engagement with society through "knowledge transfer", by means of research contracts with outside partners, by means of start-ups by students or staff from the university of by means of patents.

Covid-19 will have a marked impact on social and economic development, even if an effective vaccine is developed and available by the beginning of 2021. Early (2020) hopes of a V shaped economic development (deep recession, steep recovery in 2021) are unlikely. More-over, the extensive borrowing by Governments needed for fighting the first fall-out of the crisis in 2020 will put a strain on Government budgets for the years to come. The Government contribution to university budgets is likely to be under pressure as a result.

A special case is universities with substantial numbers of fee-paying international students. The admissions of September 2020 have not shown a decline in the number of students. However, it is likely that in the years to come the number of international students will decrease, as a result of less international mobility to conform to the safety standards to keep Covid infections under control.

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The Importance of Fundraising and Endowments: The Role of Private Philanthropy

6

William G. Tierney

1 Introduction

Colleges and universities in the United States have a unique component as part of their fiscal resources. Most institutions throughout the world rely on (1) federal and/or state funding and (2) tuition revenue to support their university. Many countries also have largely federal funding for research that supports the institution through indirect costs, as well as off-sets for faculty salaries and laboratories. Funding for research, however, largely impacts only premier research universities, and it plays a significant role in the global reputation of the institution.

Where the United States differs from the vast majority of other countries is with regard to private philanthropy from individuals and private foundations [1]. The United States has three types of fiscal postsecondary institutions: public institutions, private non-profit institutions, and private for-profit institutions. As of 2016, for-profit higher education accounted for approximately 5.4% of the total undergraduate and 8.9% of the total graduate student enrollment in the United States and warrants an entirely different conversation that will not be discussed here [2].

Private non-profit colleges and universities were the original beneficiaries of private philanthropy. Indeed, some of the United States premier research universities started through donations of wealthy donors. For example, Leland Stanford, a railroad baron, and his wife started Stanford University in 1885 in honor of their young son who had passed away. Johns Hopkins put aside money in his will for the founding of what became the largest philanthropic bequest in the United States in 1876. Wealthy businessmen donated money to start the University of Southern California in 1880. In the nineteenth century, religious denominations also started small colleges throughout the United States largely to educate students and train individuals for the ministry. This form of philanthropic giving has largely stopped. Both the University of Notre Dame and Georgetown University, however, are private, Catholic institutions that receive significant revenue from private donations that support the mission of the institution.

In the last 40 years, where private philanthropy has had a significant impact is not simply with private colleges and universities, but also public institutions. The assumption, as recently as 1980, was that a state funded its public colleges and universities, and there was no need for individuals to donate to a public institution in a manner akin to what has been done for private institutions. Indeed, in the 1980s, the first campaign by a public university—Pennsylvania State University—raised $300 million, but there was a significant amount of discussion whether a public university should need private donations [3]. Today, such discussions are moot. All public institutions in the United States need additional revenue as federal and state support shrinks [4]. Thus, Harvard University, as a private university, has set the bar for capital campaigns by raising $9.6 billion dollars. However, a public institution, the University of Michigan, has raised $5 billion [5]. Although the amount of endowment differs from institution to institution, and how much is raised obviously differs, Tables 1 and 2 are illustrative of endowments in higher education [6, 7].

In this paper, I shall outline the strengths and weaknesses of private philanthropy, discuss how one goes about raising money, and how resources are utilized. I also want to point out that private philanthropy is important at any time, but perhaps even more so when a crisis arises such as a pandemic. When federal and state governments have to cut their budgets, and students defer attending the university, institutions need as many alternative sources of funding as possible, and private philanthropy and an endowment is one such revenue stream. Thus, I shall suggest that, in a world of scarce resources where multiple non-profit organizations need public resources, philanthropy provides one additional way for universities to gain additional resources.

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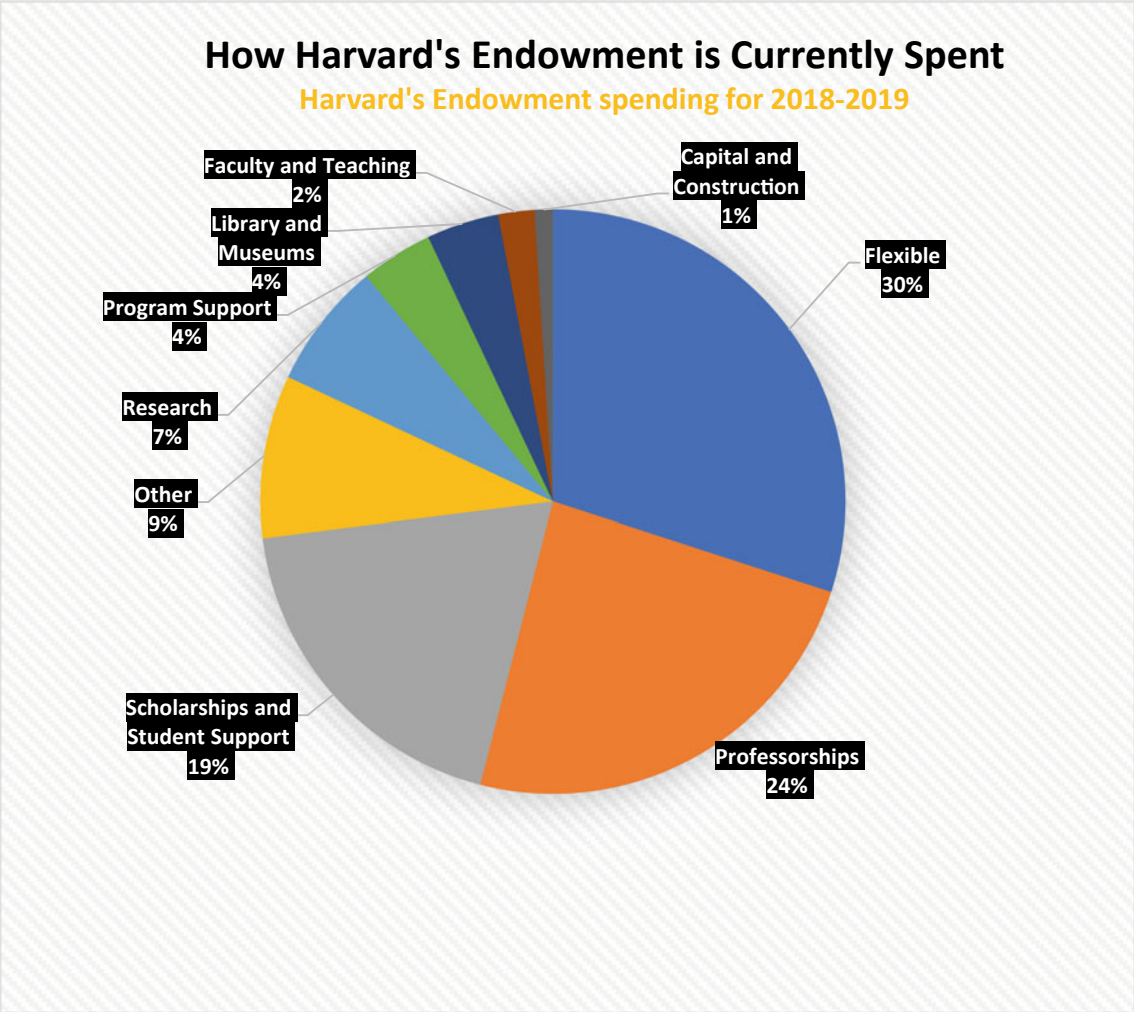
Table 1 Endowment value relative to total annual spending

Institution	Endowment/total spending	Institution	Endowment/total spending
Soka	18.3	Bowdoin	7.0
Princeton	11.6	Cooper Union	7.0
Grinnell	9.9	Principia	6.7
Pomona	9.7	Wellesley	6.3
Swarthmore	9.7	Notre Dame	6.3
Amherst	8.0	Richmond	6.1
Washington and Lee	7.5	Claremont McKenna	5.6
Williams	7.4	Smith	5.6
Berea	7.3	Stanford	4.4
Rice	7.0	Dartmouth	4.2
Yale	7.0	Massachusetts Institute of Technology	3.6
Harvard	7.0	California Institute of Technology	0.9

Table 2 Harvard's endowment



2 How Philanthropy is Done: Why Would Individuals Donate?

Any institution that wishes to court donors needs to consider four motivations for those who donate resources to a university.

2.1 Pay It Forward

Many individuals who graduate from a university have developed a deep appreciation and affiliation with the institution. There are a great many surveys where adults look back on their lives and say that the best times they had were when they attended their alma mater. A college education may have launched a career, created networks of individuals who became life-long friends, and even helped individuals find a spouse. Insofar as until recently, most of the full-time clientele who attend universities were individuals who were young adults; hence, college was a time when they learned what it meant to be an adult. These alumnae are a primary group of donors for any university.

Many individuals want to maintain contact with their institution, and some will want to repay their institution in some fashion. A donation to a non-profit institution has become a typical way that individuals demonstrate their affection for an organization that made a significant impact on their lives. In essence, the individual is looking backward with fondness and "paying it forward"—giving money that will enable future generations presumably to experience what the donor had when they went to the institution. Such giving can come from individuals who donate a few thousand dollars to individuals who provide multimillion-dollar donations.

2.2 Make an Impact

Some individuals have a particular focus that they want to influence. Individuals start foundations or made donations because of a driving interest in a particular issue. Bill and Melinda Gates, for example, started the Gates Foundation with a concern for health and education. Although the foundation has given grants to multiple organizations, one of the primary benefactors of the foundation's largesse has been universities with a focus on health or education.

Similarly, the Keck Foundation started in the 1950s in Los Angeles. William Keck made his money in oil and decided to start a foundation that focused largely on science-based projects in southern California. The foundation has given or raised over $300 million dollars in support of the Keck School of Medicine at the University of Southern California.

Other individuals may have fewer resources to make such a significant impact but still want to provide resources to support students or faculty. Someone, for example, may want to endow a chair in Islamic Studies. Someone else may want to support the construction of a swimming pool, and another person may want to offer scholarships to a particular group of students—poor students from a particular ethnic group, for example.

2.3 Generate a Legacy

Some individuals want their family name to live in perpetuity. An endowed chair in a particular area of study attached to a person's name suggests that the individual wishes to be remembered for something that is not fleeting. Similarly, a building named in honor of an individual donor on a university campus is a way to establish an institutional memory that will outlive the donor and their immediate family.

Virtually any American campus will have buildings and faculty positions named after an individual. The established tradition also has a generational pull to it. When a friend or colleague makes a donation and puts their name on a building, then other individuals will also want to make a donation so that they too might be memorialized in similar fashion. Many skilled university presidents will encourage potential donors not to make an anonymous gift but instead to give a "naming gift." The assumption is that the donation not only generates revenue for the institution but also will have a cascading impact on additional donors.

2.4 Create a Tax Benefit

Philanthropic giving has come with tax benefits in the United States throughout much of the twentieth century. One irony of the world's most capitalist economy is that it has a tax structure that encourages philanthropy. Whether a person makes an individual donation or creates a public foundation or charity for their wealth, the action occurs with considerable tax benefits. In effect, the Internal Revenue Service (IRS) is the grease that encourages philanthropic giving. To be sure, some individuals make donations entirely to accrue a tax benefit. More likely, however, is that the tax structure does not discourage giving as it does in several other countries.

Obviously, when an individual makes a donation to a university, they may do so for multiple reasons. The person may have a particular affection for the institution, want to make an impact in a particular area, and desire to have a legacy that continues once they have died. However, if the person were to be penalized by such giving, then we could expect philanthropic giving to be curtailed.

3 The Mechanics of Philanthropy

Although some individuals invariably write a check and send it to an institution, the vast majority of giving is planned. In the twenty-first century, the norm for planned giving is by way of an annual drive and a capital campaign. Those individuals who are targeted for giving largely fall into three groups: alumnae, potential donors with a particular interest of the institution (e.g. religion, geographic locale, particular specialization of the institution), and new donors.

3.1 Annual Giving

Numerous non-profit organizations have an annual giving plan. Although the preferred form of giving is to leave the donation open-ended so the college or university president might spend the money where it is needed most, the norm is to focus annual giving for specific targets, such as scholarships for students. Giving might also focus on a particular part of the institution in which someone has an interest, such as a fitness center or tech lab.

Annual giving used to be confined to a particular time of year—usually in the spring—and American universities had a "phone bank" where undergraduates called alumnae who majored in their discipline. The undergraduate cold-called an alum, spoke glowingly about the institution, and then asked if the individual might make a donation. The technique was not sophisticated, but it had a personal charm that was effective. That simplistic style has morphed into a year-round operation that is a significant component of an institution's development office. The office keeps track of year-to-year donations, the kind of giving that interests the donor, and if the person might be able to increase their donation or know of other individuals who might be new donors.

Clubs have been formed where active alumnae socialize with engaged annual donors to expand the numbers of annual givers. The clubs might be social, have lectures, or are simply parties, but the intent is to bind alumni to the institution and hopefully increase the potential of making a donation. Individuals also might be listed in catalogues the institution provides that counts them as significant members of the academic community. The assumption is that the more recognition an individual receives, the more likely it is that they will continue to make donations and hopefully increase their giving. Moreover, recognition by the institution's president and in annual pronouncements will presumably demonstrate to other potential givers that they should make a donation. In this light, development offices frequently try to ensure that donations have a name attached so that individuals might see who made a contribution. The assumption is that whoever makes a donation not only helps the institution with the contribution, but it also has a ripple effect.

Although alumnae still account for a significant percentage of annual givers, postsecondary institutions also have grown much more sophisticated in their outreach to potential donors who might have an interest in a particular aspect of the institution. Individuals who like American football, for example, may not have graduated from the university, but they have a particular affection for the institution's football team. A university which has a medical school will see many patients who have no affiliation with the institution. They may not care about the university, but they will feel very strongly about the medical unit which operated on them or cured their cancer. The football team and cancer unit also will have annual giving campaigns and generate a great deal of donations from people who are not alumnae.

3.2 Capital Campaigns

A capital campaign is a targeted challenge led by the institution's president for a specific amount of money over a set time horizon. There is no major university in the United States that does not engage in a capital campaign. The use of the word "campaign" is purposeful. A capital campaign is not unlike a general waging a non-violent war where victory is when the institution has raised the designated amount of revenue.

Frequently, a new institution's president's primary task is to gear up to develop and carry out a capital campaign. The steps are fivefold: First, the institution develops a strategic plan that sets institutional priorities and gains faculty approval. Second, the infrastructure necessary for a capital campaign has to be gauged. Just as a nation's leader ought not go to war without the requisite troops, a college president has to ensure that the development office is staffed and ready to raise the amount of money that has been set as a goal. Third, the institution's governing board has to actively support and be engaged in the campaign. At most major universities in the United States, the Board of Trustees will be individuals who either "give or get." They may be men and women of significant wealth and will know that during their tenure on the Board they need to make a significant donation that generally is in the millions of dollars. Other individuals may not be wealthy, but they know individuals who have the resources to make a donation, and they will provide entre for the president to court the individuals.

Fourth, a campaign starts quietly so that the president and their staff can "test the waters" in terms of what sorts of donations are likely to garner significant revenue for the university. In effect, the institution wants a "running start." Consequently, if an institution sets a 10-year time horizon to

raise $9 billion (U.S.) dollars, then the actual campaign may begin 2 years prior to the actual kick-off, and they will have hoped to raise close to one billion dollars toward the goal. Successful campaigns may raise the goals and extend the timeframe.

Finally, the actual kickoff to the campaign will be done in a way that tries to generate excitement and enthusiasm. The tenor that wants to be built is that the institution is going to meet its goal; that alumnae should be involved not only out of a sense of obligation, but because it's the right way to give some resources to an organization that engenders confidence; and that ultimately the organization will be stronger. The norm in the United States is that this form of kickoff will come with major announcements of donors who have contributed a few hundred million dollars, and the announcement will be done over a number of months in numerous cities throughout the country. Sometimes, the announcement will also be targeted abroad in cities where the institution has a significant presence (such as London or Shanghai).

Most campaigns reach their goal within the timeframe that has been set, and the president claims success. Just as the start of the campaign garnered celebration and tried to generate news, the conclusion of the campaign does the same. The strategy is not only to have raised a significant amount of revenue, but also to have developed an expanded donor list that will continue to be used for the ongoing annual giving campaign.

3.3 The Fundraisers

Undoubtedly, the president of the university is the team leader for fundraising. Institutions that are successful in fundraising have an elaborate organizational arm for a development office headed by a vice president who plans annual giving and capital campaigns. The vice president has a direct line to the President and considerable leeway in terms of primary donors.

The provost and deans of schools or colleges are also important. Whereas the president may spend up to 80 or 90% of their time on fundraising, it is not uncommon for deans to spend as much as two-thirds of their time on fundraising. Obviously, coordination is essential. A potential donor, for example, may have graduated with a degree in history, but made a billion dollars in information technology and have a passion for movies. The Dean of Humanities argues for the right to speak to an alumnae. The IT Dean believes it is logical that she speaks with the donor, having already known the donor from previous interactions. The Dean of the School of Cinema has Stephen Spielberg on his own board for the School and feels that Spielberg could make a logical request. Unbeknownest to all of them, however, the donor's wife is an art aficionado, and she has already spoken privately to the provost to see if they could endow the School of Art History.

What one wants to avoid is multiple individuals asking for multiple gifts of different sizes at the same time. If the university lacks coordination, then a donor may hesitate to give any money whatsoever. Another donor may simply choose the cheapest option. If a school of humanities costs $30 million to endow and a school of cinema costs $50 million, then the individual might choose humanities. That's good news for the Dean of Humanities, but the result is that the university has been short-changed $20 million. Hence, there's an essential need for coordination, which is normally done by the Vice President for Development's office.

The University also needs to be assiduous in courting new donors. All universities know the names of the world's richest individuals—Bill Gates, Warren Buffett, and the like. The problem is that when everyone knows the same individuals, they are constantly called on to make donations. The successful university is one that finds new donors that no one else knows. Any successful university that fundraises has to depend, in part, on multi-millionaires. Admittedly, there are not an endless number of these individuals, but there are thousands of them. Interestingly, the single greatest factor that accounts for their giving money to a charity or institution has to do with their courtship. Simply stated, if no one courts a donor, then the donor is not likely to part with their money. Individuals, then, are not opposed to making donations, but they need to be courted over time, and a strong relationship needs to develop [8].

One mistake that new fund-raisers often make is to assume that they can simply ask an individual to make a donation, much like undergraduates did a half century ago for the annual campaign. To be sure, some individuals will write a significant check after relatively little involvement with the fundraiser. However, the norm is the opposite. Individuals generally make donations to individuals, not institutions. They may love the institution, but they are ultimately giving money to an individual—the president, dean, and the like—who they believe will be a good steward of the investment. To gain trust of a donor requires a great deal of time, effort, and what many think of as adroit gamesmanship. One needs to meet a donor on their turf. If a donor's preference is to have lunch in New York and the president is in California, then the president needs to go to New York. If a donor wishes to have a pleasant weekend with his wife in California and invites the president, then presumably the weekend is casual, and the president's spouse comes along as well. The result is that it is not uncommon for the president of a major university in the United States to spend 300 nights a year trying to court a long list of donors that the development office has found.

One recent change pertains to the COVID-19 pandemic. Traditionally, fund-raising has been a very personal

undertaking where individuals meet with one another in an array of formal and informal activities. The pandemic brought that to a halt. A new approach had to be tried, and that approach, especially with a younger generation of philanthropists, is only going to increase in the future. Virtual fundraising where individuals court donors is going to require innovative strategies that, by and large, have not been tested but need to be invented at a time when travel has been made that much more difficult [9].

3.4 The Forms of Revenue

The days of someone simply writing a check to the institution are long gone. To be sure, simple donations to a university are still done, but there are also numerous creative ways that individuals make donations. Someone, for example, may write the university into their will, and when they die, the revenue will be made available; however, the honor of naming the gift may occur the moment the individual designates the institution in their will. An individual, for instance, could decide to endow the university's school of business with a gift of $30 million dollars. In return, the university names the school in the name of the benefactor. The school becomes the "Smith School of Business." Nevertheless, the $30 million-dollar gift does not become available until the individual passes away, which could be in a matter of days or decades.

Other individuals may not even make a gift of money. Instead, they give the university their home, their private art collection, or a villa that they own in a foreign country. A famous author who is an alumna of the university may designate the institution as the repository of their papers. Rather than dollars, someone else may give the university stock options that rise and fall with the market. All of these sorts of gifts count toward the capital campaign, even if the revenue does not become available for years, or even decades. The money also will help the donor in some fashion with regard to their taxable income. The result is thus a "win-win," presumably, for the university and donor. The institution gets revenue; the donor gets a tax break.

4 How Resources Are Used

When money arrives at the university, it comes generally in two forms. First, the revenue might be available immediately for the purpose that it has been designated. A donor might wish to endow a building for a school, and the building will be named in their honor. Thus, the "Smith School of Business" could work in "Jones Hall" because the Jones family gave the university $25 million dollars to build a building for the business school. Someone else might wish to provide scholarships for the current freshmen class and donate $5 million dollars toward the effort.

The alternative form of giving is an endowment. A donor endows a school such as the Smith School of Business with a $20 million-dollar gift. The total gift—when it becomes available—is invested by the university, and the recipient is able to use a percentage of the gift every fiscal year. An individual endows an academic center, for example, with a $5 million-dollar gift. The director of the center is able to use 5% of the endowment every year, or roughly $250,000 per year. The endowment is relatively stable revenue that the recipient should be able to count on from year to year. If the money is invested wisely, then the endowment should grow, and, in future years, more income can be utilized. The stock can also crash, and the value of the endowment may shrink. Although the money is obviously smaller than the total gift, an endowment gives the recipient relatively stable funding from year to year, whereas other similar units of the university have to generate revenue every fiscal year.

Although donations can be used for virtually anything a donor desires, in general donors have four interests.

Over the past century, the two most common donations have been for buildings and faculty chairs. Buildings cost a great deal of money and garner a great deal of attention for the donor. The assumption is that a primary piece of the university has attached to it the name of the donor. In a less significant way, but still quite important, are those individuals who attach their names to an endowed chair. Again, the building is a gift where the revenue is used immediately to build the structure, and the endowed chair is able to use 5% of the revenue toward the salary and other perks for the individual holding the chair.

A third use of donations has to do with the funding of research and associated laboratories. Any individuals who have made their impact in engineering and medicine know how expensive it is to undertake laboratory research. Many donors will make donations aimed at any number of medical problems, such as cancer, diabetes, and heart disease.

A fourth use of the endowment is for scholarships and tuition remission for particular types of students is also common. The challenge of fundraising for tuition remission, however, is that the needs are vast, and it is usually the least desirable form of giving. The tuition at a private or public university in the United States can range from $50,000 to $100,000. An endowment that covers the costs for students for their entire 4 years would be extraordinary, and it is not something that most donors are particularly fond of funding. Alumni may make contributions toward a fund that helps defray the cost of a small part of an individual's tuition, but, in general, the support is relatively meager.

Finally, the recent pandemic also has caused some institutions to consider using some of the endowment to cover the costs incurred by COVID-19. The problem is that most

of an endowment's funds are committed to a specific cause (such as scholarships or a building), so one cannot simply shift money to help an institution meet its budget. Some individuals also are against using a long-term endowment to meet short-term needs. Nevertheless, some institutions have reluctantly tapped into their endowments to help them cover their costs.

Presidents particularly like donations to a general fund that allows them to use the revenue however they please, but that is the most difficult money to raise. Donors want to give their money for something that they believe in, for one reason or another. They are less enthused to give their money so that the president might renovate the parking lot, however much the area may need refurbishment.

5 The Strengths, Weaknesses, and Dangers of Fundraising

5.1 Strengths of Fundraising

The strengths of fund-raising are obvious. Without gifts from benefactors, private universities must rely on tuition. Public institutions require the support of the state/federal government and tuition from students. At a time when parents of students, as well as the students themselves, worry about the cost of tuition, and funding from public entities is in rapid decline, an additional revenue stream is not merely a strength, but a necessity. Indeed, the pandemic has highlighted the fiscal problems that tertiary institutions face. A century ago, no public universities concerned themselves very much with funding other than from the government. Similarly, private universities largely focused on tuition dollars, although many institutions had annual campaigns, and a few had capital campaigns as early as the 1960s, with the first capital campaign being done by Harvard University; they raised $82 million, and Chicago, Duke, and Stanford followed with campaigns that exceeded $100 million [10].

In the twenty-first century, every college and university, public and private, has some form of fund-raising. More institutions are going out of business today than at any other time in the last century [11]. The primary culprit is a decline in enrollment with the concomitant decline in fiscal resources. Virtually all of the institutions that have closed had modest endowments and fund-raising capability that did not sustain the shortfall in tuition. Similarly, many public universities receive less than 20% of their total budget from the government. It is impossible to pass off the difference entirely to the customer—the student. The result is a robust approach to fundraising and building endowments. Thus, the strengths of developing fundraising are clear; what we need to consider, however, are the weaknesses and dangers of this form of funding.

5.2 Weaknesses and Dangers of Fundraising

Fundraising creates several challenges that do not destroy the advantages to an institution in raising money, but any university president needs to be aware of the dangers before embarking on fund-raising. In particular, there are four challenges.

5.2.1 Donor Influence

Any donor who provides an institution with a significant amount of revenue may think that they have the right to particular privileges and to intrude on the internal workings of the institution [12]. At a minimum, if a donor has given $50 million dollars to the institution, the donor probably expects that, if they call the president, they will be able to meet with the president immediately. Perhaps they also feel that they should receive special seating at a university event. All of the perks and privileges for a donor is on a continuum which forces the university president and development office to constantly assess what is and is not permissible. Most importantly, donors should have no say in who is admitted, and they should not be able to receive special privileges for their children. Further, a donor should have no say in who gets hired to fill an endowed chair that has been made possible by the monetary resources of the funder. The underlying purpose of an institution has to be that those at the institution are best able to make judgments about academic life based on a meritocratic basis informed by information and knowledge. If donors get to admit or hire whomever they want, then the *raison d'etre* of the university is brought into question.

5.2.2 Strategic Direction

The institution should have a strategic plan in place based on the collective wisdom of the Board of Trustees, the faculty, and the senior administration. The president develops, leads, and implements the plan. Plans should not be so rigid that they are unable to change. Strategic opportunities always exist in an ecological system. However, for one reason or another, not all opportunities should be chosen. When an individual climbs a mountain, there may be many trails that lead to the summit, but the leader of any expedition will choose the one that is best for the team. Similarly, at times, a president will be faced with the difficult decision to reject a potential donation that would strengthen the endowment because it places the institution in a direction that ultimately would be harmful. The danger for any leader is to accept revenue for whatever reason a donor wishes to provide resources. An institution without a strategic direction is one that will ultimately be in jeopardy. The challenge for any institution is to choose a strategic direction, be willing to capitalize on unforeseen opportunities, but also be able to hold fast to its mission.

5.2.3 Unforeseen Fiscal Costs

Related to the first two points are costs that may result from a gift that had not been considered. If a donor provides $50 million dollars to build a science building, the costs are generally concerned with construction. What may have not been foreseen is the annual maintenance and upkeep costs of the building that had not been built into the gift. If three generous donors have given the funding necessary for new buildings, the physical plant may have improved dramatically, but the annual costs to the overall budget may be increased by millions of dollars that otherwise would have gone to something else.

Universities also invest their endowment in stocks and bonds. Unfortunately, investments not only go up; the market can go down. A university that has become accustomed to spending the interest on the endowment every year faces difficult decisions when the market falls precipitously, such as during the recession of 2008 and the pandemic of 2020. The point is less that opportunities should be summarily rejected; rather, the institution needs to understand that opportunities come with associated risks.

5.2.4 Institutional Beliefs

Any institution has particular beliefs on which it stands. In a religious institution, such as a Catholic university, these beliefs may be self-evident, but they are true to any institution that has a history. Beliefs also change, but they change for a variety of intellectual reasons. A donor who wishes to change the belief system of the institution by way of a significant donation offers a challenge to any organization. Sometimes, it is better for an institution to close than to compromise its values. The purpose of organizational life is not survival at any costs. The work of the president, board, and faculty is to determine and to articulate the beliefs of the institution when a donor's largesse needs to be rejected because it would compromise the institution in a way that would make it unrecognizable.

6 Conclusions

I have pointed out here how philanthropic giving has played a significant role in the life of American colleges and universities. On the one hand, donations make options available that otherwise may not have been forthcoming. On the other hand, donations also play a central role in the functioning of the institution as public support declines and tuition increases can no longer be sustained. I described the various forms of fund-raising that takes place—annual giving and capital campaigns—and considered what fund-raising entails. Although I pointed out the obvious strengths of fund-raising, I also cautioned against the fulsome embrace of philanthropy without thinking through the strategic direction of the institution. Regardless of the potential pitfalls that exist, I do not see a decline in the import of philanthropic giving in the foreseeable future, especially given global crises such as the pandemic caused by COVID-19. Accordingly, I see an increase in philanthropic giving throughout the world.

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Share the Mission: Philanthropy and Engagement for Universities

7

Bernadette Tsui

1 Introduction

Universities transform lives and build tomorrow. They represent hope and change, aspiration and inspiration. Their core missions are teaching, research, and innovation, but when they carry out their missions well and nurture leaders who become the torch-bearers, when they contribute their knowledge and expertise to help society tackle challenges, and when they engage with their communities to promote shared goals and values, then universities become something larger, a fundamental part of the culture and spirit of a place. The more universities can achieve this, the more social capital they can build, then the more they will garner support from alumni who feel a natural bond and from benefactors who seek to invest in progress by funding institutions of higher learning with records of achievement. Educational philanthropy helps ensure a university's sustainability and fosters growth as well as discovery. It enables a university to help shape its community's social, economic, and technological development.

This chapter explores these principles and ideas as they relate to universities in countries across the world, but particularly in Asia and in Hong Kong, where university development and funding are historically different from that of major private universities in the west, but which over the last three decades have undergone major change. During that time and over the course of much experimentation, a fundraising methodology arose that has become a kind of litmus test for assessing a university's readiness to engage its community and stakeholders—its alumni, its donors, its local and national leaders, and its global partners in institutions involved in the acquisition and applicability of knowledge across every field of endeavor. The methodology is both art and science. It involves branding, community outreach, networking, and messaging on social platforms that turn fundraising into entrepreneurship, one rooted in recognized best practices, ethics, and an internal university infrastructure dedicated to institutional advancement by nurturing a philosophy of giving.

2 Philosophy of Giving

A philosophy of giving to a university grows along two tracks, one of paying back, out of loyalty or gratitude, and one of paying forward, out of desire to honor civic or personal achievement, or of commitments to mitigate social problems or increase what we know about the world in which we live. Every gift carries with it a story and a dream; the university becomes the depository, the place where stories and dreams are held and memorialized and acted upon. In the Confucian tradition, we individuals in a society have both emotional bonds and righteous responsibilities. We cherish *Qing* (情) and we treasure *Yi* (義). It is a highly desirable equation. As the saying goes, "*Qing* and *Yi* are worth a thousand taels of gold," taels being a unit of worth in ancient China. One thousand taels was very high worth.

Intrinsically, educational philanthropy resides first in the emotional bonds that link alumni to their universities. Alumni become part of their universities' histories and are steeped in their traditions and values. But in many societies, including in Hong Kong and across Asia, citizens in the larger community want to support their universities beyond the taxes they pay to local governments to fund higher education. They feel a responsibility for their success that can be considered righteous, but in a humble way. This commitment flows from a deeply felt conviction, shaped partly by the ravages of war and deprivation in the middle of the last century, that education is the one sure path to prosperity for the young and progress for the community. They want to be part of a university's success; they want to help it push past the boundaries of knowledge.

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Private universities in the west benefit from great endowments accumulated over centuries, but in many parts of the world, state universities rely largely on public funding. This is why such universities must build relationships with external members of their communities—alumni, benefactors, and others. They must fashion genuine partnerships based on trust. The more donations they receive, the more latitude they have in allocating resources and in strategic development. More and more, universities are attuned to this, and to the value of partnerships that increases over time. Donors and in many cases their descendants become loyal friends of the universities they embrace; they become vested in their success. Their donations are not mere transactions and are not only about size and quantity. Donations are symbols of their embrace of, and faith in, the university's mission.

This is why universities must articulate clear and convincing missions. For donors as much as university leaders, missions matter. In simple terms, beyond teaching and research, what is the university's *purpose*? Benefactors want to be part of a greater purpose than themselves. They want to help move communities ahead and create knowledge. Universities that pay only lip service and leave it only to the offices of development and alumni relations to project the mission leave the value of obvious partners untapped. Partners work across the university, in offices of student affairs, communications, marketing, and admissions. Some of the potentially most valuable partners are in the classrooms and labs—the teachers and researchers. A university's faculty can project missions with more resonance than a poster, press release or speech. And they must all be willing to welcome alumni and benefactors as partners.

Later in this chapter, we will discuss some tools, including tax incentives and matching gifts, that governments make available to universities to engage their communities and encourage donors to become mission partners. We will also examine the strategies universities employ, including the cycle of donor cultivation, solicitation, and stewardship, and the importance of viewing donations as not a case of harvesting only major donors, but of building a "donation pyramid" anchored by many donors regularly contributing lesser amounts that can provide a stronger foundation for sustainability and growth. Finally, we will stress the importance of considering alumni through all the different lenses that apply—their experience on campus, their age, their professions, their career stage, their aspirations—and the challenge of navigating the social, political, and economic issues that arise during any era and which can complicate the seemingly uncomplicated idea of educational philanthropy.

The truth of that observation became tragically obvious in 2020, when the world was turned upside down almost overnight by the Covid-19 tsunami. The pandemic's impact on families and communities has been so horrific (and may continue to be for some unknowable time) that mere words fail to fully capture it, but beyond the human toll lies the devastating impact on fundraising for universities and public-minded institutions. At the same time, however, the pandemic illustrates why communities turn to universities for knowledge and expertise, and why the university's sustainability and strategic development are so vital.

3 Covid Disruption and Donation

Worldwide, Covid-19 sent waves of disruption over every aspect of life. But the economic cost alone was in the trillions of US dollars by the summer of 2020. Apart from the anguish caused by more deaths and disturbances to our daily routines, the path to recovery is uncertain. But crises have a way of uniting people and deepening their compassion. They cause people to want to work together and turn to those in their community who can help lead the way.

In Hong Kong, my hometown, as soon as the outbreak began to spread in January 2020, the community turned to the universities for knowledge, expertise, and leadership. Three renowned scholars—Professors Gabriel Leung, Kwok-yung Yuen, Keiji Fukuda—from the Li Ka Shing Faculty of Medicine at The University of Hong Kong (HKU) where I work, were invited to join the four-person expert panel the Hong Kong government created to advise on intervention protocols and quarantine enforcement. With long-standing public and private funding support, the professors and their colleagues have been conducting pioneering research on the paths of virus transmission, epidemiological modelling, and vaccine development.

Our professors also shared their research findings with the international community, accumulated since the shock 17 years ago of the outbreak in Hong Kong and elsewhere of the coronavirus known as SARS, the acronym for severe acute respiratory syndrome. Covid-19 packs a far deadlier punch in some who become infected. Even so, while helping fight and ultimately suppress the spread of SARS, the university's experts gained insights that now helped Hong Kong contain the pandemic far more successfully than most regions, including South Asia, the Middle East, Europe, and the Americas.

Still, the disruption to the routines of Hong Kong life led to a frightful sense of crisis that caused donors, despite deteriorating and worrisome economic conditions, to want to contribute to the university's efforts. Without being asked or asking for proposals, donors gave gifts ranging from US$2 million to US$200,000. The donations included proceeds from an art auction and a collection from the staff of a law firm. Although like many he was losing money because many businesses were closed, one donor said he simply wanted to give researchers "a pat on the shoulders."

Li Ka Shing, the Hong Kong-based billionaire, renowned philanthropist, and namesake of the HKU Li Ka Shing Faculty of Medicine who endowed the faculty with a transformative gift of HK$1 billion (US$128 million) to the university 15 years ago, also gave again. As the Covid-19 pandemic took hold, Li hastened to donate millions to the global fight at different stages, from masks and protective gear to medical equipment, as well as relief funds to support small businesses to help them stay afloat. Established in 1980, the Li Ka Shing Foundation has, to date, donated more than HK$27 billion (US$3.5 billion) to education and healthcare, two causes particularly close to his heart [1]. He has funded top universities' medical research, creating a global alliance that includes HKU, Stanford University, the University of Toronto, and the Universities of Oxford and Cambridge [2].

In July 2020, on top of further pledges for medical and healthcare projects, he announced an unprecedented Career Seeding Fund; it provided HK $50,000 (US$6400) to each medical student graduating in 2020 and 2021 from HKU, to symbolize the value and importance of those joining the profession at such a critical time. The seeding fund for young doctors was reminiscent of a program Li started in 2016, which provided a grant on a blanket basis (i.e. no specific-project approval required) to all students graduating from secondary schools in underprivileged districts. At the time of the award for young doctors, the Chairman of the Li Ka Shing Foundation expressed appreciation to the medical professionals serving Hong Kong's infected and sick: "In these particularly challenging and vulnerable times, your conscientiousness and perseverance are a bright light of assurance to Hong Kong" [3].

Covid-19 raised a big question for those of us who work in universities—can we weather a financial storm? Each university has a unique mix of revenue streams and Covid-19 raised immediate threats of budget cuts [4]. There may well be decreases in state support, federal support, research grants, endowment returns, and auxiliary revenues. Then there is the loss of tuition payments due to declines in enrollments, as much as 15% of domestic students and 25% of international students, according to the American Council on Education. McKinsey & Company, the management consulting firm, also estimated that even if the virus were brought under control by fall 2020, about 25% of public colleges and universities and almost half of private institutions will face budget deficits of at least 5%.

Despite the economic devastation Covid-19 has wreaked, it also makes a compelling case for universities to appeal for donations with a renewed sense of purpose. Many public-minded institutions, especially non-governmental organizations and social delivery groups, rely on philanthropy to offer immediate relief for the grassroots, for the elderly, the underprivileged, medical personnel in need of supplies, and for children whose remote learning is hampered by lack of access to technology. These are all obviously worthy causes that have drawn support, but as the development of a vaccine against Covid-19 became national and global priorities, universities and their medical research partners began receiving millions of US dollars in donations.

For example, as early as April, 2020 the University of Toronto announced a gift of CA$10 million (US$7.45 million) from the Temerty Foundation to create the Dean's Covid-19 Priority Fund [5]. The namesake of the foundation is James Temerty, a self-made entrepreneur with a long record of philanthropy who pioneered clean-energy development in Canada. A statement issued by the foundation at the time underlined the urgency of developing a Covid-19 response:"…(We) want to support a local network of heroes fighting on behalf of all of us … to discover a long-term solution that can help us stabilize and recover from this devastating crisis … and give the talented scientists some of the tools they need to accelerate the most promising research." In its own statement, the university noted: "Around the globe, philanthropists are giving generously to support their communities and help address the Covid-19 crisis… Toronto is home to some of the world's brightest minds in biomedical research and clinical-care innovation, and this gift has already helped us to scale up their work quickly."

No one need be persuaded of the severity of the Covid-19 pandemic. The virus was not even identified until January of 2020, but by the end of July, seven months later, it had taken more than 670,000 lives worldwide and infected more than 17 million. (And by the end of September 2020, the number of cases had surpassed 33 million and more than one million people died.) Appeals for support of community-based emergency responses will find a ready ear, but like the Temerty Foundation, many benefactors across the globe will seek to underwrite the search for long-term solutions and an infrastructure to combat emerging diseases. In Japan, in June of 2020, Tadashi Yanai, chairman and head of Fast Retailing, the company behind the clothing retailer Uniqlo, pledged US$93 million for research into Covid-19 and other communicable diseases. The donation was made to Kyoto University, to be split between two Nobel Prize winners in medicine, Shinya Yamanaka and Tasuku Honjo. "We have the same passion to truly make Japan better," Yanai told Yamanaka and Honjo. "I would like to make efforts so that Japan does not decline after the virus subsides" [6].

Tecnológico de Monterrey, Mexico's largest private, nonprofit university system, encompassing 25 campuses with more than 93,000 students, did not wait for benefactors to come calling. It launched its first-ever multi-priority campaign to seek emergency student support and funding for research and its frontline healthcare programs. University officials were initially hesitant to contact donors to talk about

the university's needs, but a volunteer told them to "just keep fund-raising." So they did, with a campaign dubbed "We Can Do This Together." It raised US$2.6 million for emergency economic support for students and US$22 million for its research and healthcare programs. A university official said the university's long-term ties to donors was key. "The essence is … being close to the donors, tell(ing) them what the university is doing, giv(ing) them stories of people in the frontline … it is easy to get a timeslot from donors now during the lockdown" [7].

Being close to donors led to a US$1 million grant to fund coronavirus research at Vanderbilt University Medical Center in the US state of Tennessee. A well-known country music performer, Dolly Parton, said a longtime friend and researcher, Dr. Naji Abumrad, told her the university was making progress in the search for a coronavirus cure [8]. She said her donation was also aimed at encouraging people who "can afford it to make donations."

4 Taxing Effects

Many universities in the United States are the fortunate beneficiaries of a culture of giving that is ingrained early on in the minds and hearts of their alumni. The transformative impact of large and small donations over centuries may have contributed as much to the status and certainly the stability of universities such as Harvard, Stanford, and Yale as the accomplishments of their alumni. There is an old saying that comes to mind—the first thing a college student learns is to donate to their alma mater. However, this is not quite the case in Asia, where universities mostly started as government-subsidized, and hence the public perception is that it is primarily the government's responsibility to support higher education. The notion of systematically seeking private donations only started some three decades ago.

In the US, tax incentives written into law are also a means by which universities engage donors. They encourage giving and shape people's behavior. They enable donors to take deductions on their income tax returns for donations made to universities, thereby reducing the taxes they owe and allowing them more say in how their money is spent. It is commonly accepted that US tax incentives are crucial to the culture of giving in the US. "Tax incentives exert a direct pull on charitable giving," according to the Doing Good Index 2020. "In Asia, where philanthropists and corporations often work in tandem with governments, tax incentives also send a strong signal of official support for charitable giving that amplifies their impact" [9].

However, tax incentives in Asia are not considered significant enough to encourage donations to the same degree they do in the US because rates of tax deduction vary widely. In addition, incentives for charitable giving upon death in the form of bequests are not widespread. Only six economies even broach the issue of inheritance tax, and among these only Japan, Korea, Philippines, and Taiwan offer incentives for charitable bequests.

5 The Magic of Matching

In 2003, the Hong Kong Government decided to try to nurture a philosophy of giving. It was a noble idea, and it worked. The government proposed to match, dollar for dollar, any donations made to the eight government-subsidized universities. It set aside US$129 million, or one billion in Hong Kong dollars, and essentially challenged the community to give in order that beneficiaries get more. Government leaders were uncertain how citizens would respond, but within a year the set-aside fund was depleted as donations flowed into the universities, and not just the big ones. The University of Hong Kong, with its long history, raised 50% more than previous year. But the Hong Kong Institute of Education (renamed Hong Kong Education University in 2016), where alumni were mostly teachers, recorded a donation increase of 100-fold. The plan generated such enthusiasm that one donor borrowed from his bank in order to donate in time and double the impact of his gift [2].

The government matching program was renewed several times over the next two decades and expanded to include more than 20 institutions. In the second round of the program, the match was reduced to 50 cents per one dollar raised simply because the program was too successful. In July 2019, for the eighth round of the program, HK$2.5 billion (US$323 million), was set aside. The program was a clear effort by the government to encourage private donations and diversify funding for universities. Some donors said the matching was surely the best investment as it immediately yielded a 50% return. It signified "the best moment to give."

Hong Kong's first matching round in 2003 struck a chord in the United Kingdom. It was cited in a study issued a year later by the Council for Advancement and Support of Education (CASE), which conducted research on behalf of the Sutton Trust, a major UK philanthropy that seeks to increase social mobility for students, no matter their parents' socio-economic background (also the goal of one of the Li Ka Shing Foundation programs cited above). The study became known as the Sutton Report [10] and its purpose was to highlight educational success stories and best practices in philanthropy to boost giving in the UK. "Match funding would help kick start this process at universities across the country and could help raise a significant amount of extra money," the Sutton Trust founder, Sir Peter Lampi, said at the time. "I believe there is growing consensus that match

funding is the way forward. We are finally recognizing that fostering a climate of private giving … is crucial if we want to maintain the position of UK universities on the world stage."

In urging the UK government to launch a matching grant program, the Sutton Report described Hong Kong's then still-new program as a success because it had led to more individual support for education while also providing more government investment in education and showcasing the public value of philanthropy to a community. The Sutton Report noted that the Hong Kong program had encouraged more support not only from alumni, but from other constituencies as well. It recommended that a matched-donation plan in the UK be structured to promote giving to universities that were new to fundraising, as Hong Kong's were at the time, and to challenge universities with existing fundraising and development offices to raise their sights. The Hong Kong model, with its ceiling on the amount available for government matching, was one way forward for the UK. A sliding matching scale, with larger matches for smaller donations and vice versa, was another.

The Sutton Report said that with increased non-governmental income, universities could enhance social mobility and educational opportunities for students regardless of their socio-economical standing. The report also said its research showed that in Hong Kong and elsewhere in the world, including Singapore, Canada, and the US, matching schemes do not reduce public funding, but rather increase public support and a university's ability to build strategic links with its constituencies.

The UK government launched its own three-year pilot matching program in 2005. At the time, Professor Eric Thomas, Vice-Chancellor of the University of Bristol and Chair of the Government Taskforce into Increasing Voluntary Giving in Higher Education, observed: "No government is likely to be in a position to increase university funding sufficiently through general taxation… Higher tuition fees are part of the answer, but so is philanthropy …. It's time the UK caught up, but it won't do so unless experienced professionals … lead the fundraising effort" [11].

Matching is indeed a magic wand in fundraising—and it does not have to be the government that takes the lead. At HKU, in 2005, Vice-Chancellor Lap-Chee Tsui believed that the government's matching scheme was not attractive enough since it was only offered intermittently. Therefore, he proposed to alumnus Stanley Ho, another major Hong Kong businessman and philanthropist, that a challenge grant be launched to encourage alumni participation. Ho took up the challenge—he immediately set aside HK$500 million (US$64 million) over five years, to match dollar for dollar any donation made by alumni. If the annual target of HK$100 million was not reached at the end of each year, he would take back the remaining portion. Ho joked good naturedly that, if alumni did not come forth, he won. On the other hand, if alumni responded enthusiastically, then the goal of encouraging alumni participation would be reached, he still won.

The response was at first slow, but soon gathered momentum. By the end of the first year, donations from alumni increased by 600% while the number of individual alumni donors increased two-fold. Halfway through the fifth and last year of the program, the annual target was reached. With an aggregate of 13,000 donors, 70% of them first-time donors ranging from 19 to 95 years old, and gifts ranging from HK$20 to more than a million, the grand total of HK$1 billion (US$128 million) benefitted more than 100 units across the university [12]. The Stanley Ho Alumni Challenge won international accolades, and was commended as "extraordinary; donors knew what it meant to be giving in new ways that are not embedded in the culture; he knew he had to develop a spirit of giving; lots of participation; involvement constant and steady [13]".

Corporations across the world are now starting to give challenge grants, encouraging their staff to give to specific causes that the company will match. It is a welcome way to build staff loyalty and boost morale, while celebrating the feel-good factor in seasons of generosity like Christmas, New Year, and company anniversaries.

Here I am also including a table showing, over two selected periods, the relative contribution of philanthropy in comparison to the total yearly budget at The University of Hong Kong. This is by no means a comprehensive analysis, but may throw light on the possible impact and significance of donation support.

	Donations & benefactions (HK$) (M)	University total income (HK$) (M)	% of University total income from donations	University total expenditure (HK$) (M)
2011–12	288	6013	5	6703
2012–13 (Government matching)	1117	9772	11	7481
2013–14	1527	10,381	15	7879
2017–18	641	10,846	6	9455
2018–19	442	10,670	4	10,279
2019–20 (Government matching)	1232	12,514	10	11,062

Source Financial Report, The University of Hong Kong

6 The Donation Pyramid

At HKU, I teach a course titled "Contemporary Issues in Philanthropy" for the Master of Social Sciences in Non-Profit Management. While most people tend to assume fundraising is only about major donors with deep pockets, I often start the class by discussing the "Donation Pyramid" to explain in Hong Kong dollars why the assumption is faulty and to get to the essence of fundraising strategy?

The donation pyramid illustrated [14]

Donation Target:	1 Million Dollars
Projected Target Donors:	100 people at different levels (noting it is easier to get donors for smaller amounts)

$	100,000	×	2	=	200,000
$	40,000	×	6	=	240,000
$	30,000	×	12	=	360,000
$	5000	×	30	=	150,000
$	1000	×	50	=	50,000
		Total			1,000,000

The chart demonstrates that while 20 people donate HK $800,000, 80 others together donate HK$200,000.

In a nutshell, there are leadership gifts that continually raise the bar—transformative major gifts. In financial and operational terms, these also have all high ROIs (Return on Investments). The administrative costs associated with seeking these gifts are more concentrated and targeted, and thus usually lower per each dollar raised.

Then there is the larger number of smaller gifts. The amount per gift may seem less significant, and certainly not transformative, yet these represent no less a vote of confidence. The number of participants in a fundraising effort reflects strong backing for a cause. There is a temptation to overlook or dismiss these, as there is usually more administration involved and no less effort, while the total donation amount may not be that high, and so the ROI is deemed low. But even in the most commercial terms, many of these donors will likely grow career-wise or business-wise, and so grow in their power to give. The wide base of participation at the pyramid's bottom provides an institution a solid foundation, now and for the future.

A university, or any healthy and sustainable institution intent on a future, must not seek only quick gains, but instead consider the lesson of the pyramid and not under-value "basic donors." It is imperative that we treasure the participation rate as much as the donation amount in any campaign. Giving is a profound catalyst for engagement, a statement, and a visible act. In planning any fundraising campaign, a university would be wise to also demonstrate its principles of equality, equity, and respect for individuals—providing an equal, welcomed opportunity for everyone to contribute and participate. It is vital to embrace the wider community, to welcome goodwill from different sectors, and engage a large audience. As in a rally, concert, or soccer game, mass participation is infectious and uplifting. Crowd endorsement will in turn give the campaign legitimacy, and remind us again of the goal of engagement by sharing values and mission. Fundraising is never just about money.

7 University as Family

In professional fundraising protocols, a well-known cycle exists: Cultivation–Solicitation–Stewardship. You cultivate your relationship with the prospect, then when the right time comes, you ask, you succeed, and after donor-recognition rituals, you steward the relationship. Any client relationship management manual in the business world will share the same jargon, utilitarian though it may seem.

In parts of Asia, in a tradition that is more subtle and often described as Confucian, relationships have a deeper cultural dimension. Apart from the shared mission, there are, as we noted in the introduction to this chapter, emotional bonds (*Qing*) and righteous responsibilities (*Yi*) that tie benefactors and recipients together. They are worth "a thousand taels of gold" [14]. They arise from true friendships and loyalty, mutual caring and support, and a shared sense of responsibility for life's ups and downs. In this tradition, the university family is real; there is a strong sense of community and continuity. Genuine and meaningful bonds are made with fond memories that in turn shape the institution's traditions or culture. These cultural bonds are embedded in the act of giving. Thus, donation becomes more than mere transaction; it is never a matter of quantity or size, but altruism that celebrates not just the mission of a university, but friendship and trust between a benefactor and the institution or its leaders.

One of Hong Kong's most prominent civic leaders, William Mong Man-Wai, built a business based on trust, which also was at the heart of his philosophy of giving. He became famous for forging cross-cultural commercial links

in Japan and Mainland China and for being the founding chairman of Shun Hing Group, which distributed products manufactured in Japan by Matsushita Electric Industrial Co. Ltd., which was re-named the Panasonic Corporation in 2008. His firm sold ten million Matsushita-made rice-cookers in Hong Kong over five decades [15]. He once said that his contracts with Matsushita were not grounded as much in legal details as they were "a handshake that represented trust, loyalty, and friendship" [16]. This same principle, this contract of trust, was the guiding spirit of the Shun Hing Education and Charity Fund, which Mong founded in 1984. It donated billions of Hong Kong dollars to civic projects and universities in Hong Kong, Mainland China, the UK and the US. When Mong passed away in 2010, his son David Mong carried on with the same spirit of trust, loyalty and profound friendship in the Charity Fund's continuing benefactions to universities and society.

Mong's *modus operandi* was common among an older generation of philanthropists, the early entrepreneurs who built business empires in the East. Trust was the pivotal factor, first and foremost. With a handshake, or a nod of the head, they would pledge a major donation, a transformative gift, and leave it to their executives to follow up with the operational details.

With globalization, all top institutions in the world compete for the same major donors. In the past ten years, Hong Kong became famous for having possibly the highest per capita concentration of billionaires, and thus many potential major donors, all within a small urban city with a population of only seven million.

The likely single highest donation from Hong Kong, US $350 million, was given in 2014 by the Chan Family and its Morningside Foundation to the Harvard School of Public Health—then the largest gift in the university's 378-year history [17]—which was renamed the Harvard T. H. Chan School of Public. Alumnus Gerald Chan said at the time, "(the gift) was unsolicited, unrestricted, and unexpected—unsolicited by Harvard, unrestricted by the donor and unexpected by the public. Harvard never came to me to solicit a gift. The best philanthropic giving comes from the heart, oftentimes a grateful heart. I am grateful to this university for the education that I received here. That education changed my life. I am also grateful to my late father, who instilled in me the values by which I have lived my life. This gift is a way of memorializing my father and the values that he stood for."

University presidents from the US, the UK, Canada, and Australia regularly make Hong Kong a stop during their international tours, not without reason. It was jokingly said that, on any one day, the number of overseas university presidents in Hong Kong outnumbered the local university presidents. At the time the comment was popularly shared in the donor world of Hong Kong, about ten years ago, Hong Kong had only eight universities (government-funded; some of them consistently high on international rankings).

Those familiar with philanthropic lore in Hong Kong also like to recall a famous story involving Professor Tien Chang-lin, Chancellor of the University of California at Berkeley, and a leading businessman seated next to him on Tien's flight from Hong Kong back to California. The Chancellor spoke of his mission at the university with the stranger he had just met as they flew across the Pacific Ocean. By the time the plane landed, the businessman had become so impressed by Tien's vision that he pledged a US $1 million gift. The men and their families subsequently became life-long friends [18].

A Hong Kong philanthropist who asked to remain anonymous also tells a story about a university president from North America who came to see him for what the philanthropist thought was just a courtesy visit, but who instead "audaciously asked me for a US$1 million donation at the breakfast table!" The philanthropist, modest and generous as he was usually known to be, was quite offended. "What does he think I am? A money tree? I would never want to see him again!" For his part, the university president thought he might as well be direct because he had come a long way and it might be another year before he could meet the donor again. He had also decided that he would not express disappointment if the donor declined—unaware that in the donor's culture his demeanor could have been interpreted as impudent, if not insulting [19]. These stories, which I was fortunate enough to hear or witness first-hand, found their way into my book documenting close to 100 tales of giving that reflect a wide spectrum of cultural differences and attitudes.

Indeed, cultures differ, and so do generations. Young people in their 20 and 30s, the so-called millennials, are different from the super wealthy of another time who decided to donate, then left it to others to work out the details. The millennials, like any other group, cannot all be put in the same stereotypical box, but some experts say there are certain common traits that will require some re-defining of philanthropic engagement while challenging universities in particular to adopt new strategies of engagement. They grew up in the age of the 24-hour news cycle and are digitally connected, but their digital engagement with friends and family does not always translate to engagement with nonprofit causes. They want to be creative and are "solution-centered" [20]. They prefer collaborative leadership, hands-on involvement, and tangible milestones such as those sometimes offered by nonprofit organizations—for example, a small donation that will buy a net in Africa to help prevent the spread of malaria for one family.

My experience has shown they also want transparency and direct conversations to inspire trust. They want to know where the money is going, how it is going to be spent, and

specific stories of impact. They are not satisfied to just share the institution's vision in abstract terms. With universities, they want to understand where their dollars can go, and measure the impact systematically. They want to create movements for change. These millennial traits can lead to better connections between organizations and potential supporters, but they could also lead to demands for involvement, which might raise issues of academic autonomy when involvement amounts to excessive interference. There is surely a fine line between engagement and intervention. That line is still evolving, and all the possibilities and potentials are yet to be explored.

8 Alumni Value

Due to their education, alumni tend to be in an affluent demographic. They understand the positive impacts of their university lives and degrees. They share similar journeys and have walked through the same gates. They want to be part of a network and feel a sense of belonging. They do not give just out of nostalgia—but also out of gratitude, pride, purpose, the sharing of a larger mission, and of a sense of paying back. Those who once benefitted from scholarships may want to give back to the next generations and even set up scholarships in their names. They also want to be appreciated and feel that their input matters. Their alma mater can be as much a lifelong bond as a base for lifelong learning.

Alumni can be advisors, advocates, and allies in support of their alma mater's mission. They can be highly effective spokespersons with legislative bodies, regulatory agencies, media outlets, community organizations, and even the major donors. Engaging with a dynamic, accomplished network of alumni leaders benefits the university in its community outreach. They can donate their time and expertise, in volunteering, providing advice, mentoring, student recruitment, networking, and referrals. They can help forge long-term relationships that will benefit the institution for decades to come. They can volunteer as guest lecturers and honorary professors. They can enrich the university's social network, and help reach out to business, financial, and technological leaders. They can be a major part of the university's social capital.

However, other organizations will see them as assets as well. In virtually every society, the nonprofit or charitable sector will have doubled in number in the last decade. They offer no less noble causes to support—helping the underprivileged, the handicapped, the abandoned. They want their time and expertise too. Therefore, universities must not under-value the importance of alumni engagement. Alumni associations are one form of engagement; they are useful as networks or nuclei, but alumni are not a "body." One expert writes: "They are individuals whose campus experiences, current life stages, and points of connection vary widely. To be successful, therefore, alumni relations programs must carefully differentiate among alumni and speak to the interests, needs and affiliations of each alumna or alumnus. Often the engagement involves supporting the alumni, especially in the early stages of their lives. In the aftermath of the global economic crisis, for example, alumni are looking for their institutions to provide career services, mentoring and networking opportunities, and retraining and skills development" [21].

The student experience on campus is also vital and will greatly determine the quality of alumni engagement. Any graduate who had a miserable experience as a student will be hard to enlist as an ambassador. But that reality should not stand in the way of attempts to engage even the student who had a bad experience. Despite it, they understand and appreciate the benefits the institution can bring, the culture and values it represents, and the life-long partner it can be. Alumni engagement can result in a new appreciation of the university experience. And that can build over time. Cornell University found that a donation exceeding more than US$1 million was typically preceded by 13 smaller donations—and that 80% of the time, the first three donations were less than US$250 [22].

9 Uneasy Engagement

Universities are pluralistic communities and that is reflected in their principles and in their public engagement and communications. One of the rewards of participating in a university community is the freedom to debate and learn different views. But pluralism can be tricky to navigate and difficult for the public to appreciate. University of Edinburgh Vice-Chancellor Peter Mathieson described the issue this way in a Times Higher Education virtual summit: "One of the characteristics of universities is the ability to disagree with one another, have a debate and come to a viewpoint. In the public eye that may come across as disunity or lack of clarity." He said UK media had characterized academic wishy-washiness as "one expert says this, and one expert says something else. That sends potentially quite a confusing message to the public. Are experts able to come to a view or not?" [23].

While a university may cherish diversity of opinion, sometimes views can be sharply polarized, especially when issues have a political edge, and the university gets caught between opposing camps. It can inadvertently become a battlefield pitting factions from within and outside the university. This can result in negative media scrutiny, public cynicism, alumni displeasure, even official criticism. These consequences can become challenging obstacles for

professionals in university engagement who steward external relationships.

In today's world, fragmentation seems an inevitable fact of life. Students, academics, alumni, benefactors, and the community are divided along many lines and split into different interest groups. Channels of communication, the ways to reach them, are also fragmenting. Some want to receive online publications; others insist on printed copies of university magazines and even posted letters. Then there are all the different online platforms where people communicate or find information. Consequently, the university has to communicate in different ways to cater to different needs and attitudes. Mass marketing becomes niche marketing.

But universities are also about innovation, and challenges lead to innovations. For example, the rapid growth of online learning may be a useful model for boosting alumni engagement. The Covid-19 pandemic closed campuses and forced universities to move from in-person to online learning and virtual classrooms, or a hybrid, leading to potential new ways of learning for everyone, including webinars and Zoom meetings. Similarly, the development of MOOCs (the acronym for massive open online courses) can lead to lifelong learning opportunities for alumni and donors, featuring subjects of particular interest to them, for potentially worldwide audiences. As one expert has noted, "Offering major donors access to MOOCs on subjects of particular interest to them will represent a quantum leap from a faculty member giving a 30-minute talk at a campaign dinner" [24].

10 Conclusion

Philanthropy and engagement are crucial for the modern university, private or public, in the west or the east. To grow and to discover, to become a fundamental part of the culture and spirit of a place, universities need the support of their communities as the communities need them to share their knowledge and expertise, in ordinary times and in times of crisis.

As we noted at the outset, beyond teaching and research, universities are about transforming lives and building tomorrow. These are social contracts universities make with their stakeholders—their students, their alumni, their communities, their benefactors. In order to try to meet their commitments, universities must nurture a philosophy of giving, which requires the development of a fundraising strategy based on shared goals and values, and a fundraising methodology that is both art and science—a methodology that includes tailored approaches to alumni and donors with unique histories and interests, and fundamental concepts such as the Donation Pyramid.

Our goals, strategies, and methodologies naturally evolve with time and with change. But the values universities share with their communities are the bedrock principles that tie them together and produce, as Confucius would say, emotional bonds and righteous responsibilities. Universities, as citadels of knowledge and beacons in humanity, must continue to share their noble missions and visions as well as intimately engage with the wider world.

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8 Technology Transfer and Commercialization as a Source for New Revenue Generation for Higher Education Institutions and for Local Economies

Richard S. Katzman and Ricardo Azziz

1 Introduction

The basic and underlying mission of most universities is two-fold: knowledge transmission (education and training) and knowledge generation (research and scholarship). The fundamental challenge for these organizations is that this mission often comes with costs that are difficult to cover, thus creating significant financial burdens. In general, neither education nor research operate in a business model that allows the opportunity to generate any substantial excess of revenue over expenses (e.g. profit or margin). Moreover, both missions require substantial ongoing investment for these organizations to remain academically competitive and market relevant. Compounding the challenge, from a community perspective, is that universities often serve as critical economic engines for the cities and towns where they are located. Universities support local area businesses, housing, schools, healthcare facilities, and a host of other economic drivers vital to the health of these municipalities.

The issue is therefore to identify new and meaningful sources of revenue that can be used to augment the organization's immediate and long-term needs to maintain and expand their infrastructure. Technology Transfer represents one such opportunity where investment of resources can yield a return which can then be cycled back into the university for its further growth and development.

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2 The Business of Technology Transfer

2.1 What Exactly is Technology Transfer

Technology transfer is a commonly used term that often means different things to different people and the organizations within which it is functioning. At its core, technology transfer (also known as 'Tech Transfer') is:

> The process of transferring (disseminating) technology from a person or organization that owns or holds it to another person or organization. It occurs along various planes: (1) among universities, (2) from universities to businesses (and vice versa), (3) from large businesses to smaller ones (and vice versa), (4) from governments to businesses (and vice versa), across geopolitical borders. [1]

The goal for tech transfer is to bring new discoveries to market, either individually or collectively, creating a product or service and making it available. The result is society benefits as a collective, and those bringing this technology to the marketplace create an economic value for themselves and those who were involved with its discovery and commercialization.

2.2 The Regulatory Framework for Technology Transfer

To understand why tech transfer has become such an important tool for universities and so critical to the entire consumer market, it is useful to first understand its regulatory protection.

2.2.1 The Bayh-Dole Act (U.S.)

Introduced by Senators Birch Bayh (Democrat from Indiana) and Robert Dole (Republican from Kansas) in the United States (U.S., the Patent and Trademark Act Amendments (P. L 96–517) was passed into law in 1980. This law enabled universities to retain ownership of new inventions and

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discoveries through use of patents and copywrite protection while also pursuing commercialization. The Bayh-Dole Act, as it has become known, defined a uniform patent policy among the U.S. federal agencies that funded research, enabling universities, non-profit organizations, and for-profit businesses to retain ownership. It also created a mechanism and system to incentivize these organizations and their investigators to document, capture and monetize the value of this intellectual property (IP) [2].

Importantly, this legislation provided a legal framework upon which industrialized countries around the world could: (1) pursue similar goals related to research, development, and commercialization; and (2) form meaningful partnerships across international borders. Prior to passage of this legislation, laws governing IP and inventions, in the U.S. and globally, were vague and inconsistent, making it difficult for inventors and scholars to protect their discoveries. This then was a disincentive to universities and their researchers to invest in proper protection for the eventual sale and distribution of these new technologies. Consequently, many opportunities were lost, and new technologies were not being leveraged and optimized to enable and achieve a proper level of economic benefit.

The Bayh-Dole Act is "perhaps the most inspired piece of legislation to be enacted in America over the past half-century," according to 'The Economist' magazine. In "Innovation's Golden Goose," an opinion piece published in Dec. 12, 2002, the respected publication states that, "Together with amendments in 1984 and augmentation in 1986, this [Act] unlocked all the inventions and discoveries that had been made in laboratories throughout the United States with the help of taxpayers' money. More than anything, this single policy measure helped to reverse America's precipitous slide into industrial irrelevance" [2]. The effects of the Bayh-Dole Act, as will be discussed, have critically accelerated invention and creativity, and their commercialization, for universities in the U.S. and around the world.

2.2.2 Other Countries with Legislation Similar to the Bayh-Dole Act

The Bayle-Dole Act serves not only as a guide to U.S. tech transfer, but as a model legislation fort the rest of the world. Since passage of the initial legislation in 1980, that process which defines discovery to product development to commercialization has become the standard for a worldwide "Discovery-Entrepreneurial Ecosystem". Today, tech transfer has been embraced around the globe (Table 1). It has become a critical source of revenue for universities and a primary pipeline of new products and services across all industries. During the past 40-years, countries around the world have developed and implemented their own versions of this legislation. This has enabled and incentivized more active scientific cooperation across international borders.

2.3 Protecting and Managing Technology Innovation and Investment

To ensure that an inventor or researcher, and their institution, can benefit from their discoveries and, in turn, ensure that the idea is moved to its full realization and commercialization for the benefit of the larger society, it is critical that there be a regulatory and legal framework that protects these ideas. Often the terms patent, copyright, and trademark are confused. Although there may be some similarities among these kinds of IP protection, they are different and serve different purposes.

2.3.1 What is a Patent?

A patent for an invention is the grant of a property right to the inventor. In the U.S. it is issued by the U.S. Patent and Trademark Office (USPTO). Generally, in the U.S. the term of a new patent is 20 years from the date on which the application for the patent was filed or, in special cases, from the date an earlier related application was filed, subject to the payment of maintenance fees. U.S. patent grants are effective only within the U.S., U.S. territories, and U.S. possessions. Under certain circumstances, patent term extensions or adjustments may be available.

The right conferred by the patent grant is, in the language of the statute and of the grant itself, "the right to exclude others from making, using, offering for sale, or selling" the invention in the U.S. or "importing" the invention into the U.S.. What is granted is not the right to make, use, offer for

Table 1 Countries with legislation similar to the U.S. Bayh-Dole Act

Brazil [425]	Japan [49,702]	Russia [555]
China [17,754]	Malaysia [258]	Singapore [1064]
Denmark [1,271]	Mexico [376]	South Africa [173]
Finland [1,563]	Norway [138]	South Korea [21,817]
Germany [17,326]	Philippines [86]	United Kingdom [7599]
Italy [3386]		

Note The numbers in brackets indicate the number of patents each country was awarded by the USPTO in 2018
Adapted from [3]

sale, sell, or import. Rather, it is the right to exclude others from making, using, offering for sale, selling, or importing the invention. Once a patent is issued, the patentee must enforce the patent without aid of the USPTO [4]. In other words, under U.S. regulation having a patent gives one the right to sue others for infringement, but does not mean the USPTO will enforce such infringement. A critical distinction and something other countries wishing to enhance their tech transfer capabilities may want to assess.

Other than seeking patent protection in their own country, inventors can also seek international patent protection. The Patent Cooperation Treaty (PCT) [5] was signed in 1970 and amended subsequently. By filing one international patent application under the PCT, applicants can simultaneously seek protection for an invention in a large number of countries. The PCT assists applicants in seeking patent protection internationally for their inventions, helps patent offices with their patent granting decisions, and facilitates public access to a wealth of technical information relating to those inventions.

There are various avenues to assist inventors in pursuing international patents. For example, the Office of International Patent Cooperation (OIPC) under the USPTO was established in 2014 to support and improve the international patent system. The office leads efforts to assist U.S. inventors and businesses in protecting their patent rights worldwide and supports the global innovation community. The World Intellectual Property Organization (WIPO) was established in 1967 and is a self-funding agency of the United Nations, with 193 member states. WIPO serves as the global forum for IP services, policy, information, and cooperation. This, patent protection in one country can also be sought by inventors from other countries.

In 2018 the USPTO provided 178,184 patents to inventors from a total of 123 countries [3, 6]. Table 2 provides an overview of those countries that had the most active research and technology development in 2018, as defined by the number of patents issued by the USPTO. In the same year, the U.S. received 48% of patents awarded by the USPTO, with another 35% issued to five countries (Japan, South Korea, China, Germany, and Taiwan), 9% to seven countries (UK, India, Israel, Italy, Netherlands, Sweden, and Switzerland), and the remaining 9% of (~31,000 patents awarded) distributed across 111 different nations.

2.3.2 What is a Trademark or Service Mark?

A trademark is a word, name, symbol, or device that is used in trade with goods to indicate the source of the goods and to distinguish them from the goods of others. A service mark is the same as a trademark except that it identifies and

Table 2 US patent and trademark office—patents awarded by Country—2018

Patent types						
Country	Utility	Design	Plant	Re-Issue	Total	% of total
United States	144,413	16,644	493	259	161,809	48
TIER 1 [>10,000 patents awarded]						
Japan	47,566	2014	43	79	49,702	15
South Korea	19,780	1967	7	63	21,817	6
China	15,224	2520	5	5	17,754	5
Germany	16,033	1196	81	16	17,326	5
Taiwan	10,933	793	–	16	11,742	3
Sub-total	109,536	8490	136	179	118,341	35
TIER 2 [2000 to 9999 patents awarded]						
United Kingdom	6616	943	27	13	7599	2
India	4225	103	–	1	4329	1
Israel	3996	191	28	4	4219	1
Italy	2802	557	24	3	3386	1
Netherlands	2700	200	317	3	3220	1
Sweden	2807	359	–	11	3177	1
Switzerland	2669	312	–	6	2987	1
Sub-total	25,815	2665	396	41	28,917	9
TIER 3 [<2000 patents awarded]	27,996	2,698	183	49	30,926	9
Total Non-U.S	163,347	13,853	715	269	178,184	52
Total	307,760	30,497	1208	528	339,993	100

Adapted from [3, 6]

distinguishes the source of a service rather than a product [4]. Trademark rights may be used to prevent others from using a confusingly similar mark, but not to prevent others from making the same goods or from selling the same goods or services under a clearly different mark.

2.3.3 What is a Copyright?

Copyright is a form of protection provided to the authors of "original works of authorship" including literary, dramatic, musical, artistic, and certain other intellectual works, both published and unpublished. In the U.S., the 1976 Copyright Act generally gives the owner of copyright the exclusive right to reproduce the copyrighted work, to prepare derivative works, to distribute copies, to perform, or to display the copyrighted work publicly [4].

2.4 Summary

- Technology transfer (tech transfer) is the process of transferring (disseminating) technology from a person or organization that owns or holds it to another person or organization. The goal for tech transfer is to bring new discoveries, either individually or collectively, to market by creating a product or service.
- A significant driver of tech transfer in the U.S. and globally was the framework provided by the Bayh-Dole Act, as it has become known, which defined a uniform patent policy among the governmental agencies that funded research, enabling universities, non-profit organizations, and for-profit businesses to retain ownership of their discoveries. Many countries have adopted similar regulations since the Act was approved in 1980.
- To ensure that an inventor or researcher, and their institution, can benefit from their discoveries and, in turn, ensure that the idea is moved to its full realization and commercialization for the benefit of the larger society, it is critical that there be a robust regulatory and legal framework that protects these ideas, including patents, copyrights, trademarks, and licensing.

3 The Potential of Tech Transfer for Universities

3.1 The Impact of University-Based Tech Transfer

To understand and fully grasp the power of university-based tech transfer, one needs only consider the following facts regarding long-term impact of research and innovation on the U. S. economy:

- From 1980 to 2013, more than 5,000 startups were created through university tech transfer programs [7].
- From 1996 to 2013, tech transfer has enabled $518 Billion to the U.S. Gross Domestic Product (GDP) on $1.1 Trillion on the U. S. Gross industrial output [7].
- During this same 17-year period, 3.8 MM jobs were added to the U. S. economy [7].

A recent survey by Association of University Technology Managers (AUTM) [8] of 198 U.S. universities noted that these research institutions posted a record number of patents in 2018. For the second year in a row, Technology Transfer Offices (TTOs) in this group of institutions formed 1,080 start-ups. In 2018, these institutions of higher education produced 828 new consumer products coming from academic research entered the market, and 7625 US patents were issued. This is the most-ever reported in the survey.

Total research expenditures from sources outside the federal government and industry grew to $71.7 billion, an increase of 5.1% over 2017, and a 13.8% increase over the past five years. Investments and growth that directly impacted local economies, with more than 69% of the new businesses remaining in their institution's home state. This underscores the importance of tech transfer on local economies, none of which would have been possible without the regulatory framework defined in the original Bayh-Dole Act.

3.2 Technology Transfer Across Industries

3.2.1 Types of Technology Transfer

It is not only about medicine and engineering discoveries. According to the USPTO, patents were filed for new IP across 30-different categories or classifications. Table 3 provides a list, demonstrating the wide range of potential new products being introduced into the market [9].

The table amply demonstrates that opportunities exist for capturing IP rights associated with new discoveries across a wide range of disciplines. From a university perspective, this illustrates the importance of taking a holistic approach when working with university faculty. Any department pursuing research can be a source of IP and yield an opportunity to eventually realize both academic and economic goals. The question to consider is in what industries are the opportunities most significant to translate their academic research into a transaction that will produce both social and economic benefits.

3.2.2 Identifying Market Opportunity

One way to examine how different industries have responded to the introduction of new products and services is to look at the number of transactions or licensing agreements occurring across industries. According to the ktMINE

Table 3 US patent and trademark office—summary of major categories of patents

Food	Resin, synthetic rubber, artificial & synthetic fibers	Machinery	Motor vehicles, trailers, parts
Beverage & tobacco	Pharmaceuticals & medicines	Computer & electronic products	Aerospace product & parts
Textiles, apparel, leather	Other chemical products & preparations	Computer and peripheral equipment	Other transportation equipment
Wood products	Plastics & rubber products	Communications equipment	Furniture & related products
Paper, printing & support activities	Non-metallic mineral products	Semiconductors & other electronic components	Miscellaneous manufacturing
Chemicals	Primary metal	Navigational, measuring, electromedical, control instruments	Medical equipment & supplies
Basic chemicals	Fabricated metal products	Transportation equipment	Other miscellaneous

Adapted from [9]

database [10], the bulk of licensing agreements are occurring in a handful of industries. In 2007, five industries accounted for 46% of all transactions, whereas in 2016, they accounted for 55% of the total (Fig. 1).

Most industries appear to have weathered the effects of the Great Recession of 2007–2009. From 2007 to 2016, changes occurred in the distribution of business transactions across six major industries.

- In 2007 business services accounted for the largest percent of business transactions (~13%). By 2016, this had declined to ~10%.
- Consumer products reported the most significant decline, from ~8% in 2007 to ~5% in 2016.
- The three healthcare-related sectors (i.e. biotechnology, healthcare-pharmacy, and healthcare–products) experienced the most significant collective increase, from 21% in 2007 to 36% in 2016.

For universities with medical schools and programs that train and pursue research in these disciplines, it points to an opportunity that is already well defined. The current COVID-19 pandemic will only serve to increase this area of demand.

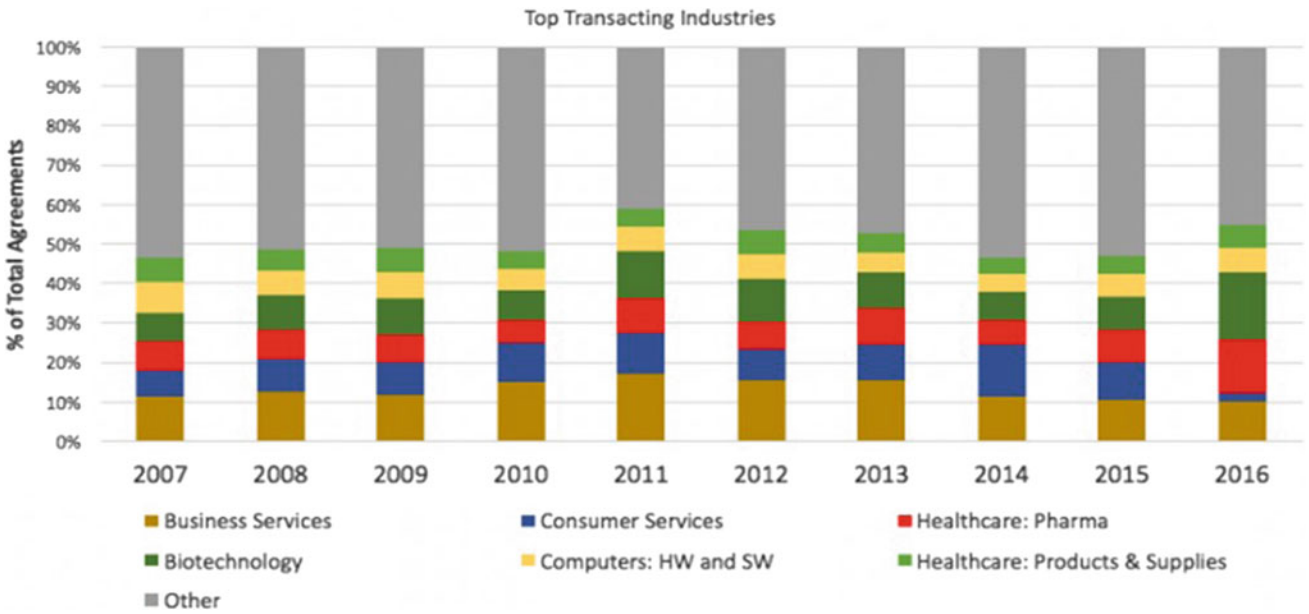

Fig. 1 IP licensing transactions by industry—2007 to 2016 (from [10])

3.3 Mechanisms for Translating New IP Into Products for The Market: 1980 to Now

When the Bayh-Dole legislation was initiated in 1980, the prevailing focus was on protecting discoveries and then seeking opportunities to license that IP to large established companies. The term "entrepreneurship" was barely understood. There was a *"one size fits all mentality"* when it came to commercialization of new discoveries. Few mechanisms were available to universities through which to move their nascent technology into the market. In those early days, university TTOs were focused on four priorities: (1) educating faculty about tech transfer; (2) seeking to identify new patentable discoveries coming out the faculty's labs; (3) filing patents; and (4) identifying licensing partners. Breakthrough discoveries were surrendered by universities to corporations for limited payments and modest royalty agreements across all industries from information technologies to materials to drugs and medical devices.

However, in the last 20 years the world of tech transfer and IP has changed dramatically. While these four fundamental functions of TTOs remain important, new opportunities for financing discoveries have evolved and investigators have uncovered the value of promoting their own work and, thus, of entrepreneurship. These changes have occurred for several important reasons, as we briefly summarize below.

3.3.1 New Systems and Technologies

The introduction of new technologies and systems to allow for self-funding of product development and market entry. This evolution has enabled individual inventors to pursue innovation without dependence on large corporations as the only point of entry into the market.

3.3.2 Financial Need

As the cost of operation continues to rise, and extramural funding ebbs and flows, universities and individual investigators have come to realize that their ability to explore and create cannot remain strictly dependent upon government agencies and foundations.

3.3.3 Investment

Different sources of investment capital have emerged during the past 20 years. From traditional venture funding to crowdfunding, there is a novel range of opportunities enabling innovative investigators and universities to bring new ideas into the market.

3.3.4 Laws and Policies

As the market has matured, so too has case law regarding patent protection and the application of international business practices which have favored individual inventors.

3.3.5 Government Programs

In the U.S., government agencies like the National Institutes of Health (NIH), have also stepped in to enable university investigators to more readily identify funding to support their entrepreneurship in concert with their research. Two examples of this are the Small Business Innovation Research (SBIR) and the Small Business Technology Transfer (STTR) grants of the NIH. These programs are in response to the U. S. Congress' requirement that eligible governmental agencies set aside a percentage of their extramural budget so that domestic small businesses can engage in research and development (R&D) that has strong potential for technology commercialization. These are just a few examples of an active government supporting innovation and entrepreneurship.

3.4 Summary

- Tech transfer can occur in virtually every field of study or discipline.
- University TTOs generally focus on four priorities: (1) educating faculty about tech transfer; (2) seeking to identify new patentable discoveries coming out the faculty's labs; (3) filing patents; and (4) identifying licensing partners.
- In the last 20 years the world of tech transfer and IP has changed dramatically with new opportunities for financing discoveries and with the greater engagement of investigators in promoting their own work and in their own entrepreneurship.

4 Tech Transfer on Campus—From Licensing to Entrepreneurship

4.1 The Entrepreneurial Ecosystem

Success breeds and encourages more success. As the marketplace observes individual scientist—entrepreneurs finding success, this encourages others to pursue innovation. The net result of these changes and conditions has been the development of an entrepreneurial ecosystem that facilitates innovation and commercialization.

The entrepreneurial ecosystem is defined by three separate but co-dependent engines, which enable successful innovation (Fig. 2). Each of the three engines (discovery, enablement, and economic development) that follow produces the fuel required to support the operation of the one that follows.

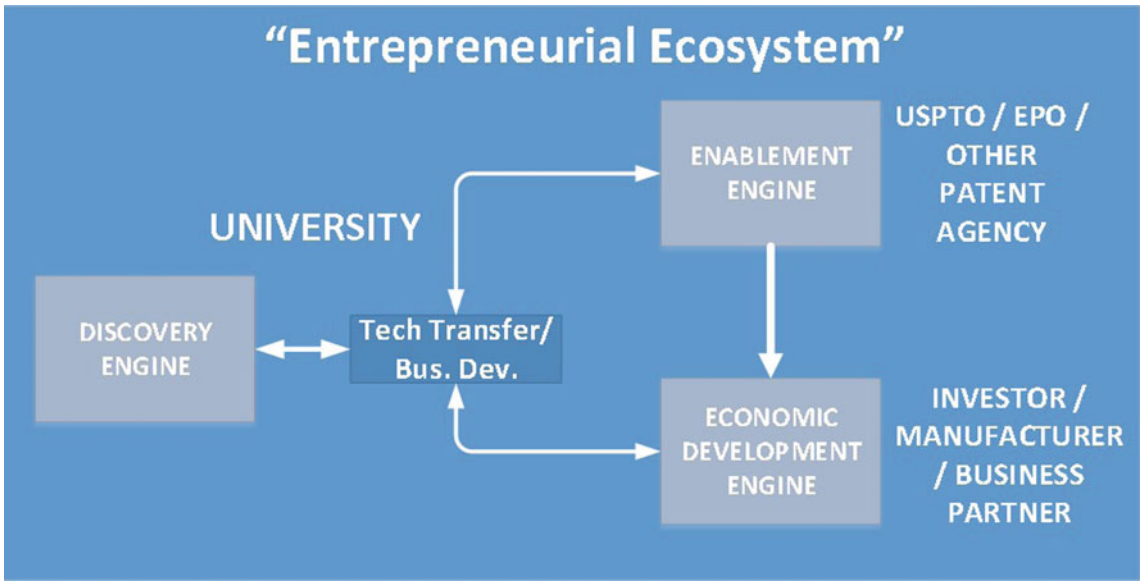

Fig. 2 The graph depicts a model representing the global ecosystem which has evolved over the past 20 years

4.1.1 Discovery

While there are no rules on where innovation and discovery can take place, complex problems require the best minds working together in a collaborative environment. Universities, research institutes, and academic medical centers represent the best opportunities to pool talent, as a way of testing and ensuring concepts are proven. This in turn promotes higher quality of research that can be captured, properly documented, and protected.

4.1.2 Enablement

This is where we see the power of effective government policy, laws, and a system of enforcement to enable individual and group entrepreneurship. Starting with the principles of the Bayh-Dole Act as exercised through organizations like the USPTO or similar structures such as the European Patent Office (EPO) or other similar agencies, discoveries can be turned into protected IP. This IP is now able to fuel the third engine, economic development.

4.1.3 Economic Development

Of the three engines of the 'Entrepreneurial Ecosystem', economic develop has evolved the most during the past 20 years. While private investment through venture funds has been in place since the 1990s, new financing vehicles have been identified. Moreover, international trade agreements, cooperative legal systems regarding IP, and the ability to communicate through the internet, have all played significant roles in expanding the opportunities of individuals and universities to secure economic development opportunities.

4.2 Developing a System of Tech Transfer in a University: Fueling the 'Discovery Engine'

The Association of Public and Land-grant Universities (APLU) is a U.S. research, policy, and advocacy organization of public research universities, land-grant institutions, state university systems, and higher education organizations. With a membership that consists of 246 public research universities in the U.S., Canada, and Mexico, the APLU advocates for public policy to enable innovation on university campuses. The APLU supports the idea that innovation drives our economy and improves the health and quality of life for people, by incentivizing discoveries and moving good ideas to full development and commercialization. To this end, the APLU established the ***Task Force on Managing University Intellectual Property*** to examine the purposes of university innovation, technology transfer, commercialization, and entrepreneurship. In 2015, the task force released a statement of recommendations on reaffirming and communicating the purposes of university management of IP. The following summarizes these recommendations for university leaders [11].

- University leaders should follow the recommendation of the National Research Council's 2011 report, "*Managing University Intellectual Property in the Public Interest*", to create a clear university IP policy.
- University leaders should identify existing institutional policies that restrict the university from working with

organizations acquiring IP rights without the intention of commercialization.
- University leaders should identify and implement approaches that effectively manage university IP, and more broadly to engage with other entrepreneurs and/or industry, emulating practices that have been effectively adopted by peers.
- University leaders should develop a framework for assessing IP practice to include multiple measures that capture and reflect the university's IP management mission.

Figure 3 depicts a generic university operating in a traditional department-based academic research model. Each department (e.g. biology, engineering, information technology, botany, physics, literature, etc.) have some level of peer-review funded research. Each department also has a department head or chair, and likely vice chairs, with responsibility over research, teaching, business operations, and other support functions. Likely, there are many other layers (university administration, academic or faculty senate, etc.) defining overall university operations and in turn the academic focus of these institutions. Each chair is responsible for defining the academic direction of their department, its business operations, allocation of available resources and ensuring adequate resources are available to achieve the desired growth and development [11].

The departmental model of academia today, centered as it is around specific self-defined disciplines, fosters the development of, often intractable, siloes. However, today's model for research, its 'Discovery Engine', should be built on a chassis of teamwork and collaboration. Since most problems being studied are complex, success occur most frequently when multidisciplinary teams that integrate different departments can coalesce and bring together a broader range of idea and problem-solving skills. Furthermore, effective research often involves collaboration with teams from different universities, institutions, and countries.

External collaborations can also include companies who themselves have their own R&D teams. In recent years, many large companies that traditionally had internal R&D units have abandoned them in favor of seeking the work of external universities and research institutes. As the APLU guidelines note, innovation and entrepreneurship require highly visible support from university administration and leadership. This support comes in several forms:

4.2.1 Cultural Balance

For universities, the challenge of establishing the appropriate balance between the demands of a traditional academic system that demands peer-review publications as a yardstick of excellence and more entrepreneurial pursuits. University leadership needs to determine that balance and provide permission for faculty to pursue either as their interests direct them.

4.2.2 Support for Collaborations and Partnerships

Policies that encourage, enable, and facilitate collaboration both within the university, across departmental lines, and with outside organizations and companies are vital. This could include support for both formal and informal channels of communications where the work of investigators is made available across departments.

Fostering internal collaboration and innovation also may involve the development of cross/multidisciplinary institutes or centers in universities. These may include not only internal members but also external members, from other universities, research institutes or companies. While the development of these university-wide units seems logical, they often run afoul of faculty's own departmental-based view of what an academic discipline is. Hence, establishing and growing these cross-disciplinary units requires significant and visible leadership support as well as meaningful seed funding and other resource allocation. Otherwise, they may simply become a focus of faculty discontent, rather than of collaboration and invention.

4.2.3 Financial Incentives

These are defined by policy that rewards individual investigators and their teams when a patented discovery produces new IP that is licensed and commercialized. While a full discussion of the exact formula goes beyond the scope of this chapter, we should mention a few elements of importance when developing university-based tech transfer incentive plans.

Develop Incentive Plans Carefully and Fairly

Great care must be put into the development of incentive formulas or metrics. University leaders must recognize that university faculty and researchers are extraordinarily aware (over-aware) of their own skills and needs, while simultaneously often not understanding or even undervaluing the contributions of the institution to their own success. Hence, formulas that somehow are viewed as being punitive, unfair, or stingy to individual investigators will have the counter-effect of suppressing invention, the sharing of ideas, and entrepreneurship. Institutional leaders should remember that most inventions will yield small amounts of royalty, if at all. Consequently, they should strive to incentivize greater numbers of discoveries and successful faculty, rather than trying to maximize the institution's take on any individual discoveries. For example, institutions may consider tiering incentives, such that more goes to the investigators when

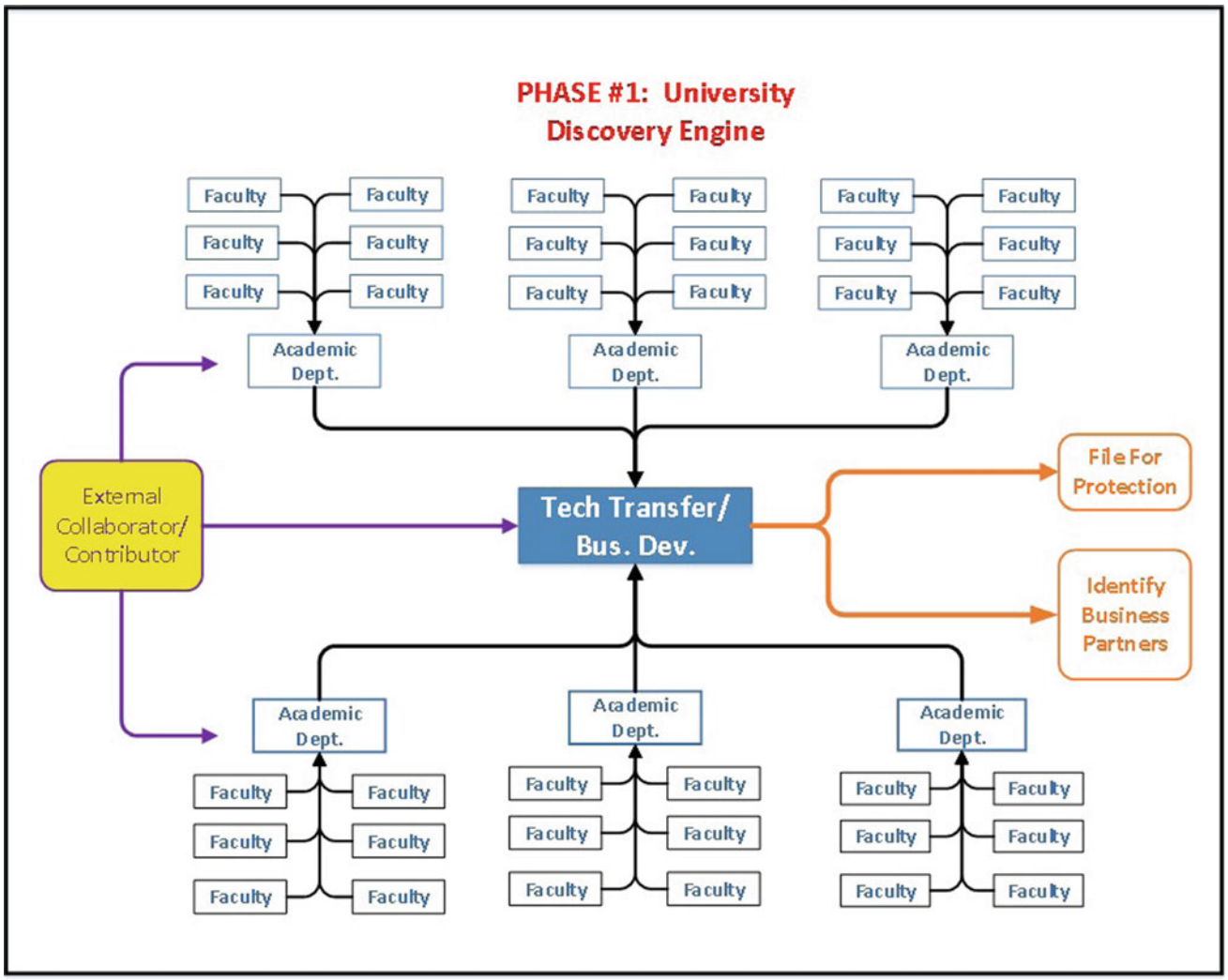

Fig. 3 The first engine of the entrepreneurial ecosystem—The university discovery engine

royalties are lower and the proportion that goes to the institution increases as the total royalties increase.

Be Transparent

Keep metrics simple and easily understood. Anything that is complex will be viewed with suspicion and negativity. And be clear where the monies obtained by the institution go.

Incentivize Individuals and Teams

Find ways to ensure the productivity and loyalty of those investigators who are the principal drivers (i.e. dealmakers or rainmakers), but also to separately incentive teams. Furthermore, consider incentivizing in some fashion the TTO or management teams that enable these deals occur.

One Size Does Not Fit All

As institutions and institutional culture varies widely, one size does not fit all when it comes to incentive plans. Each institution should work transparently with their faculty to establish such metrics and incentive formulas.

You Get What You Incentivize

Often forgotten when designing an incentive plan is the propensity for these to have unexpected consequences. It is important to carefully understand how the incentive plan may work out in the university ecosystem. As you create monetary incentives in one direction, leaders should not be surprised when faculty then focus on those areas, often to excess and possibly at the expense of other important activities (e.g. research instead of education).

4.2.4 Supportive Physical Environment

Collaborative research often depends upon physical space that enables what is referred to as points of intersection or collision when investigators can meet and exchange ideas. This means having proper conference space for formal

meetings and open more causal spaces which promote informal discussions. These informal discussions often lead to productive exchange of ideas when promotes more formal working relationships.

4.2.5 Business Infrastructure

TTOs employ trained professionals to support the discovery pipeline. If operating effectively, the office provides a nexus for all of the business-related activities required to move science out of the lab and eventually into the market. These offices enable the movement of data, samples, and information from outside the university to the appropriate investigator supporting the research and ensuring all sides are protected. TTOs help identify when a new idea is ready to be turned into an invention disclosure or when it is too early to capture ideas that warrant the protection that creates IP. There are standard documents and agreements that provide the basic infrastructure by which, TTOs receive and manage information that flows through their domain.

Material Transfer Agreements (MTAs)

MTAs are used to document in the transfer of materials [i.e. cell lines, tissue, materials, or compounds, etc.] into a university and/or research lab from another university. The objective is to define ownership of the materials that will be introduced to enable results in other research activities.

Confidentiality Agreements (CDAs)

CDAs are used at the initial stages of conversation between two organizations each wishing to share information and begin a process of negotiation, leading to an eventual transaction. The CDA protects each company's rights to privacy vis-à-vis confidential information that may need to be disclosed by either party to the other to initiate a transaction.

Data Use Agreements (DUAs)

DUAs are used to allow the flow of proprietary data and information between two entities. These entities could include two university research programs wishing to share information to advance science or between a university and private company also seeking to advance research towards new technology.

Invention Disclosures (IDs)

IDs are filed by the investigator with the TTO and represent the first codification of the discovery. This becomes the document of record if/or when there is a filing with the patent office. It is used to describe the essence of the discovery that is to be filed and ultimately becomes a patent or other type of IP.

4.2.6 Establishing Technology Transfer Offices (TTOs)

Today, most universities with active research programs have introduced and funded a TTO. The problem most offices face is that all too often results are mixed and fail to demonstrate an anticipated value when evaluated by their university leadership. When expectations appear to have not been met, it is likely due to three fundamental misunderstandings regarding what can and should be expected of these offices.

The mission of university based TTOs is often misunderstood by university administration and the investigators they have been asked to support. TTOs are in place to facilitate, support, and ensure compliance with the processes around invention and commercialization. They do not drive commercialization or revenue generation directly.

Expectations placed on these offices and what they can realistically accomplish vis-à-vis new business development is often not aligned with the realities of the market. Expectations can also become distorted around the idea that these offices will generate huge financial returns every year.

The wrong metrics are often applied to how these offices are evaluated [12]. For example, the number of times an invention disclosure or MTA is completed cannot and should not be used as any measure of a TTO's effectiveness. The best measure of success for any TTO should be based on whether the following are in place:

- Support of and information for the entire community of university investigators.
- Rapid and efficient service to investigators and to external partners, regulatory agencies, funders, and commercial interests.
- Capabilities are available to assess new technologies, provide a fair and accurate assessment of how novel they are, and the opportunity offered to protect and generate market relevant IP.
- A network of contacts and professionals is available to provide the skills, knowledge, and experience to create a system for filling patent claims and identifying opportunities to bring these discoveries into the market.

4.3 Summary

- During the past 20-years, an "Entrepreneurial Eco-System" has evolved that is structured around three fundamental engines or sub-systems: (1) discovery, (2) enablement, and (3) economic development.
- The most direct road to success comes when universities fully embrace processes that proactively protect new

discoveries made by their research faculty, by actively capturing new IP.
- Research and the path to successful entrepreneurship is only possible when viewed by all involved as a "team sport". A wide range of skills and experience is required from a multi-disciplinary team.
- A culture that embraces entrepreneurship is also critical to long-term success. This culture needs to find a balance between traditional academic demands such as the importance of peer reviewed publications against a commitment to planning, budgeting, and sound business management.
- Positive and productive partnerships between universities and industry is also critical. If structured correctly and with the right incentives, it can significantly increase the chances of success for new technology being introduced into the market.
- University TTOs can play a pivotal role in the process of bringing new technology out of a university lab and into the market. The TTO should be developed with appropriate resources to manage this complex process. The TTO manages the business side of entrepreneurship, enabling researchers to do what they do best; that is making groundbreaking discoveries.

5 Bridging the Gap Between Innovation and Commercialization

5.1 Fueling the 'Enablement Engine'

The process of creating or enabling IP by filing for a patent or some other type of protection is well defined. The challenge with filing for IP protection is two-fold: (1) the time required can be significant (on average 3 years), and (2) the costs associated with the process can become significant. The process can also be unpredictable and produce delays that are difficult to resolve. Figure 4 provides a view of the process and average time spans associated with submitting and prosecuting a patent application. We will use the experience with the USPTO to illustrate the basic steps of the process, as described below:

5.1.1 Novelty Search

This is among the 1st steps in the process. While optional, it is important to ascertain if in fact others have already filed similar ideas [a.k.a. defined as "prior art"]. This will provide guidance as to whether the certifying agency (i.e. USPTO) will grant a patent and how broad those claims might be.

5.1.2 Filing the Application

The next step generally requires from 4 to 6 weeks to complete. The patent application can be filed as provisional or non-provisional. The provisional application establishes a "place in the line" which is good for 12 months following the date on which it was filed. Though not reflected in Fig. 4, during this year it is advisable for the TTO to initiate a process of testing the market for potential licensors or to explore funding to take the IP forward into product design, development, and commercialization.

5.1.3 Examination

At the conclusion of the year, a non-provisional application is issued and there is a claim back to the date at which the provisional patent was filed. Note, once filed as a provisional the patent is noted as "pending". The advantage for inventor and the university of having a "patent pending" is that others are barred from filing and securing patent protection on a similar discovery. Post filing, a period of 1–3 years begins during which time the USPTO evaluates or examines the claims in the patent application. Steps can be taken at the time when the application is filed to shorten the standard wait time for office actions. A fee can be paid to obtain a prioritized office action which can reduce the time to as little as 6 months. Working in concert with the investigator, the TTO can guide this process [13].

5.1.4 Office Actions

Acceptance or rejection of the application is provided through office actions According to USPTO statistics, approximately 90% of all applications receive a rejection on the initial application. The process strives for balance between granting claims that are broad enough to provide reasonable value and prevent infringement but at the same time prevent intersection of these claims with any prior art that is identified. This process can occur numerous times and with each re-submission costs ranging from hundreds to thousands of dollars are incurred. The university, in consultation with the investigator and the TTO need to focus their strategy on managing this process. At some point, there could be a realization that the cost of securing the patent could nullify or render the potential patent(s) unable to achieve a reasonable return on investment.

5.1.5 Issuance, Appeal, Abandonment

At this final stage, the USPTO will either issue a patent or not. The issued patent may only cover limited or narrow claims as compared to what was initially submitted. At that point, it is up the organization that filed the patents to accept the claims as issued, file an appeal or simple abandon the filling. At any point in this process the filing organization can decide to abandon their filing. Once the patent is issued

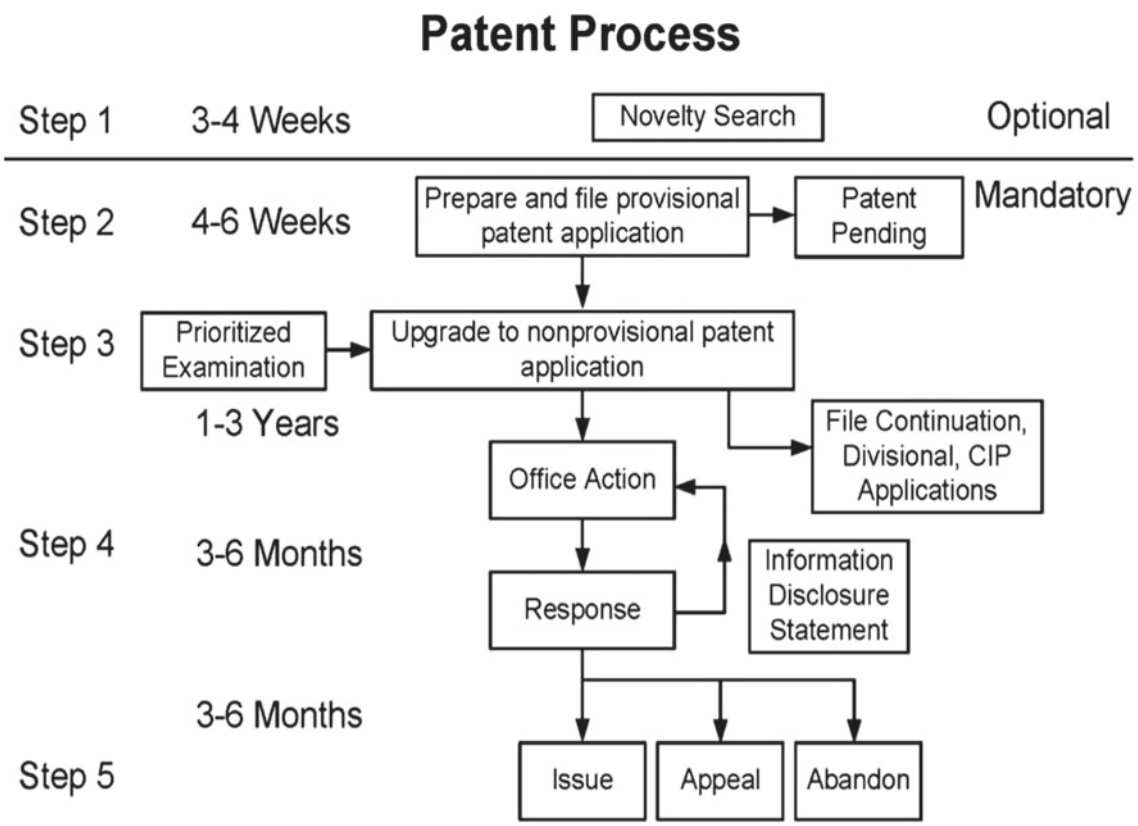

Fig. 4 The second engine of the entrepreneurial ecosystem—The enablement engine (from [13])

maintenance fees come due at 3 years and 6 months, 7 years and 6 months, and 11 years and 6 months.

As mentioned before, before entering the patent process, analysis of patentability is critical. It is also vital to know in which jurisdictions to pursue patent protection. The USPTO only provides patent protection in the U.S. and its territories. Decisions should be made upfront regarding which other countries to seek patent protection. This should be driven by what the IP is for, its market potential if converted into a product, and the resources available to support the process. Patent related expenses will increase exponentially, if further protection is pursued through the WIPO, EPO, and in other countries in Asia and South America. This is where the patent assessment referred to above and a market analysis, discussed in the section that follows, will be instructive towards making these strategic decisions.

5.2 Mechanisms for Disseminating and Commercializing Technology and IP—Fueling the 'Economic Development' Engine

While the processes associated with the 'Enablement Engine' are generally well established, the operational dynamics that drive the 'Economic Development Engine' continue to evolve. The process of identifying a licensing partner is essentially the same and is also generally well defined. The challenge is understanding the true value of the IP and finding a licensing partner who is willing to provide appropriate compensation by way of initial licensing fees, milestone payments and ultimately a reasonable royalty rate. When it comes to taking a more entrepreneurial tact and developing IP into a product or service, this requires more time, money, and a willingness to accept greater risk. New approaches to funding continue to be introduced as well as variations on established forms of financing and ownership. While the tools continue to evolve, the basic goals remain unchanged:

- Speed to market with as few missteps as possible
- A nimble process capable of making adjustments as conditions evolve
- Compliance with legal and regulatory standards for wherever the country, state, or legal jurisdiction in which the business will be operating
- A well-crafted business model that ensures reasonable and equitable returns to all involved.

Above all, before launching into either process it is critical to have a firm understanding of the regarding the

potential need and demand of the market for what the technology can provide to consumers. When pursuing a start-up, a well-conceived business plan is a critical success factor. This process should be managed by the TTO in cooperation with the investigator who knows their science best and understands its underlying potential. Regarding timing, elements of the business plan process should start in conjunction with the filing of the invention disclosure (ID). In fact, the IDs form the basis of several elements of a standard business plan. Below is an overview of basic elements of a business plan.

5.2.1 Market Assessment

During this process, studies are conducted to isolate who the potential consumer(s) of the product or service will be. The market analysis also helps to focus the development process so that the product or service is well understood, and the number, location and socio-demographic profile of prospective consumers is fully appreciated. The study allows an opportunity to test the market for potentially competing products or services, understand or define a process for marketing and branding, and how these ideas will be accepted into the market. Finally, it forms the basis for determining potential pricing strategies and defining volume forecasts that will drive the eventual accumulation of revenue.

5.2.2 Intellectual Property (IP) Summary

The invention disclosure provides the foundation for this component of the business plan. Once the patents have been filed [provisional of non-provisional] there is now some sense of what the IP can offer to prospective investors. This may change over time as office actions are returned and the range and depth of patent claims are better understood.

5.2.3 Proforma

The proforma provides the basis of any request for funding support in exchange for ownership. It defines the total investment required, the timeline for product development, market entry and scaling up of sales through the ultimate financial return on the investment(s). The proforma consists of three essential components:

Revenue Model

This model brings together information captured in the market assessment and converts those findings into a projection of future revenues. The model is driven by three factors. First, a market assessment that defines the potential demand (i.e. units of service) that the market is likely to require. The market assessment should also provide an unbiased understanding of how to price whatever it is that is being produced and sold. Finally, the pace for product/service absorption by the market also needs to be considered. This latter parameter will have a major impact on how the operating expense budget is defined and therefore the funds required to support company start-up.

Operating Expense Model

This model determines how much of an investment will be required to achieve a positive operating position, payback on the investment and future return on investment (ROI). The model is determined by several basic components. First, is an understanding of the staffing required to support the start-up. In this analysis, the number of people required, skills and experience of the staff, what will be done by internal staff versus consultants, the pace of development, etc. is all considered. In addition, basic operating expenses need to be considered such as the cost of space (e.g. rent), office operating expenses, travel related expenses, cost to support the patent process, marketing and any other fees associated with day-to-day operation of the new venture need to be identified. In addition, the proforma will need to include things like interest and depreciation on capital investments that are required. In total this analysis provides a full operating expense statement that is incorporated into the proforma, or operating profit and loss statement.

Capital Budget

In general any physical asset greater than $5000 can be considered as capital and budgeted as such. From a cash flow perspective an understanding of this is critical. These assets require cash for purchase but under the right circumstances the annual depreciation of the items is added into the operating profit and loss statement.

5.2.4 Implementation Timeline

Among the more important elements of any business plan is an implementation timeline or "critical path". This outlines the process from start-up through the new company reaching a full operational status. This timeline provides an overview of major milestones that need to be completed as the company is ramped-up. This is also of importance to investors who want to track progress of their investment to ensure an understanding of when they might begin to see a return on their investment.

5.3 The 'Engine for Economic Development' at Work

Figure 5 depicts a flow chart that defines the basic "*Economic Development Engine*" which represents the third and final phase of the overall Entrepreneurial Ecosystem (see also Fig. 2). It is here where results are achieved or not. The

best discovery science accompanied by successful patenting or enablement of the science may not reach the intended market without effective execution. Up to now, much of the work is academic, meaning it is happening inside of a relatively closed system that is well understood. In this third and final phase, any protection that is provided by consistent and well understood systems if replaced by a free market that can respond in ways that can be entirely unexpected. Again, this is the reason why it is critical that there is a solid market assessment at the beginning that can support whatever direction the university and the investigator(s) elect to take when moving their discoveries forward.

This last stage of the Entrepreneurial Ecosystem will require institutions and investigators to select a path to commercialization. For example, options include licensing to an established company or starting up a new company, the latter which can include technology *incubators* or *accelerators.*

As noted in the section above, once an invention disclosure is filed by the investigator with their TTO, a market analysis should be completed. With that market assessment in-hand, the TTO can work with the investigator(s) and select a path forward for the new technology. As with most aspects of this ecosystem, the path forward is determined by a series of questions and answers which determine the final direction to be pursued. At the Step #2 decision diamond in Fig. 5, the TTO should try and understand the following:

- Does the IP offer a real opportunity to create financial value through its introduction as a new product or service?
- Are there established companies offering similar products or services that might be interested in adding this new technology to their existing product offering?
- Are there any lessons to be learned from those companies that would inform and influence our development process?
- Is the university or the investigator interested and able to garner the financial and professional support required to effectively develop the product on their own?
- Do any faculty investigators have the desire to take this challenge on?

The answers to these and several other questions define the decision regarding pursuing a licensing agreement with an existing company or going in the direction of a start-up. If the answer is a license, then the path is clear, and a relationship can be pursued. If the decision is more entrepreneurial, starting up a new company, then the next step would be preparation of a business plan, as described above. With that business plan in-hand, there are three potential paths to follow: (1) seek enough investment capital to pursue the start-up immediately; (2) obtain minimal funding and enter an incubator program to refine your science and begin the next evolution of product and company development, or (3) bring together what you have by way of Ideas and IP if available, and enter a technology accelerator. Below we briefly described what a technology incubator and a technology accelerator are.

- **What is a Technology Incubator?** Incubators support the development of new business ideas by providing mentorship, business services and funding connections to

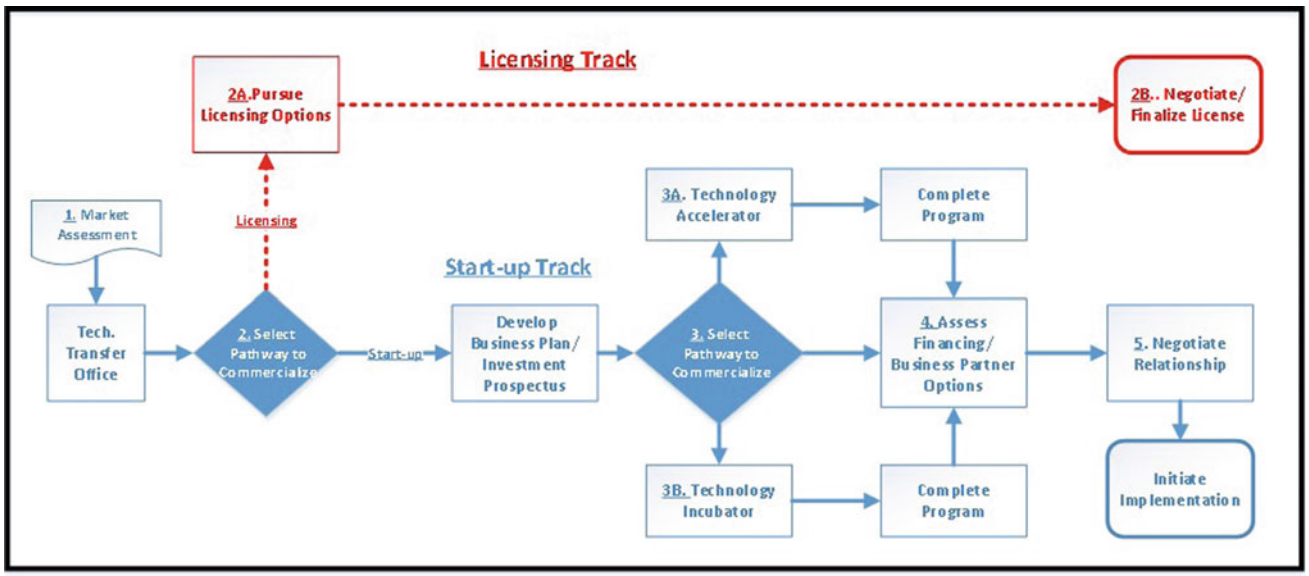

Fig. 5 The third engine of the entrepreneurial ecosystem—The economic development engine

young tech companies. There are more than 1250 business incubators in the United States (up from 12 in 1980), and about 37% focus specifically on developing technology companies. Tech incubators come in all shapes, sizes and business models. In 2015, more than 7000 business incubators operated worldwide [14]. When the company enters into an incubator, they have some funding, a company has been established and there is a desire to utilize the mentorship and business services to position the company for its next round of funding and to move from incubation towards early stage product production and entering the market.

- **What is a Technology Accelerator?** Tech accelerators provide an environment in which a group of talented people or teams who have an idea for a company, receive some upfront financial support, in return for equity in the company. Similar to the incubator, the infrastructure of the accelerator provides some mentoring from people who have previous experience. In addition, office space is provided for some limited period time. The underlying goal is to try and steer people in these companies in the right direction to ensure a more successful launch. Mentors in these accelerators can come from a tech company like Google or Facebook or a venture capitalist with a track record in investing in successful startups or running their own.

Accelerators "accelerate" growth of an existing company, while incubators "incubate" ideas with the hope of building out a business model and company that can disrupt the market [15]. Once these programs (accelerator or incubator) are completed, the company should be ready to graduate to its next stage of development. Today, there is a range of options available for these university-based and faculty-driven entities to finance, productize and enter commercial markets with the discoveries. Among the options to support the ever-evolving ecosystem are the following.

5.3.1 Licensing Agreement

There is an expression in the patenting world that "when you have seen one licensing agreement you have seen one licensing agreement". In short, this means that each one is unique and subject to their own special terms and conditions. There are certain parameters within which most licensing agreements tend to fall:

Long Term/Short Term

In a long-term arrangement, a minimum cash payment ranging from $1 to $1,000 is paid upon licensing of the technology. The bulk of the value is paid to the licensor once the technology is in the market and a royalty percentage is paid. Royalties can range from 1% up to 10% but in most cases, it runs from 3 to 6% [16]. In contrast, some companies prefer to pay upfront for a cash license and secure the rights with limited if any further liabilities associated with royalty payments. In this case the payment could range up to as much as USD$1.0M. In either case, value is determined on a case by case basis. This value is driven by several factors: (i) The stage at which the technology has been developed; (ii) market size and potential; (iii) profit margin of the potential product or service; (iv) the strength of the patent claims; (v) the cost anticipated to complete and bring the product to market, and; (vi) the nature of the license, exclusive or non-exclusive.

Exclusive/Non-exclusive

The difference between the two options is simple. Under an exclusive license only one company gets to utilize the patent rights, while under the non-exclusive multiple organizations obtain the patent rights. Exclusive licenses bring greater fees and royalty rates to the licensor, while the non-exclusive serves to mitigate risk for the licensee. Different technologies and varying patent claims as well as market conditions can drive the decision between exclusive versus non-exclusive.

It is also worth noting that different universities maintain different policies regarding the re-payment of patenting and legal fees, who they will license to, and the timing and use of milestone payments to ensure the technology is being developed. Some universities such as Caltech in California tend to pursue start-up companies when licensing their technology. They favor the start-up over larger companies and are therefore less strict regarding licensing fees and recapturing expenses associated with the patenting process. By contrast the University of California requires the licensee to repay the cost of patenting upfront as part of their standard agreement. Again, these are question's each university needs to consider as it empowers its TTO to initiate these business arrangements [16].

5.3.2 Start-Up Companies

During the past 25-years, more and more universities and their faculty have taken on the idea of developing their own technology via some form of start-up company. As with licensing, the approaches taken can vary widely and will often depend upon the individual universities culture, willingness to accept risk and view on the balance between commercialization and academic purity. There is no right or wrong answer but rather a set of broad decisions that need to be made by university administration before entering the market. Whatever the approach, there are mechanisms through which companies seeking start-up support can pursue.

Venture Capital (VC)

This is a source of investment funding provided by a private equity firm capable of providing economic support to opportunities that demonstrate high growth potential. This investment comes in exchange for an equity stake in the company. Venture capital is generally available to start-up companies or smaller companies that are seeking to expand but lack the capital to elevate themselves to the next level through internal funding sources. The nature of VC investment is that it is high risk and therefore failure rates can be high. At the same time VC investment is designed to enable massive ROIs when the right technology is identified along with the right team leading company development.

Angel Investment

Generally associated with early stage start-up companies, an angel investor is an individual or group of individuals who provide capital for an emerging company. Angel investors are generally the first group willing to provide financial support, even ahead of more established VC firms. It is not uncommon to find angel investors among family and friends who are willing to support on a one-time basis to help get the company launched to carry the company through its most challenging phase of development.

Equity Crowdfunding

While it has been used most popularly for the funding of art and other consumer-driven causes, equity crowd-funding is still a new and evolving source of revenue by which universities can capture funds to support a range of different startups [17]. Implementing equity crowdfunding in tech transfer, a form of investing by many small investors pooling their resources, is best used for those startups that appeal to the emotion of consumers-donors (e.g. improving the lives of the disabled) and to younger individuals. Equity crowdfunding is often a useful tool for startups created by students, both to fund the development of the technology, but also as a tool to educate young entrepreneurs on how to develop their companies. An example of how this funding source is becoming mainstream is the Jumpstart Our Business Startups (JOBS) Act, signed into law in 2012 in the U.S., which allows startups to raise up to $1 million via *crowdfunding*. In much the same way that universities have used their alumni to support their athletic programs, these institutions are using the commitment of this group and other supporters to develop investment funds in exchange for equity in a start-up.

5.4 Summary

- The evolution from a laboratory-based discovery into a product or service that can be delivered to a waiting market is complex.
- The migration from innovation to commercialization is complex and therefore proper planning is the most critical first step in what can be a long and challenging process.
- The move from innovation in the lab to commercialization into the market requires that whatever has been discovered is properly protected. This requires filing for and ultimately receiving a patent or some over form of IP protection.
- Filing for IP itself requires a strategy that takes into account the potential value of the claims being filed, the existence of prior art, a projected economic value for what the IP might produce, and the time and expense associated with the filing process.
- In conjunction with filing a patent, the larger process of moving to commercialization requires a comprehensive business plan which builds on the patent analysis but then identifies and integrates in other expenses associated with converting the discovery into a product(s) and delivering it into the market.
- This planning process helps to determine the most favorable direction to be taken: (1) licensing the discovery to an existing company, or (2) pursuing development of a start-up company that will take that discovery and produce something that the market will demand.
- If the university goes the route of pursuing a new company, there are a variety of tools and mechanisms available to support that process. This can include the use of technology incubators and/or accelerators and a host of long term and short-term options for financing the new venture.

6 Tech Transfer on Campus—Creating the Right Culture

A successful tech transfer program requires a change in the culture of academe—a change to make the campus more ‘tech transfer friendly’. As discussed in Sect. 4.2, creating a campus culture that values, supports, and promotes tech transfer is critical to the success of the initiative and requires university-wide commitment. Creating such a campus culture begins with visible leadership, followed by engagement

of the faculty and student bodies, ensuring the highest quality of research, and fostering and incentivizing both creativity and entrepreneurship, while recognizing that local or national cultures vary and play an important role in tech transfer. For example, not only should knowledge be valued for knowledge's own sake, but the university community should also value the ability to apply that knowledge as well.

Promotion and tenure (P&T) reviews and academic expectations should value not only research publications, but also patents and entrepreneurial and commercialization efforts. And university leaders should recognize that while there may be individuals that drive R&D, most successful research and tech transfer efforts today involve a team approach. This approach not only needs to be recognized, but also incentivized. We briefly elaborate.

6.1 Visible Leadership

A successful university-based tech transfer system begins with leadership. The changes that need to happen to the traditional culture of a university campus will require visible leadership, starting with the institution's chief executive (president, chancellor, vice-chancellor, etc.) and their team. It also will require skilled, visible, and empowered tech transfer leadership. Notably, the first recommendation of the National Research Council 2011 report, '*Managing University Intellectual Property in the Public Interest*', states:

> The leadership of each institution—president, provost, and board of trustees—should articulate a clear mission for the unit responsible for IP management, convey the mission to internal and external stakeholders, and evaluate effort accordingly. The mission statement should embrace and articulate the university's foundational responsibility to support smooth and efficient processes to encourage the widest dissemination of university-generated technology for the public good. [18]

Higher education leaders should become familiar with many of the leading recommendations in the area, including the those of the National Research Council of the U.S. National Academies of Science [18], APLU [19], AAU [20], AUTM [21], and so forth. Specifically, university leaders need to be able to:

6.1.1 Provide a Clear Vision for the Tech Transfer Initiative

Why is it important and why does it matter? And why should individual faculty and students care? Such vision statements should be made repeatedly, clearly, concisely, and consistently. A transactional approach should be avoided when articulating this vision, and the vision should be tied not as a direct benefit to the school and faculty, but to public interest and enhanced economic development for all.

6.1.2 Break Down Siloes

Leaders who expect success in the tech transfer arena must be deliberate and planful in breaking down the siloes inherent in traditional academics. Many, if not most, valuable discoveries and applications arise from cross-disciplinary/multi-disciplinary efforts and collaborations, and not from the usual department-level structure inherent to traditional academics. Achieving a true cross-disciplinary model will require creating structures (e.g. institutes, laboratories, centers, etc.) that bridge across disciplines and departments. This than requires the support of academic leadership, including deans and department chairs themselves.

6.1.3 Remove Barriers

Leaders must also be deliberate and planful in seeking to identify barriers to tech transfer and commercialization within the university and should not wait for those barriers to become evident. There are many barriers to a successful tech transfer program, not only around campus culture, but also around support systems, client services, available expertise, networking capabilities, and so forth. Hence, leaders should proactively and continuously seek out and address the many barriers inherent to a successful tech transfer program.

6.1.4 Provide Resources

While no operations, particularly in higher education, ever has enough resources, it is important that leaders recognize that any transformational effort, including implementing a successful tech transfer system on campus, requires a threshold amount of resources. Resource allocation signals not importance but also prioritization. And resources are not only monetary, but also in human capital. In fact, one of the most precious resources, and one that is often not given in sufficient amount, is the attention and focus of leadership.

6.1.5 Hire the Right Leaders

One of the most important work of any leader is to hire and empower the right leaders. Institutional leadership should strive to hire experienced tech transfer leadership, with a focus on effective outreach and client services. They should strive to empower these individuals, not only providing them with adequate resources, but also with the necessary delegated authority.

Set Appropriate Expectations

In their zeal to provide a vision for tech transfer, one of the mistakes that leaders often make is to create exaggerated expectations. Expectations that because they are unrealistic or simply incorrect lead many on campus to quickly become disillusioned with tech transfer in general, and TTOs and their leaders in particular. It is important to note that the

benefits of an effective tech transfer culture on campus is much more than about generating revenue for the institution. It is about driving and enhancing regional and national economic development. Additionally, the principal expectations of TTOs should be around client services and infrastructure. And because TTOs do not create the ideas and innovations, their success should not be tied strictly to royalty payments or number of inventions. Finally, a successful tech transfer program, however defined, takes time, and success should be examined in no less than 5-year intervals.

6.1.6 Ensure Fair and Faculty-Favorable Incentives

University leaders need to be the first to stand for fairness when monetary incentives are created for faculty. Without productive and incentivized faculty there are no inventions, discoveries, and the like.

6.2 Engage Faculty and Students

It is critical that the faculty be educated and supportive of tech transfer efforts. Faculty culture is an important determinant of campus culture, and their lack of support or even disinterest can be very detrimental to the implementation of a successful tech transfer system. It is critical that the faculty understand the broader vision from their and other institutional leaders, and that they be educated regarding the principles and processes of tech transfer. It is also important to ensure that all faculty, regardless of whether they do research or not, understand the need and reasons underlying the initiative, as all faculty will need to be supportive of modifications in the P&T and faculty evaluation processes.

When educating faculty regarding the value of tech transfer a study by David Wright is instructive [22]. Wright noted that faculty culture concerning tech transfer is dependent upon informal communication networks, principles of diffusion, history, and social interaction:

> Because faculty concerns center on whether commercialization is worthwhile and whether the prevailing university culture permits such activity, their real concerns are not based on policy but on a sense of identity and emotional/professional equilibrium. Therefore, their actions are not strictly in response to policies, but in response to their beliefs about policies and their true impact on professional identity and success. [Tech transfer] and diffusion are inherently social processes that lead to identity formation, not only for the university but for the faculty researchers who comprise the university. For faculty members, altering their identities to incorporate [tech transfer] is a process that relies on communication and ideological support from their peers. Faculty members attempting to develop a "hybrid role" on campuses that have not traditionally supported [tech transfer] may have difficulty reconciling their conflicting identities as commercial researchers and traditional faculty members. [22]

Likewise, it is important that students, particularly graduate or postgraduate students, also begin to be educated around the benefits of tech transfer, entrepreneurship, and commercialization, whether as part of a credit-earning curriculum or as part of their informal education, or preferably both. Finally, in educating faculty and students it is important to ensure that the education is continuous, highlighting best practices and celebrating short-term wins.

Research and discovery are most successful when approached as a "team sport". At the core of successful team science is effective and unfettered sharing of ideas. The process of discovery is further benefited when data and information can be safely shared between groups. It is this sharing that forms the basis of discovery and ultimately leads to important new IP.

Consequently, an important work with the faculty will be around the P&T and annual evaluation processes. P&T should not just be about research or scholarly publications. P&T policies and procedures need to be able to fully recognize and value innovation, entrepreneurship, commercialization, and teamwork. This will require carefully negotiating with faculty governance and departmental leaders.

6.3 Foster and Support Quality Research, Innovation, and Creativity

Successful tech transfer begins with innovative and quality discoveries and inventions. The higher the caliber of the research being performed, and the more creative researchers are, the more likely impactful and commerciable ideas and products will be generated. Consequently, leaders must be rigorous and disciplined to ensure their institutions generate the highest quality of research. While most/all faculty in universities will be scholars (i.e. a specialist in a particular branch of study; a distinguished academic), not all faculty are researchers.

Research is not a hobby and not all faculty can or should be researchers. In fact, even at very highly ranked research universities, only 15–30% of faculty do any significant research. Even less do R&D that may lead to commercialization. Thus, the establishment of dedicated research units within departments or schools, to create shared spaces and facilities and sufficient critical mass. Because research costs and resources are not unlimited, available support should be reserved for researchers that are truly productive. Leaders should resist calls for having all faculty do research (the primary duty of a faculty member is to teach), or that research support and time is a privilege that is granted to all faculty. It is not. This kind of executive rigor is what has built research university powerhouses worldwide.

Likewise, leaders should ensure a culture of creativity. What is creativity? Quoting Sir Ken Robinson regarding creativity, "There are two other concepts to keep in mind: imagination and innovation. Imagination is the root of creativity. It is the ability to bring to mind things that aren't present to our senses. Creativity is putting your imagination to work. It is 'applied imagination. Innovation is putting new ideas into practice" [23]. Other observers note that "creativity is the ability to transcend traditional ways of thinking or acting, and to develop new and original ideas, methods or objects" [24], while "innovation is the process of creating value by applying novel solutions to meaningful problems" [25].

Creating a culture of creativity in higher education is not always easy. Higher education is often highly regulated, bureaucratic, and hierarchical, characteristics that are anathematic to a culture of creativity, which requires significant freedom. Creativity is a pattern of thinking. It is about developing and activating the right neural networks, neural networks that allow individuals to make new, and often unexpected, connections.

Creativity is non-linear, but it is logical; it is about new and original thinking by the individual (although the thinking may not be new by historical standards). Creativity involves making critical judgments about whether what one is working on is any good, not just working on anything one chooses. It is not the opposite of discipline, but often requires deep knowledge of what others have achieved and high levels of practical skill. And yes, creativity can be developed and taught. Leaders should strive to understand the fundamentals of creativity and how to develop the skills on their campus, particularly among their community of researchers.

6.4 Foster, Incentivize, and Create Entrepreneurship Expertise

The University of California Working Group on Technology Transfer report noted that "…. the University must create a culture of entrepreneurship and innovation… Academic researchers must be engaged in a dialogue with the commercial world" [26]. Successful technology transfer is the fruit of successful innovation and creativity linked with entrepreneurship.

However, few researchers understand entrepreneurship, often defined as "the activity of setting up a business or businesses, taking on financial risks in the hope of profit." In other words, it is the act of building a business around the discoveries and inventions being made. Without entrepreneurship, by somebody somewhere, it is not possible to commercialize any of the innovations faculty (or anybody else for that matter) generate. However, many faculty intuitively reject the idea of commercializing their ideas and discoveries, appropriately preferring instead to 'share it with the world'. In fact, this generosity of spirit and focus on the public good is what make higher education such a powerful force for change.

In order for a tech transfer program to work effectively, all researchers should have a modicum of understanding of what entrepreneurship and commercialization entail. Furthermore, institutional leaders and TTOs should aim to ensure that tech transfer efforts are aligned and supportive of the growing economic engagement responsibility of universities, by including innovation, entrepreneurship, and "economic engagement" programming in their strategic planning processes [19]. The APLU report '*Technology Transfer Evolution: Driving Economic Prosperity*' notes that the need for universities pursuing tech transfer to foster an entrepreneurial culture on campus, including developing entrepreneurship awareness and education for faculty, staff, and students; connecting and aligning across entrepreneurial education efforts; mentoring and entrepreneurs in residence; and institutional policy in support of entrepreneurial culture [19].

A usual tactic to enhance entrepreneurship is for institutions to partner with current or former entrepreneurs, including venture capital (VC) companies. However, while these arrangements may bring needed knowledge to the table, it is important that institutions recognize that they will need to develop the skills internally [27]. External investors will be primarily interested in proven technology, something most university research is not. This gap in research development is what accounts for much of the failure of traditional university tech transfer to yield results [28]. Thus, it behooves universities to help their faculty develop the skills to find funding and to develop their own start-ups and companies. As the UC report noted:

> The current funding and investment climate creates challenges in translating early-stage inventions generated by university researchers into commercially valuable products and services. Investments beyond the scope of federal and other traditional research funding agencies are needed to mature technologies and create sustainable business to exploit them to create public benefit and economic value. Private funding for pre-seed and seed-stage investments, even in California, is insufficient to support the translation of many new ideas into businesses that generate economic prosperity for California and the nation. Creating funding for translational and early-stage development programs is of increasing importance to the way universities support economic development in their local and regional economies. [26]

6.5 Recognize That Local Or National Cultures Vary and Play an Important Role in Tech Transfer

Finally, it is important to recognize that one size does not fit all, culturally speaking. Grzegorczy studied the influence of culture on social capital in six American and ten Asian technology transfer offices and organizations involved in technology transfer [29]. Her findings suggested that culture can influence creation and utilization of social capital in university-industry links. Culture appeared to influence not only relationships with external stakeholders in technology transfer (industry, governmental bodies), but also internal relationships and management styles in TT offices (influences on organizational culture). For example, comparing Asian TTOs versus American TTOs, management styles were found to be dominating authoritative, directive, and hierarchal versus dominating participative, communication style was formal and indirect versus informal and direct, and networking style involved food versus drinks, respectively.

Moortel and Crispeels compared the Chinese and Western perspective regarding international university-university collaborations on technology transfer [30]. They observed different entry modes and pathways for international university-university technology transfer. The dominant Chinese perspective was to enter these collaborations formally and with substantial resource commitments, while the dominant Western perspective suggested a more informal entry mode without the creation of a new entity. The Chinese pathway to these international university-university collaborations seemed to be based on generating mutual confidence through formal arrangements and on replacing formal safeguards by informal arrangement as the collaboration matured, while the Western perspective suggests formalizing collaborations through a greater commitment of resources, which reduces managerial problems and allows collaborative learning. Local and national perspectives and cultures will play an important role not only ion defining university-based tech transfer, but also in how collaborative efforts will expand globally.

6.6 Summary

- A successful university tech transfer program requires a change in the culture of academe—a change to make the campus more 'tech transfer friendly'.
- While recognizing that local or national cultures vary and play an important role in tech transfer, creating a campus culture that values, supports, and promotes tech transfer is essential, requiring university-wide commitment, visible leadership, faculty and student engagement, the highest quality of research, and incentivization of both creativity and entrepreneurship.
- P&T reviews, and academic expectations, should value not only publications, but also patents, and entrepreneurial and commercialization efforts.
- While there may be individuals that drive R&D, most successful research and tech transfer efforts today involve a team approach, which needs to not only be recognized, but also incentivized.
- University leaders need to be able to: (a) provide a clear vision for the tech transfer initiative, (b) break down siloes, (c) remove barriers, (d) provide resources, (e) hire the right leaders, (f) set appropriate expectations, and (g) ensure fair and faculty-favorable incentives.

7 Conclusions and the Impact of Covid-19

University-driven technology transfer is a powerful tool to enhance regional and economic development. However, it is important to recognize that the actual revenue potential for an individual university is limited. Increasing revenue from technology transfer operations is a notoriously unpredictable and lengthy process, and revenue from licensing is dominated by a small fraction of disclosures. In the U.S. in 2011, the top ten revenue-generating universities accounted for 60% of the total royalty income of all U.S. universities [26]. Thus, tech transfer must be viewed through an economic development lens rather than a purely transactional revenue generating perspective.

Universities that are successful in establishing an effective tech transfer program have a number of characteristics in common. For example, universities that lead the Milken Institute's University Technology Transfer and Commercialization Index [31] actively promote tech-transfer. This takes engaged and dedicated leadership, engaged, and educated faculty and students, and the development of campus culture and processes that promote, support, and incentivize creativity, innovation, quality research, and entrepreneurship. Tech transfer is not only large research-oriented universities, but it is an arena that medium to small institutions can also compete in, albeit at a more limited level.

Finally, the recent COVID-19 pandemic and its aftermath will readily impact many of the processes that play a role in developing a successful university-based tech transfer program. Viewed broadly, COVID-19 will serve as an accelerant for many trends that were developing or were being established, albeit at a slower rate. The already existing financial strain on institutions of higher education will worsen, exacerbated in part because of decreasing enrollments in many parts of the globe, the increasing financial

stress on potential students, and because of the significant excess capacity existent in the higher education industry in many countries. This may put negative pressure on universities as they consider investing in the development of a tech transfer program, whose gains will be well into the future. The pandemic has and will negatively impact globalization, placing pressure on many international collaborations that were valuable in creating innovative inventions [30]. Furthermore, social distancing, reduced travel, and other mitigation measures against viral transmission will negatively impact the spontaneous sharing of ideas, potentially stifling innovation and collaboration.

Alternatively, COVID-19 will have an accelerating effect on innovation around testing, and the production, particularly local, of testing supplies, vaccines, personal protective equipment (PPE) and ventilators. There will be an increasing emphasis on research and innovation in infectious, pulmonary, and critical care medicine, vaccine technology, and pandemic and disaster preparedness. Researchers and inventors should always understand that it is best, from a commercialization perspective, to leverage current trends [27].

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An Alternative Model of University Endowment

9

Abdullah Atalar

1 Introduction

The typical revenue of a university is composed of tuition income from conventional students and from online programs, direct government support and subsidies, research grants from public and private agencies, research contracts from companies, royalty and license income from patents, gifts and donations from private sources and in some cases endowment income. Although tuition, research grants, patents, and donations all bring in revenue, many universities pay considerable attention to generating additional funds from their endowment funds. An endowment is an aggregation of assets and investments to generate money for supporting the university's educational and research mission [1, 2]. Most institutions with endowments never spend the principal of their endowment, while they consider part of the interests and dividends as usable income. The unused part of the endowment earnings is reinvested to protect the value of endowment against inflation [3].

There is no or very little increase in productivity in education when compared to other goods. In the United States, the cost of education increased above inflation rate steadily over time [4]. Hence, the tuition amount became unaffordable for many families in the United States. A good size endowment allows a university to broaden the access of the university to all social classes of society, reduce its tuition rate, provide more financial aid or tuition discount [5], and hence increase the student selectivity in admissions while keeping the quality of education at a high level. While most revenues of a university may fluctuate because of varying economic conditions, the presence of an endowment provides a stabilized and steady stream of income and a financial buffer [6]. This stability enables a university to support faculty positions, student scholarships, risky research projects, intercollegiate sports, music and arts, innovative technologies, and library purchasing even in dire economic circumstances. Therefore, an endowment permits a university to make strong commitments going into the future, comforted by the fact that the endowment income will always be available and makes the university to be "immortal" [7].

In the United States, where university endowments are very common, about 650 universities have endowments over $50 million, while about 62 institutions have endowments exceeding $1 billion. Although the endowment income is a modest fraction of the annual budget of most institutions, many non-profit [8] universities[1] rely on income from their endowments. There is a direct and strong correlation between the success of the university and the size of its endowment. At the wealthiest schools, the tuition income is on the average 10% of the revenues. They use the endowment income to offer financial aid packages or tuition discounts to students, to build a state-of-art laboratory, to hire top faculty members. On the other hand, at universities with smaller endowments, the tuition income is more than 60% of the revenues. There is a good correlation between the size of the endowment and the success and reputation of a university. For example, Harvard University's endowment is the largest in the world, and Harvard is ranked as the top institution of the world by most ranking agencies [9, 10].

2 Conventional University Endowment Model

The concept of endowment originated in England in the sixteenth century. In the United States, where many universities have an endowment, the endowment model goes

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[1] A nonprofit university is barred from distributing its net surplus, if any, to individuals who control it, such as trustees. Such surpluses should be devoted in its entirety to financing further research, teaching, or scholarly activities.

A. b. O. AI-Youbi et al. (eds.), *International Experience in Developing the Financial Resources of Universities*, https://doi.org/10.1007/978-3-030-78893-3_9

back to Keynes [11]. An endowment is a form of saving to be spent in the future. In theory, it will be used to provide lower tuition, more teaching, and more research. The endowments are managed as if the university expects to live on forever. The investment objective of Northwestern University is stated as "… to preserve their purchasing power … over time must achieve on average, an annual total rate of return equal to inflation plus actual spending".

Yale University's endowment spending rule requires spending an amount equal to 70% of the amount spent in the previous year plus 1.35% of the current market value of the endowment. This rule makes sure that in the long run, the real value of the endowment does not decrease. It also assures that the university receives a steady income from endowment even in market downturns.

In the United States, many Universities shifted their endowment investments from fixed income to equities and later to hedge funds or venture capital to increase their returns [12]. In 2012, about one-third of the university endowment portfolio was in private equity and hedge funds [13]. This shift of nearly 75% of funds in risky assets provided good returns at good times of the market while increasing the market risk considerably [14]. Many endowment managers preferred to increase the endowment size [15] rather than provide a more than normal payout to the university at good times. As a result, the growth rate of the average endowment has outpaced the growth rate of the university expenditures. Harvard University's endowment was $4.2 billion in 1988, became $34.7 in 2007 and grew to $41 billion in 2019, with an average growth rate of 7.7% per year. In the 10 years preceding 2007, the annual return of the largest endowments averaged 11.1%, while for small endowments the same figure was 6.7%.

The universities with larger endowments took larger risks: For example, they can buy entire companies or put money in timber as investments. On the other hand, the universities with smaller endowments can only afford the buy the shares of public companies. Additionally, those universities with larger endowments can afford to hire more talented money managers due to the economics of scale [4].

When the market moved in the negative direction, many endowments failed to provide support to the university in the very period it is needed the most [12], since more than half of aggregate university endowments are allocated to illiquid assets [16]. During the large market downturns of 2001–2002, 2008–2009 and the Covid-19 pandemic crisis of 2020, the universities with the huge endowments preferred to cut back on expenditures, instead of using their endowments to help ameliorate the financial effects of the pandemic and avoiding furloughs and layoffs of their economically most vulnerable and low-paid workers and independent contractors. While their endowments grew on the average of 9% yearly in the past 40 years, many such universities hesitated or not allowed to use the 8% from the principal of their endowments to reduce the effects of the crisis.

3 An Alternative University Endowment Model: Ownership of For-Profit Companies

In many developing countries, the bond market or stock market is not well developed and they are usually shallow. In such countries, the conventional university endowment model of the United States may not be directly applicable. Moreover, the donation and giving culture of the society may not exist. Alternative approaches to generate revenues for universities should be considered.

Some universities are located within cities and they are usually referred to as city universities. Students of such universities benefit the convenience of living in a city with a large diversity of available amenities. Almost all of the needed services for a student's life are available in the city already: They can rent out apartments in the region of their choice for their housing. They can use public transportation for their mobility within the city. They can enjoy the diversity of catering, accommodation, shopping variety, endless social opportunities. They may use public or private sports centers. The nightlife of the city gives the students added adventure and a chance to meet different people.

On the other hand, many campus universities are located outside cities. Such universities are mostly insulated from the outside world. They operate like small cities of their own. Campus universities provide a community spirit and a cozier experience to its students. However, they need to provide the essential services to the students for their proper operation: Catering services in the campus, housing in the form of dormitories or residences, transportation to and from the nearest city center, security within the campus, shopping facilities and many similar services. Many universities outsource most of these services to third party companies. These companies may be asked to pay a fee to the university, because of the privileges they got within the campus. Having jurisdiction over such an ecosystem provides a good opportunity for the university to use it for its future.

3.1 Service Needs of a Campus University as Seeds for Companies

A campus university may want to set up university-owned companies as income generators, supplementing its conventional revenue sources. It may be the preferred approach when the university does not have a significant endowment capital to be invested in money markets.

As many startup companies are founded every year, starting a business is not an easy task [17]. On average nine

out of ten startup companies fail [18]. The most difficult stage of an emerging company is its initial startup phase, when it does not have the customer base and cannot generate revenue. The main failure mechanism is the lack of or insufficient demand for the product the company makes or the service it provides. Therefore, having a desired and original product is the most important attribute of a startup company.

A university campus provides an excellent ecosystem for starting a company. The students on the campus can be possible customers for such a company. Similarly, the needs of the university may justify the formation of a company. Possible areas for companies are listed below:

3.1.1 Bookstore

All universities need a bookstore to sell textbooks, books, school supplies, gifts, collectibles, and apparel to students. A good bookstore is an essential part of a good university. The professors can specify and order the textbooks of the courses they will be giving most conveniently through their university's bookstore. The presence of a bookstore is not only a convenience for students but also improves the belonging feeling of students toward their university. Many university bookstores also sell clothing like t-shirts, sweatshirts, and outerwear with the logo of the university. They may also offer unique memorabilia related to the university found only in that bookstore. Obviously, this creates a business opportunity for the university.

3.1.2 Foodservice and Catering

Campus universities must have food service centers to serve the needs of students. These are mostly in the form of food courts, cafeterias, catered halls, and cafés. Vending machines also serve the needs of the students outside normal dining hours. The quality and price of food is an important satisfaction criterion for the students: They would like to get good food at an affordable price. To increase student satisfaction and reduce complaints many universities have subsidized food centers. The formation of a company by university running the food service and catering operations is certainly a possibility.

3.1.3 Market

Most universities have markets within their boundaries to serve the needs of the student community. Opening hours of such a market should be chosen according to the needs of students. For example, the students living on campus may need a market that is open at least until midnight. Moreover, the goods present in the market could be more suitable and specialized for time-strapped students: Ready-to-eat meals, items more desirable for the young population such as backpacks, bicycle parts, etc. Opening such a market is certainly a good business opportunity for a campus university.

3.1.4 Property Rental

University may rent space for required operations within the campus, like a bank, a travel agency, hairdresser, pharmacy, dry-cleaner, printing, and car-wash services. Having an on-campus gas station with car maintenance facilities is also a convenience for students and faculty. Many of them lack the time to go outside the campus for such amenities. Having such services within the campus can generate rental income for the university. The university also may rent the sports stadium or large auditoriums for third party activities of large participation.

Since marketing rental spaces and collecting rental income professionally requires specialization and know-how, it is desirable to a have university property rental company that markets such facilities and collects rental income on behalf of the university.

3.1.5 Shopping Center

Many campus universities have shopping centers within their boundaries. A shopping center investment may pay itself in a relatively short time since most universities increase the real estate value of the neighboring communities. People that are more affluent and that with more expendable funds tend to live near universities. This increases the potential rental income of a university shopping center. Such a center may have a high return on investment.

Renting the space in such a shopping center should be carried out by the property rental company of the university.

3.1.6 University Research Parks

University research parks are considered an important infrastructural mechanism for the transfer of knowledge created at universities to the local economy [19, 20]. It is widely believed that university research parks help enhance the performance of the universities and foster regional innovation. Although the cost of transmitting information is independent of distance, the cost of transmitting knowledge increases with distance, hence the proximity and location of where the information is created and where it will be used matter [21, 22]. In many countries, the formation of university research parks within the boundaries of university campuses is encouraged and sometimes subsidized to act as a catalyst to improve the collaboration between the university and industry, since universities play a central role as producers of basic research and sources of skilled labor. In some countries, tax incentives are given to companies operating in university research parks.

Buildings housing such research parks can be constructed within the boundaries of university campuses to be rented to startups and high technology firms. Many governments support the universities financially for this purpose. A research park would not only increase the visibility and

influence of the hosting university as an engine of growth and regional booster and but also bring revenue in the form of rental income.

3.1.7 Facility Management, Security and Maintenance

A university needs to clean and maintain its physical facilities. It needs to provide security services in many of its buildings. University administrators are usually very busy dealing with high maintenance academics. Optimizing the cost in such operations, what they consider mundane or routine is not in their focus. Hence, performing such services using university-hired personnel is usually inefficient and costly. It is desirable to set up a company with a manager focused on improving efficiency. Such a company may grow and give such services to third parties, improving efficiency even further. Moreover, this company can also provide cleaning, security, and maintenance services of the other university facilities like the shopping center or the university research park.

3.1.8 Energy Production

Electricity bill of most universities is a significant fraction of the yearly budget, especially if the university has cleanroom facilities, a shopping center, or similar high energy-consuming buildings. Most campus universities require more than 50 MVA of electric power. This is a sufficiently large consumption number to justify the formation of an electricity production plant. Combined heat and power plant uses the waste heat from the plant as a source of the heating system of the university, university research park, and its own companies, making it more efficient and hence more economical. The excess electrical energy generated plant may be sold to the national grid, especially during peak consumption periods when the prices are high. Therefore, forming an energy company for a campus university is certainly a possibility.

3.1.9 Hotel

Universities usually organize conferences attended by hundreds of people. Scholars visiting the university to give lectures or seminars are also common. While a university may have large auditoriums to host conference meetings, it usually lacks the comfortable rooms the conference attendees or visiting professors are expecting. Having a four or five-star hotel near the university is a great convenience for such visitors as well as for parents visiting their children studying at the university. Investing for a university-owned hotel is worth considering.

3.1.10 Software

Information technology plays a crucial role in the proper operation of universities. Since universities have diverse needs, many universities developed their software as the university operating system. Such a software package needs to keep track of student records, statistics, faculty and course records, student evaluations of faculty, and many other academia related records. The development and maintenance of this package require a team of software specialists. It is very risky to depend on a third party software company for this development. If such a company ceases its operations, the university will be in deep trouble.

It is possible to hire software engineers and specialists as university employees for this purpose of developing and maintaining the software package. However, it may be difficult to keep high caliber people with high ambitions as university employees in the long run. Instead of developing the software package with university employees, a university may prefer to set up a software company completely under its control. That software company may market its services to other parties, increasing its revenues even further.

3.1.11 High Technology Startup Companies

When an idea or technology developed at a university is transformed into a good or service it creates a new value for customers. That new idea or technology should be replicable and satisfy the customer needs adequately, in which case it is called innovation. Those proprietary and disruptive ideas form the revolutionary nature of the company. Usually, it is not enough to have a product better than the competitors' product. If the product is only a minor improvement over that of the market leader, the customers tend to stay loyal to the original company [23]. It is therefore imperative to own the first product in the market, rather than to produce the imitations of previously developed ideas with minor improvements. It is observed that research universities tend to produce more startups in contrast to those with teaching focus because completely new ideas originate there. Moreover, universities in large cities are more productive in terms of startup generation in contrast to those in smaller cities [24].

The students with those innovative ideas may not know how to start a company. Many countries have strict and complicated accounting rules, difficult to follow for a novice. A university may provide the initial financing of a startup company easily similar to a rich family providing startup money for a young family member. Moreover, the university may provide guidance, advising, and accounting services to startup companies. This gives such a university-backed startup company an important cost advantage compared to a startup using the bank loans and third party accounting or advising services. In exchange for these services and possibly for the initial capital, the university may have an option to own a share of the company, if the company becomes successful.

Another important factor for a startup company is the presence of talented individuals [25]. Older people are less

likely to be entrepreneurs since they are more risk-averse than the young are; they are less willing to enter risky occupations [26]. University is a diverse environment where talented and young individuals thrive. In a university environment, a startup company has a higher chance of recruiting brilliant, energetic, hardworking, and motivated young graduates. Since many students love their university environment and they do not want to leave the campus, they will be willing to work in a company without leaving their beloved university. This puts the startup companies owned by the university at a definite advantage since they can recruit the best graduates of a university getting references from the past instructors of the students.

3.2 Opportunities Provided by Covid-19 Crisis

Following the Covid-19 crisis of 2020, the countries are more inclined to produce conventional goods locally, since there were problems in importing goods and shortages of some goods were observed. This may give an incentive for countries to raise import duties on goods normally imported. It may be a good time to start companies producing such goods.

Startup companies focused on fabricating kits to detect the presence of the Covid-19 virus or its corresponding antibodies are in many countries supported by the state. This is a great opportunity to start companies working in that direction.

4 Long Term Management of Companies: Establishment of a Holding

A holding is a parent company that owns all the companies in the form of subsidiaries. A holding company does not conduct any operation of its own, does not engage in buying or selling of products or services to third parties. It controls the policies of subsidiary companies and oversees the decisions, but it does not run day-to-day operations. It may run common operations of companies like human resources, internal auditing, and finance department for increased efficiency. In return, it may charge the subsidiaries for these services. Holding companies have a tax advantage in many countries by filing a consolidated tax return by combining the financial records of all the firms including that of itself. If a subsidiary company loses money, it will be offset by the profits of the other companies reducing the tax liability. Its liability is limited by the stock it owns in the subsidiaries: If a subsidiary company goes bankrupt, its creditors can not ask for compensation from the holding company.

If a university owns a significant number of companies, it is reasonable to form a university holding company to reap the benefits of the holding structure.

4.1 Challenges and Risks

The monopolistic nature of the university campus companies should not be exploited by increased prices or low service quality to increase profits. Otherwise, the dissatisfaction of students may result, lowering the attraction of the university in the eyes of potential students. The university companies should see the campus market as a breeding ground and learning environment in their initial years. They should try to expand their operation beyond the home market using the experiences obtained there. The university administration should not hesitate to cease the operation of its own companies if they are not providing quality service at reasonable prices.

In private businesses with private stakeholders, there is a strong motivation to watch and scrutinize the performance of CEOs and professional managers to maximize the profit of the owners. In contrast, a company owned by a university does not have private and direct owners. The mission of a university company is to generate funds for a good purpose: Better research and teaching. Most employees of the company pride themselves on working for such a purpose. On the other hand, in such companies, internal control deficiencies may exist and it is vulnerable to fraud [27]. As it is commonly found in such companies, the monitoring mechanism is usually weak and the executives may get abnormally high and excessive compensation and bonuses rather than reasonable salaries [28]. The executives may put their personal interests above the interest of the company and corruption may occur [29]. Consequently, very strong provisions, frequent reporting requirements, and rigorous corporate governance practices resulting in accountability and transparency must exist to detect and punish managerial incompetency, misbehavior, or fraud [30]. A university-owned company must be audited regularly and rigorously by a well-defined internal and external control mechanism, reporting directly to the holding administration. The external audit partner should be changed at regular intervals to avoid the loss of objectivity over time [31]. The control mechanisms should reasonably assure that the CEO and managers of the company have an effective and efficient operation, they report the financials of the company reliably and the company complies with the laws and regulations of the country. The internal and external audit reports generated by such a control mechanism should provide information to the holding administration on the level of performance of

company managers. The presence of both an internal and an external control mechanisms and the corresponding salaries of internal auditors and fees of external audit companies may seem like an unnecessary cost and burden, but it is a well worth investment in the long run for the well-being of the companies. If the managers are not found to be successful as a result of audit reports, the holding managers should not hesitate to fire incompetent or corrupt managers.

Owning a holding should not change or shift the main mission of the university towards commercial goals [32] and the university should not be influenced by the surrounding corporate culture of the companies. While a university-business partnership is valuable [33], there is a definite threat, if the moneymaking task of the companies interferes with the research and teaching mission of the university. If a university concentrates on making a profit from teaching and research, its mission may be compromised. For this purpose, the companies and the university must be sufficiently separated from each other, and a clash between industrial and academic values should be avoided.

5 Case Study: Bilkent University

5.1 Brief History of Bilkent: A Non-profit Private University

Bilkent University was founded in 1984 by İhsan Doğramacı (1915–2010) as a non-profit private university in Ankara, Turkey's capital city. He aimed to create a center of excellence in higher education and research. The name of the university exemplifies the founder's aim since Bilkent is an acronym of "bilim kenti" in Turkish for "city of science".

Doğramacı, an academic himself, was at Harvard and Washington Universities in the United States between 1944 and 1946, where he had observed the advantages of non-profit research universities. He contributed to the establishment of several state universities and served as rector of Ankara University (1963–1965), as chairman of the Board of Trustees of Middle East Technical University (1965–1967) and as founder and first rector of Hacettepe University (1967–1975). Observing the limitations of the public university system, it had long been his objective to establish a non-profit private university distinguished by its high-quality research and teaching. With this goal in his mind and using his family fortune, he purchased a large tract of land (about 3 km^2) near a village in the western hills of Ankara starting in 1967. He first established a construction company (1968) to develop projects on the land he owned. To generate funds for the university, he founded a furniture factory (1969), the first mass-production facility in Turkey with modern imported fabrication equipment at a time when Turkey was in a currency exchange rate crisis and was not able to import. He then founded an information technology company (1976) selling and developing software for mini-computers, the first of its kind with Turkish capital.

He advocated for decades for the Turkish legal system to allow non-profit private higher education institutions. His dream finally materialized in 1982 when a constitutional clause that he proposed was accepted. This clause allowed the formation of private universities, called "Vakıf[2] (foundation) university", as long as the institution operates under non-profit rules. According to the Turkish constitution, the founders of the university have full control of the university, but they are not allowed to get any dividends from the surplus that the university might generate.

After the constitutional amendment, he established Bilkent University in 1984. Some of the lands is developed in the form of apartment complexes to generate funds for the further development of the university. The presence of the university increased the real estate value of the land, and the region known as Bilkent became one of the most attractive locations in Ankara. The construction of a shopping center (1996) within the boundaries of the university increased the attraction of the region even more since the shopping center with a very large supermarket operated by a German company and with a large parking lot was the first of its kind in Turkey. On the weekends, the road to Bilkent was congested with cars trying to visit the shopping center. The establishment of a sports club, again first of its kind in Turkey, added to the value of the neighborhood.

Construction of housing for academic staff, cafeterias, student dormitories, the Student Union building, and various academic buildings followed in rapid succession. Buildings and facilities include a semi-Olympic indoor swimming pool, a concert hall for Bilkent Symphony Orchestra, and a semi-covered outdoor auditorium that hosts 4000 people.

Bilkent University admitted its first 386 undergraduate and graduate students in 1986. As of 2020, there are over 12,000 students. Among them are international students and exchange students from 73 countries. Around 64% of the student body benefits from a variety of scholarships. The tuition income of the university is only 43% of its operating budget.

[2] "Vakıf" is an Ottoman non-profit institution that is established mostly by wealthy philanthropists by donating funds or assets as starting capital for pursuing a public mission. Vakıf is supposed to generate funds on its own to be sustainable for continued operation as a public service, just like a university endowment. For example, founded by a Vakıf, a "külliye" was an Ottoman establishment containing a school ("medrese") providing education service without tuition, a hotel ("han") and Turkish bath ("hamam") generating profits to support the operation of the school.

5.2 For-Profit-Companies Owned by Bilkent University

Bilkent University owns 29 companies with a total of 29,000 employees as of June 2020. Most of the companies are the oldest or first companies in their fields. In terms of market share in Turkey, they rank in the top three in most cases. The companies are owned 100% by the university and they operate in areas like construction,[3] prefabricated building,[4] construction materials,[5] security[6] and building maintenance services,[7] real estate management,[8] shopping centers,[9] insurance, furniture,[10] hospitality,[11] catering,[12] university science park,[13] printing,[14] and defense electronics.[15] The university is also a shareholder in the largest airport operator,[16] airport construction[17] and ferry operator[18] companies of Turkey. The first sports club[19] in Turkey belong to Bilkent University. Research on semiconductors by Bilkent faculty lead to the formation of the first semiconductor fabrication company[20] of the country.

5.3 Management of Companies: Bilkent Holding[21]

The board of the holding is composed of five members: the Rector and three professors from the university and the CEO of the holding. The rector acts as the chairman of the board. The companies are grouped under four directors. Each subsidiary company has five-member boards chaired by the relevant director. Professionals manage the day-to-day operations of the companies. They need to use the arms-length principle for dealings with university. The companies are not obliged to hire the graduates of the university, although many graduates of the university work at university companies. Their sole purpose is to generate funds for the university. The managers of the companies are rewarded in relation to the profit of the company. The university provides reduced tuition for the children of the company employees if they are accepted to the university through the national university entrance exam system.

6 Conclusions

To diversify the conventional revenues of a university, universities with high aspirations should try to set up an endowment fund. The presence of such a fund will support the university in difficult times when other revenue sources are in trouble and the conventional income of the university is reduced.

Philanthropy is not encouraged by the tax system in all countries. Raising funds for university through voluntary contributions of alumni or wealthy individuals may be difficult due to the absence of the donation culture of the country. While raising cash for the university endowment may be difficult, setting up companies may be easier, especially in a developing country. Covid-19 crisis also provides an opportunity to start companies in areas normally dominated by imported goods. Starting a group of companies owned by a university to generate funds for the university is certainly a good possibility especially for a campus university. Using the service needs of the students can provide a breeding ground for such companies. The companies should avoid exploiting their dominance in the campus market to maximize their profits. Instead, they should try to extend their operations beyond the campus limits, to increase their revenues and profits by using the know-how gained at the home.

Ideas originating from the university may also lead to startup companies with the university being a shareholder. Not all such startups will be successful, but if they do, they will bring significant revenue for the endowment of the university.

[3]Tepe Construction (founded in 1969) tepe.com.tr/en.
[4]Tepe Prefabrik (founded in 1977) tepeprefabrik.com.tr/en.
[5]Tepe Betopan (founded in 1984) betopan.com.tr/en.
[6]Tepe Savunma (founded in 1993) tepesavunma.com.tr/en.
[7]Tepe Servis (founded in 2008) tepeservis.com.tr/en.
[8]Tepe Emlak (founded in 1996) tepeemlak.com.tr/en.
[9]www.bilkentcenter.com.tr
[10]Tepe Home (founded in 1969) tepehome.com.tr/en.
[11]Bilkent Hotel (founded in 1988) bilkentotel.com.tr/en.
[12]BCC Catering (founded in 1993) bcccatering.com.tr/en.
[13]Bilkent Cyberpark (founded in 2002) cyberpark.com.tr/en.
[14]Meteksan Matbaa (founded in 1969) meteksan.com.tr.
[15]Meteksan Savunma (founded in 2006) meteksan.com/en.
[16]TAV Airports (founded in 1997) tavhavalimanlari.com.tr/en.
[17]TAV Construction (founded in 1997) tavconstruction.com.
[18]IDO (founded in 1987) ido.com.tr/en.
[19]sportsinternational.com.tr/en.
[20]ABMicroNano.
[21]Bilkent Holding (founded in 1986) bilkentholding.com.tr/en.

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10 Outcome Summary of the International Experience in Developing the Financial Resources of Universities

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It is widely believed that economic returns of tertiary education to the public are much higher than those in other sectors of the economy. Excellence in education and research, therefore, is an important factor for the welfare of countries. To improve the well-being of their citizens, governments invested heavily in higher education. The number of higher education institutes in the world has reached 18,000, and as a result, a larger fraction of people is getting tertiary education degrees. The expansion of the university system required a corresponding increase in the funding. Growth in the number of higher education institutes in both developed and developing world increased the competition between those institutes. Almost everything a university does costs money, especially in a competitive environment. The expenditures of universities inflated above the inflation rate in the developed world. In the developing world, university budgets are under strain, because of the increasing number of students. Consequently, university administrators all over the world are in a constant search for more funds.

If higher education institutes are expected to deliver high-quality education and research, their sustainable funding is crucial for the future of that nation. Many governments recognize this fact and support the higher education institutes directly as much as possible within the limitations of their budgets. Research funding agencies present in most countries support the research in universities in a competitive manner. In recent years, they preferred to support ideas that may convert into innovative products.

While governmental sources are a major part of the funding of most universities, economic downturns, as in the case of the COVID-19 crisis, may reduce government funding. The university administrators are looking for other sources to compete in a global setting.

While tuition income is also a major source for universities in some countries, it may be very small or nonexistent in the rest. For top universities of the developed world, tuition from international students attracted from the young population of developing countries and branch campuses established in those countries turned out to be another source of income.

As the government subsidy is shrinking, many universities in the developed nations try to stabilize their income by forming an endowment to help them in difficult times. For example, many private and public universities of the United States were able to build significant sized endowments using gifts from their alumni and by philanthropy from private sources. To diversify their revenue sources, universities became more commercial oriented organizations compared to what they were 50 years ago. They try to convert their research findings into income sources by getting patents of their ideas and licensing them to commercial entities to collect royalty income. University faculty members are also encouraged to get involved in startup companies to fuel the local economy and generate more jobs.

The chapters in this book gave the visions of some academic leaders in the search of more funding for their universities, especially in the aftermath of the COVID-19 crisis. Outcomes of all chapters, discussing different strategies and methods to secure funding for higher education institutes, are summarized below:

- University administrators will obtain a better ability to construct future-based funding that aims at growth and innovation across an institution during a time of constant change. This is done through an analysis of the existing funding and budgeting models open to institutions, the strengths and weaknesses of each model, and how to

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leverage an institution's key differentiators to develop external funding sources for diversification.
- University administrators understand that reliance on government funding, even for public universities, is becoming fragile and alternative sources are needed.
- International full-cost-plus-fee paying students have become a major source of income of universities.
- The resilience of universities against external events needs to be enhanced.
- The COVID-19 crisis in 2020 will put a strain on government budgets for the years to come. Because of the crisis, the number of international students and the corresponding tuition income is also likely to decrease.
- Assets of a higher education institute include everything that it owns, controls, and influences, including people. Historically, monetization meant converting an asset into cash or liquidating it. It is better understood as a two-part set of tactics, i.e., pulling resources from some assets and investing them in other assets.
- Higher education institutes may employ six monetization tactics:
  - Wringing out resources to invest;
  - Borrowing resources to invest;
  - Trading resources to invest;
  - Soliciting resources to invest;
  - Selling monetized assets; and
  - Creating new assets. These are typically carried out through advancement offices or strategic plan initiatives of universities.

Each tactic has special features and limitations, and its utility depends a lot on the assets being monetized. For example, parking structures and academic departments are very different assets, monetized differently.

- Current issues facing most higher education institutes require much swifter and more dramatic responses than in the past.
- The implied stability of annual budgets is being supplanted by the impatient pursuit of survival and growth.
- Worthy academic purposes through asset monetization are ultimately reflected financially in two metrics, net income in the near term and, over the longer term, growth in net assets.
- Comparing decades-long changes in net assets with rival peer universities is an unambiguous metric of the institution's success.
- There are marked international variations in funding models for public universities and also variations within countries. Learning from best practices and adapting those practices to the local context will be required.
- Alternative sources of income for a university include philanthropy, links with industry/business, commercialization of research, digital technologies, and future horizons.
- Tuition income, whether as fees from individual students, in fellowships or scholarships or as in block grants from governments or other funding agencies, remains the mainstay of university income.
- The presence or raise of tuition fees in public universities are in many countries the subject of intense political debate, centered on social mobility. Since high tuition fees may reduce social mobility, income-contingent loan schemes can be a way to offset the negative impact of a rise in tuition fees.
- The impacts of funding and budgeting in the era of the COVID-19 pandemic will alter an institution's focus and ability to fund operations and key objectives. This includes assessing internal funding models during COVID-19 and examining the likely external research funding landscape during and following the global pandemic.
- In a world of scarce resources where multiple non-profit organizations need public resources, philanthropy provides one additional way for universities to gain additional resources.
- Private philanthropy is important at any time, but even more so when a crisis arises such as a COVID-19 pandemic. Private philanthropy and an endowment is one such revenue stream.
- Educational philanthropy ensures a university's sustainability and fosters growth and discovery. It enables a university to help shape its community's social, economic, and technological development.
- An alternative model of endowment development may be applicable in developing nations. Since not all nations have a philanthropy culture or a donation motivating tax system, a university in such a country must find new ways of raising an endowment.
- Endowments and gifts are important for public universities, even if they are substantially smaller than for private universities. Endowments enable the university to generate revenue for important institutional activities such as establishing endowed chairs and centers, building research centers and the like, and creating additional investment opportunities.
- In many societies, citizens want to support universities beyond the taxes they pay to local governments in order to contribute to higher education. There are four reasons donors give to a university: (a) to repay the institution for what they learned, (b) to make an impact, (c) to create a legacy, and (d) to gain a tax benefit.
- Some Governments support universities by matching the donations they receive to nurture a philosophy of giving in their communities.
- Fundraising methodology involves branding, community outreach, networking, and strategic messaging which also makes fundraising entrepreneurial.

- The more universities engage with communities to share their mission, goals, and values, the more they can garner support from alumni and benefactors.
- The primary leader of fund-raising is the university president or chancellor. The Board of Trustees also plays a significant role.
- A fully-staffed development office is essential for a successful capital campaign. Benefactions celebrate not just the mission of a university, but also friendship, bonding, and trust between a benefactor and the institution or its leaders.
- Donors differ across generations. This requires periodic re-defining of philanthropic engagement and challenges the university to renew and review its strategies.
- A university with a campus is basically a small city, where full control is in the hands of the university administration. Many such universities rent spaces or outsource to third parties to cover the basic needs of the campus population. Income from rental can be considered a low-risk income. Some of these services can be turned into seeds of new companies, which can grow beyond the limits of the campus.
- The basic needs of this small town, like bookstore, food service, market, shopping center, energy production, hotel, facility management, security can be the breeding ground for those new companies, which are totally owned by the university.
- The companies should be run by professionals, not by the university administrators, who are not trained to be efficient business executives. If those companies become successful outside the campus limits, the university may benefit from the profits of such companies, as an alternative form of an endowment.
- Technology transfer represents an opportunity for universities to secure a return on their academic investment which can then be cycled back into the institution for its further growth and development. Technology transfer can occur in virtually every field of study or discipline, with the goal of bringing discoveries to the market, either individually or collectively.
- During the past 20 years we have seen the evolution of an "Entrepreneurial Ecosystem" for technology transfer structured around three fundamental engines: (1) discovery, (2) enablement, and (3) economic development.
- Universities may increase their funding through knowledge transfer: research contracts with outside partners, start-ups by students or staff from the university or patents.
- While recognizing that local or national cultures vary and play an important role in tech transfer, creating a campus culture that values, supports, and promotes tech transfer is essential, requiring university-wide commitment, visible leadership, faculty and student engagement, the highest quality of research, and incentivization of both creativity and entrepreneurship.
- To promote technology transfer effectively university leaders need to: (a) provide a clear vision for the initiative, (b) break down silos, (c) remove barriers, (d) provide resources, (e) hire the right leaders, (f) set appropriate expectations, and (g) ensure fair and faculty-favorable incentives.
- It is always possible to extract new income resources based on the participation of all those who benefit from higher education, including public and private sector companies, institutions, and organizations, as well as the local community.
- As an example of funding development, the leading university, King Abdulaziz University, of a developing nation, Saudi Arabia, has managed to develop additional financial resources on top of the funds allocated by the government. The university generates its funding from the following methods:
  - Establishing an investment company for the university, and providing consultations and research to the public and private sectors;
  - Marketing research products and inventions by transferring technology,
  - Encouraging creativity and entrepreneurship;
  - Making research centers available to solve community problems,
  - Developing a research endowment,
  - Providing its services to the community through diplomas in the specializations required in the labor market, and using e-learning methods to provide paid education and training globally;
  - Providing online consultations and studies in many fields to the global community,
  - Activating partnerships and opening investment prospects with big companies;
  - Self-operating some university sectors in a commercial investment manner;
  - Establishing a center for advanced health care and health tourism;
  - Privatizing some service and research sectors and making them available for investment for everyone;
  - Marketing the expertise and capabilities of the university, its laboratories, and research centers;
  - Investing the university property (theatres, sports buildings, lands, etc.);
  - Establishing companies for industries concerned with technology transfer and localization;
  - Supporting innovation and encouraging patenting, then converting patents into a product.

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