

Agricultural, Biosystems, and Biological Engineering Education

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Chapter 41

Growing Agricultural Engineering in Africa: Students' Attitudes, Perceptions, and Expectations on Agricultural Engineering Education

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Umezuruike Linus Opara

Introduction

Agriculture is a critical component of the economy of many African countries, often contributing to over 45% of the gross domestic product (GDP) and providing a source of livelihood for over 70% of the population. Accordingly, the African Union's Agenda 2063 – the Africa We Want, the masterplan for transforming the continent into a global powerhouse of economic prosperity, has identified the modernisation of agriculture for increased productivity and production as a strategic goal. During the launch of the Comprehensive Africa Agriculture Development Programme (CAADP), the former President of Nigeria, His Excellency General Olusegun Obasanjo, noted that “Improving agricultural performance is at the heart of improved economic development and growth, and its role in poverty eradication and in the restoration of human dignity can never be over-emphasised”. Agricultural engineering education and research have critical roles to play in achieving the aspirations of Agenda 2063 and the goals of CAADP.

Agricultural engineering (AgEng) is a well-established academic discipline and profession in Africa. It is offered in many institutions of higher education, including universities and polytechnics, and in some countries, such as South Africa, there is a dedicated Institute for Agricultural Engineering as part of the Agricultural Research Council. Earlier academic programmes in agricultural engineering started as part of the faculty of agriculture and later became part of the faculty of engineering, such as at the University of Nigeria, Nsukka. In the 1970s–1980s, student enrolments boomed, but in recent times, students' interest in agricultural engineering has waned and there is concern about the number of undergraduate student intakes in these programmes. To maintain the relevance and viability of both the programmes and academic departments, academic leaders have taken several measures, including renaming both the department and degree programme and reforming the curriculum.

Despite these efforts, problems remain, casting doubt on the future of agricultural engineering education. To adequately address these challenges facing agricultural engineering education, a multi-stakeholder approach is needed, including

academia, students, policy makers, the private sector, etc. Understanding the factors which drive student choices and those factors which enhance retention is essential. Studies in New Zealand (Opara, 2003a,b) and the Sultanate of Oman (Opara, 2006; Opara et al., 2006) have provided insights on student perceptions of the AgEng discipline and academic programmes, including curriculum content and attitudes towards professional identity. These studies highlighted the low preference for and poor image of the AgEng academic programme among students and a perceived low profile of the discipline among the public. Students also offered fresh insights on how to enhance the quality of AgEng education, including curriculum reform and implementing dedicated stakeholder awareness programmes to raise the profile of the discipline and profession.

The critical role of agricultural engineering education and research as a key driver in transforming and modernising African agriculture for socio-economic development cannot be over-emphasised. The relevance of agricultural engineering in achieving the United Nations Agenda 2030 Sustainable Development Goals (SDGs) and the African Union's Agenda 2063 – the Africa We Want has been articulated by Fomunyan and Opara (2023). Despite its much-acclaimed success in raising global food production and access during the past century through the impacts of agricultural mechanisation and related technologies, agricultural engineering has continued to face challenges of identity and relevance which have impacted the survival and future of many academic programmes. A case in point is how to grow the pipeline of future agricultural engineering practitioners and thought leaders who are equipped with relevant skills for lifelong learning, technical expertise, and social engineering to drive the agri-food systems transformation agenda. In response to these challenges, AfroAgEng – the Pan Africa Society for Agricultural Engineering (PASAE) initiated a project to grow agricultural engineering in Africa, which was funded by the Royal Academy of Engineering (UK) through the Global Challenges Research Fund – Africa Catalyst programme on “Planning for the growth of Agricultural Engineering in Africa by supporting the establishment of AfroAEng”.

In 2018, PASAE organised a workshop on “Strategies to Grow Agricultural Engineering in Africa” as a contribution to the symposium organised by the South African Institution of Agricultural Engineers on “Meeting the Challenges and Growing Agricultural Engineering – Together We Can”. In his keynote address, the founding president of PASAE highlighted the need for stakeholder engagements in developing actionable strategies to grow the pipeline of motivated students and well-equipped graduates and to ensure that agricultural education in Africa is tailored to address current and future developmental challenges facing the continent and the world at large (Opara, 2018).

Nearly two decades ago, Opara (2004b) presented a synthesis on the global status of agricultural engineering education and research and prospects for developing countries, which included an outline of the emerging importance of a technological innovation triad – biotechnology, nanotechnology, and information and communication technology. Subsequently, in a three-part series of the special issue of the *International Journal of Engineering Education* on “Trends in Agricultural, Biosystems, and Biological Engineering Education – Transformation and Reinvention”, researchers chronicled the evolution of agricultural engineering and emergence of biosystems/biological engineering (Opara & Cuello, 2006a), discussed developments in curriculum reform, assessment, and accreditation (Opara & Cuello, 2006b), and highlighted innovative teaching and learning methods in agricultural and biological engineering education (Opara & Cuello, 2007).

Comprehensive studies on student attitudes and perceptions of agricultural engineering education have been reported in New Zealand and the Sultanate of Oman (Opara, 2006). Using a combination of focused group discussion and paper-based questionnaires, students enrolled in the agricultural engineering programme at Massey University, New Zealand, offered their perspectives on their career prospects, critical skills, and discipline name change. The findings showed that the majority of students came from rural farming backgrounds but would prefer jobs in the non-agricultural (farming) sector, including off-farm (downstream) agribusiness (Opara, 2003a). Students also bemoaned the prevailing low attitudes and perceptions among students (especially those enrolled in other disciplines!) and the public and highlighted the critical importance of new efforts to improve this poor “rural” image (Opara, 2003b). In a similar study at Sultan Qaboos University, Oman, students also reported a very low appeal of the agricultural engineering degree programme among students, including a low image and poor public understanding, which altogether contributed to low student enrolments and high attrition rate (Opara et al., 2004a, b). Omani students preferred that the academic home of the degree programme should be the College of Engineering rather than the College of Agriculture and Marine Sciences. At Massey University, both the degree programme in agricultural engineering and the academic department were based in the Faculty of Agricultural and Horticultural Sciences until the department was merged into a new Institute of Technology and Engineering, which became the new home of the academic programme during the period of the study reported here.

To date, there is limited understanding of the perceptions and attitudes of undergraduate students towards AgEng

education in Africa and how these can be improved to grow and promote agricultural engineering on the continent. In this chapter, we report the findings of a study aimed at assessing the attitudes of undergraduate students in East, West, and Southern Africa towards agricultural engineering education, their perceptions about the academic discipline and profession, and key priority impact areas where the discipline may contribute towards successful agri-food systems transformation and modernisation for sustainable development in Africa.

Study Design

The study was carried out using SurveyMonkey®, a web-based electronic survey tool that is suited for creating quick, easy, and cost-effective online professional surveys (Collier et al., 2005; Herreid et al., 2014; Herreid et al., 2013; Varela et al., 2016; Symonds, 2011). The questions were placed into categories which explored several issues that were considered relevant to the research objective, including:

- family background of the respondent in relation to agriculture,
- choice of undergraduate degree programme,
- name of the degree programme and department,
- skills areas expected in the agricultural engineering degree programme,
- the ability of the current curriculum to meet the expectations,
- preferred occupation sector after graduation,
- priority impact areas for agricultural engineering education, and
- public understanding and image of agricultural engineering and proposals for improvement.

The questionnaire was administered online to undergraduate agricultural engineering students enrolled in five agricultural engineering departments in Universities in East Africa (Makerere University, Uganda and Sokoine University of Agriculture, Tanzania), West Africa (University of Nigeria, Nsukka, Nigeria and Kwame Nkrumah University of Science & Technology, Ghana), and Southern Africa (University of KwaZulu Natal, South Africa). A total of 160 students responded, with 21.95% from East Africa, 62.17% from West Africa, and 16.89% from Southern Africa. The results are presented as percentages for each question using bar charts and pie charts, where appropriate. Given the relatively small number of institutions and regions covered in the present study (Africa has five geo-political regions – East, West, North, Central, and South, plus the Diaspora), no comparisons were made between regions and institutions. While many institutions offer agricultural engineering education programmes in countries in Southern Africa, only one institution in South Africa could be covered during this preliminary study. Some students did not respond to every question asked; therefore, the results in percentages for some questions may not add up to 100%.

Major Findings and Discussion

Family Background of Students

Most students (51%) reported that they came from a farming family background, with a large majority (42%) identifying their families as smallholder (subsistence) farmers (Figure 41.1). Similarly, a large proportion of the students (48%) reported that they come from non-farming families. Together, these findings highlight some important facts about the current state of agriculture and agri-food systems in Africa, as well as possible implications for agricultural engineering education. First is that smallholder subsistence agriculture still dominates the food systems, and second is that an increasing number of Africans no longer depend on agriculture, particularly farming, for livelihood. For the students who reported that they were from non-farming families, it is presumed that their parents are not involved directly in farming, and this detachment from agriculture is expected to impact the students' perception of agriculture, agricultural engineering, and their future career interests. It is conceivable that during the birth of agricultural engineering as a tertiary educational programme in Africa over half a century ago, nearly all undergraduate students would have come from a smallholder farming family. The growth of the civil service post-independence and the emergence of new industries – from education to health care, transportation, manufacturing, telecommunications, and services, etc., would have contributed to growth in careers and jobs outside agriculture, particularly for the educated middle class.

Together, these findings present challenges and opportunities for agricultural engineering education in Africa. For instance, given the reliance of smallholder subsistence agriculture on the human muscle as a power source and archaic implements such as the hand-hoe and cutlass, questions arise about the relevance of current curricula and practical aspects of teaching and learning. Furthermore, with only nine percent of the students reporting a family background in medium- to large-scale farming, it is clear that a large majority have not been exposed to nor experienced commercial agribusiness characterised by high knowledge intensity and the application

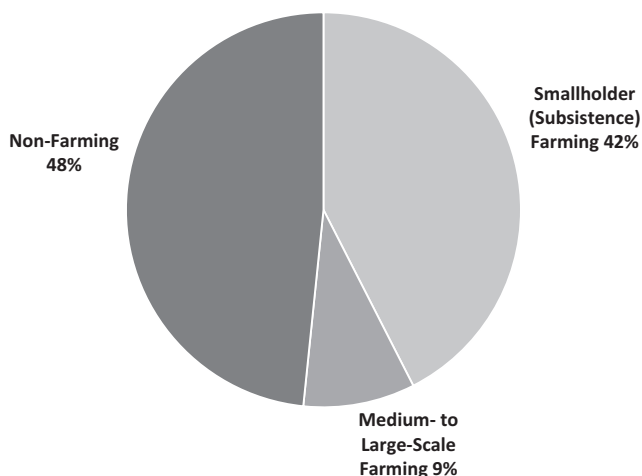


FIGURE 41.1 Family background of the students.

of improved inputs and technologies which enhance productivity. As the rate of urbanisation continues to rise in Africa with the increasing demand for a steady supply of food in both quantity and quality, how do we ensure that agricultural engineering education remains attractive to youth – both rural and urban?

Degree Programme Preference

When students were asked, “Was agricultural engineering discipline your first choice when you applied to study at university?” only 42% agreed, while 58% did not. Among those who did not apply to study agricultural engineering *ab initio*, 76% chose other engineering and related courses, including civil > electrical > mechanical > geological/mining > chemical/petroleum > electronic = telecommunications/computer = quantity surveying/building technology > architecture (Figure 41.2). Additionally, 20% of the students who did not choose agricultural engineering preferred medicine and related health sciences, including medicine and surgery > pharmacy/herbal medicine = nursing > human biology/biological sciences. Some students went further to comment about their lack of knowledge about the agricultural engineering major, saying: “I didn’t know about it”, “I had no idea that (the) university had such a programme”, and “I didn’t know much about the programme. I only wanted Mechanical”. The preference for other engineering majors and medicine is similar to the findings from previous studies on agricultural engineering education among undergraduate students at Sultan Qaboos University, Oman (Opara et al., 2004a, b). Overall, these findings underline the limited knowledge about agricultural engineering as an academic discipline in engineering among high school matriculants, and possibly including parents, caregivers, and career advisers. The pervasive negative attitude towards agriculture among the youth, parents, and the general public at large could also contribute to the low interest among students to study agricultural engineering (Opara 2003a, b; Opara, 2004a, b; Opara et al., 2004a, b).

Preferred Name for Discipline and Profession

During the past three decades, there has been debate among agricultural engineers and educational administrators about the appropriateness and relevance of the name “agricultural engineering” (Opara, 2002a, b; Opara, 2004b; Opara & Cuello, 2006a, b; Opara & Cuello, 2007) in enhancing the appeal to prospective students and other stakeholders including parents, career advisers, and employers (Opara, 2003a, b; Opara et al., 2004a, b; Opara et al., 2006). Four dominant names in Africa and elsewhere globally were identified and selected, namely agricultural engineering, biological engineering, bioresources engineering, and biosystems engineering, and students were asked to choose one which is most appropriate in the 21st century.

A large majority (40%) of the students preferred the name “agricultural engineering”, in the following order: agricultural engineering > bioresources engineering, biosystems

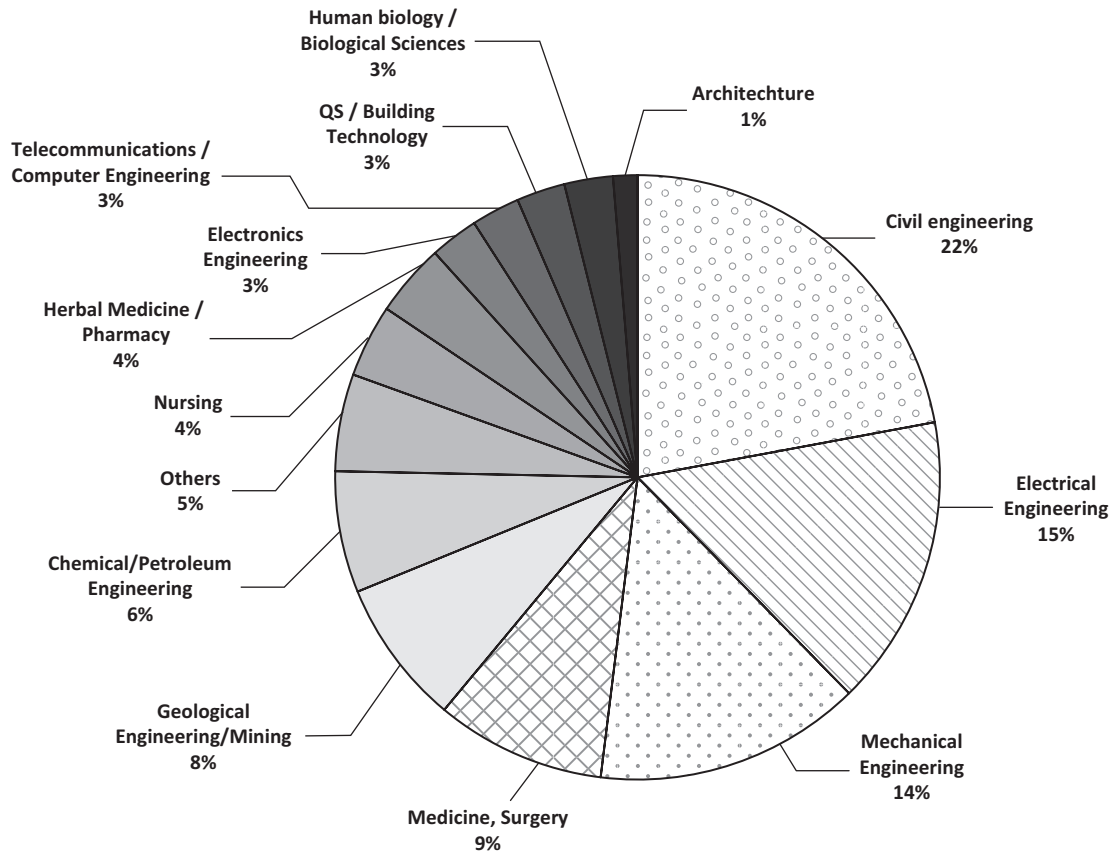


FIGURE 41.2 First choice degree programme among students who reported that they did not apply to study agricultural engineering *ab initio*.

engineering > biological engineering. However, with a higher majority (60%) opting for the bio-inspired names (Figure 41.3), it is clear that the students welcome the proposition and widespread acceptance of biology as the fundamental science underpinning agricultural engineering (Johnson, 2006; Johnson & Phillips, 1995; Johnson & Schreuders, 2003).

Students also offered alternative names, such as “biomechanical” engineering and compound names, such as “agricultural and biosources engineering” and “agricultural and biosystems engineering” (Box 41.1). Some of the sentiments expressed against the name “agricultural engineering”, an indication of preference for a name change, include the following:

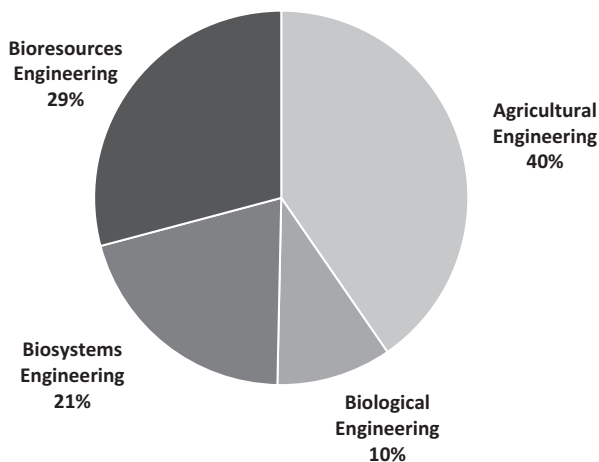


FIGURE 41.3 “There has been a debate about the appropriateness of the name ‘agricultural engineering’ in enhancing the appeal to prospective students and employers. Which one of the following names do you think is most appropriate in the 21st Century?”

- “People perceive agricultural engineering and agricultural science as one discipline”.
- “‘Agricultural engineering’ comes across as very limited to people who know nothing about it. They immediately assume it’s only farming centred”.
- “Agricultural engineering makes it sound as if we farmers”.
- “A name change would really do the sector good because people consider it to be, just about farming, instead of its true value”.

The low preference for “biological engineering” (ten percent) and high preference for “agricultural engineering” are supported by the following comments:

- “Majority of the students in Uganda who apply for this course have not done Biology (or it wasn’t one of their favourite subjects), so calling it purely biological would, in my view, bias them. Employers in developing countries can understand directly the

BOX 41.1: KEY COMMENTS PRESENTED BY STUDENTS IN RESPONSE TO THE CHOICE OF A PREFERRED NAME THAT IS MOST APPROPRIATE IN THE 21ST CENTURY.

- 1 It depends which direction you choose in Ag Eng.
- 2 People perceive agricultural engineering and agricultural science as one discipline.
- 3 “Agricultural engineering” comes across as very limited to people who know nothing about it. They immediately assume it’s only farming centred.
- 4 A name change would really do the sector good because people consider it to be, just about farming, instead of its true value.
- 5 Agricultural engineering makes it sound as if we farmers.
- 6 Agricultural engineering terms makes people to think you are farmer.
- 7 In my university it is referred to as Agricultural and Biosystems engineering and I think it should stay that way. Majority of the students in Uganda who apply for this course have not done Biology (or it wasn’t one of their favourite subjects) so calling it purely biological would, in my view, bias them. Employers in developing countries can understand directly the need for and agricultural engineer than a Biosystems, Biological, Bioresources engineer.
- 8 The name agricultural engineering is vast in that in it combines knowledge from almost all other engineering disciplines; civil, mechanical, electrical, etc. This is applicable in agriculture thus allowing work flexibility. The wonder is; potential learners are limited and most people have adopted to specialised fields.
- 9 Agricultural Engineering is still a suitable name for the 21st century. The agricultural engineers solve problems related to agricultural equipment, water quality and water management, biological products, livestock facilities, food processing, and many other agricultural areas. This discipline combines all the other disciplines (Biological, Biosystems and Bioresources Engineering). This is a diverse field of engineering in Agriculture. The future of agriculture depends on the next generation of problem solvers. Creative and skilled individuals, like agricultural engineers, can use their knowledge of agriculture and life sciences, along with the problem-solving skills of engineering, to create new systems and solutions for the 21st Century. Agriculture is changing faster than any time in history. That’s why, if you are interested in helping direct the future of agriculture, a degree in agricultural engineering is what you need. When we begin talking of biological, biosystems and bioresources engineering we do contradict with biomedical sciences outlook and thus running away from agriculture context. To my opinion, I wish Africa even in the 21st century outlook should think of Agricultural Engineering in order to enhance appropriate way to students and employers, and as a way to modernising agriculture production, processing and management.
- 10 The main key issue is food production.

need for an agricultural engineer than a Biosystems, Biological, Bioresources engineer...”

- “Agriculture is changing faster than any time in history. That’s why, if you are interested in helping direct the future of agriculture, a degree in agricultural engineering is what you need. When we begin talking of biological, biosystems and bioresources engineering we do contradict with biomedical sciences outlook and thus running away from agriculture context. To my opinion, I wish Africa even in the 21st century outlook should think of Agricultural Engineering in order to enhance appropriate way to students and employers, and as a way to modernising agriculture production, processing and management”.

Given these results and comments, it is therefore not surprising that the name “biological engineering” is rarely used in Africa for an academic department and/or degree programme, compared to the United States. Indeed, while the majority of students prefer a name with “bio”, the name “agricultural engineering” remains the single most preferred name.

Preferred Career After Graduation

When students were asked, “Where would you like to work after graduation?” based on three broad categories of occupation areas in agriculture and the non-agricultural sector (Figure 41.4), the majority (61%) would prefer to work in off-farm agriculture, comprised of postharvest handling and processing (31.41%) and agricultural support services (29.49%) such as logistics, marketing, research, and teaching. Among the agricultural sectors, the lowest preference was for production/farming (26.28%). Only 12.82% desired to pursue a career in the non-agricultural sector and some of the areas identified by the students include aviation, finance, law, oil and gas, construction, “mechanical engineering companies”, automobile, and civic society organisations (Box 41.2). Put together, off-farm and non-agricultural sectors accounted for 74% of student preferences, which strongly underscores the low preference for a career in direct farming/field production. Given that postharvest (post-farmgate) activities can account for up to 80% of both the economic value and profitability of agriculture and given the prevailing drudgery and low productivity of agriculture among smallholder subsistence farmers (who carry

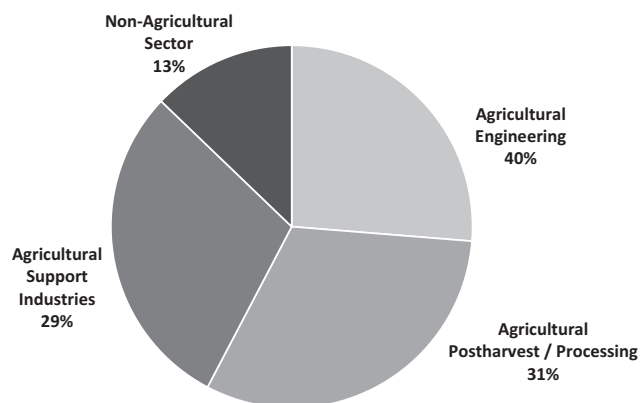


FIGURE 41.4 “Where would you like to work after graduation?”

out the majority of agricultural activities in Africa), it is therefore not surprising that most students prefer careers in off-farm activities and in the non-agricultural sector. These findings are in line with the results reported among undergraduate students in the Sultanate of Oman (Opara, 2004a, 2004b) and New Zealand (Opara, 2003a, 2003b), respectively.

Relevant Skills

A well-trained engineer requires a wide range of skills to succeed in any field, and these are technical and non-technical (soft) skills. Students were asked to select as many options as applicable from a list of key technical skill areas which they would need in order to meet the expectations of future employers and/or the preferred career already identified in the preceding section. The results showed that “machinery management” ranked highest while “field production” was the least (Figure 41.5); machinery management > equipment and/or process design > information and communication > analytical and data management > field production. Students also

BOX 41.2: ADDITIONAL INSIGHTS PROVIDED BY STUDENTS ON TYPE OF WORK/CAREER PREFERENCE AFTER GRADUATION.

- 1 Machine prototype developing industries
- 2 Construction companies
- 3 Aviation or Finance Sector
- 4 Self-employed engineer
- 5 Oil company
- 6 I will be working with computers. I want to be a computer programmer. Didn't know what I loved until I came to school.
- 7 Academics
- 8 Irrigation and drainage (hydrology)
- 9 Material science engineering
- 10 Design Engineering sector
- 11 Water and rural community development
- 12 Water engineering, waste management, or environmental engineering
- 13 Automobile
- 14 Mechanical engineering companies
- 15 Law firm
- 16 I want to work in both the production and processing sector.
- 17 Civil society organisation
- 18 Water sector

Rating of Current Agricultural Engineering Programme Vis-à-Vis the Required Skills

Having examined the preferred career/job after graduation and identified the relevant skills needed to succeed in the workplace, students were asked to assess the extent to which the current agricultural engineering curriculum would enable them to achieve those skills to meet the expectations of future employers/employment. Satisfaction with the current

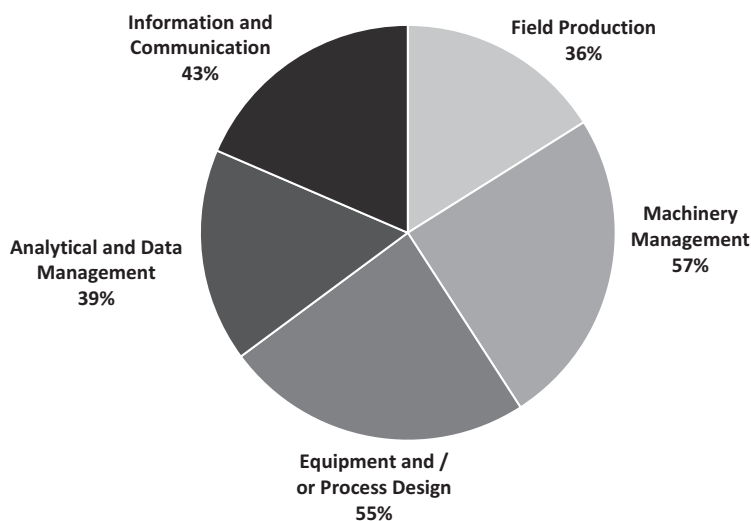


FIGURE 41.5 “Which of the following skill areas will enable you to meet the expectations of the employer/employment you prefer after graduation?”

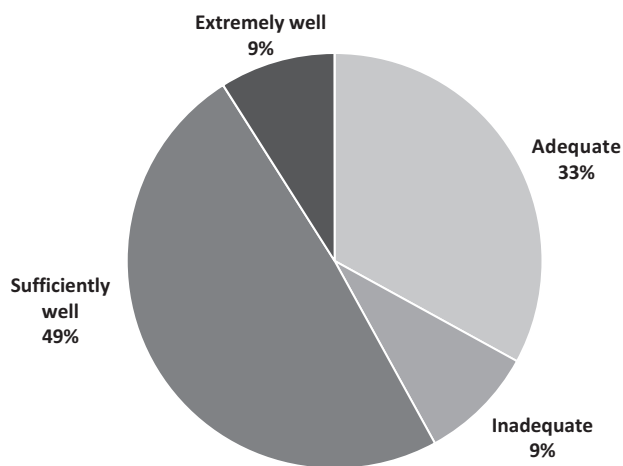


FIGURE 41.6 “To what extent do you think the current agricultural engineering programme would enable you to achieve those skills to meet the expectations of your future employer/employment?”

curriculum/ academic programmes was rated as follows: very good > inadequate to just adequate > excellent (Figure 41.6). Overall, 58% of students considered the programme to be very good or excellent.

Image and Public Understanding

Persistent issues facing the growth of agricultural engineering in Africa and indeed around the world are the low profile, poor image, and limited public awareness and understanding of both the discipline and the profession. These have contributed to both low enrolment and low retention rates of undergraduate students enrolled in agricultural engineering programmes. Even where enrolment has remained fairly high or stagnant during particular periods, students have reported that agricultural engineering was not their first choice of study (Opara et al., 2004a; Opara et al., 2006; Opara & Mullah, 2023, in this book). In this study, and compared to other disciplines, students rated overall public understanding of agricultural engineering and its role in economic development to be very poor to poor > fairly good to good > excellent (Figure 41.7). Students also recommended a wide range of actions to improve public understanding of the discipline (Box 41.3), which can be summarised into the following actionable points:

- Use new and social media platforms.
- Carry out awareness programmes in schools – at all levels.
- Create a special forum to recognise the work of agricultural engineers, including awarding scholarships.
- Promote link with industry in the curriculum, including providing agricultural engineering services.
- Develop agricultural engineering-related industries.
- Improve salary/remuneration.
- Change the name.

A couple of students summarised the poor image and low profile of agricultural engineering and offered solutions as follows:

- “People see Agricultural Engineering as an inferior course compared to Mechanical Engineering, Electrical Engineering, and the rest. There should be awareness created on the importance of Agricultural Engineering to the economy”.
- “There is no public education for the other engineering courses, but then they are soaring. This is because they have large markets for employment and also recognised industries. I believe we should rather work hard as agricultural engineers and create an industry of our own. That way, the public has to research into it”.
- “Very many people think that agricultural engineering is all about managing tractors, and so most of the engineers in this field are not recognised. This can be improved by increasing[ly] explaining the work done by agricultural engineers through media”.

To achieve goals, students specifically single out the role of professional agricultural engineer societies and associations at national, regional, continental, and global levels:

- “Having national and international bodies or associations bringing agricultural engineers together”.
- “By setting up a body that unites agricultural engineers in the country. Also, by encouraging the implementation of an agricultural engineering post for each district and by so doing this will improve the publicity of the course and its relevance. Also through frequent seminars both at district and school level”.
- “By creating forum for AE recognition, that is by carrying out practicals and creating awareness in the public and scholarships”.

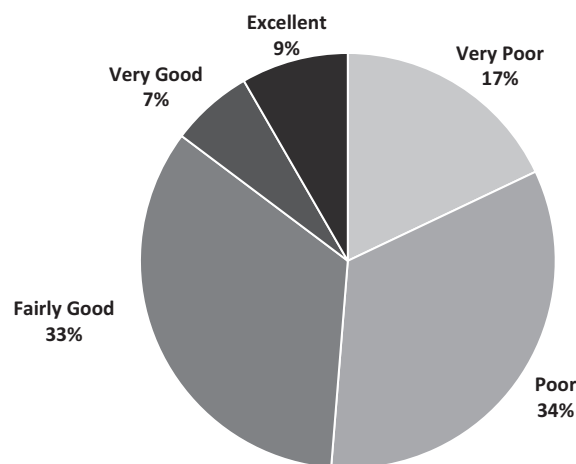


FIGURE 41.7 “Compared with other engineering disciplines, how would you rate the overall public understanding of agricultural engineering and its roles in the economy?”

- “Through setting up seminars to the general public & visiting high schools to let them know about Agricultural Engineering”.

These recommendations highlight the critical importance of professional bodies such as AfroAgEng/PASAE in growing agricultural engineering and enhancing its profile in Africa (Opara, 2012; Taylor et al., 2021). This will require working closely with the adhering national and regional associations and in partnership with other stakeholders, using deliberately designed campaigns and other programmes.

**BOX 41.3: RECOMMENDATIONS
OFFERED BY STUDENTS TO IMPROVE
PUBLIC UNDERSTANDING OF
AGRICULTURAL ENGINEERING.**

- 1 I think by intensifying education on importance of agricultural engineering aspect.
- 2 Educating them that agricultural eng are not famers.
- 3 More “Ag Eng promotions” at high school level nationally and not just at UKZN open days.
- 4 I think it can be improved by educating people about the importance of agricultural engineering and make it a more popular subject amongst students in high school.
- 5 Through agricultural extension services.
- 6 It needs to be promoted on a national level to high school children. Varsity students should also be involved in promoting it because they can relate to scholars as young people.
- 7 By mutualising/linking the agricultural engineering dept with industries (agricultural). For their design, research, and referral purposes.
- 8 By creating forum for AE recognition, that is by carrying out practicals and creating awareness in the public and scholarships.
- 9 One is to improve and promote agriculture in our schools, from primary, secondary to Tertiary institutions, government investing in agricultural resources.
- 10 Dissemination of information to students who are yet to get admission about the course and letting them see the value and importance of agriculture to humans and the world at large.
- 11 By the government supporting agriculture and making open agricultural sector to invest and new technological advancement.
- 12 People see Agricultural Engineering as an inferior course compared to Mechanical Engineering, Electrical Engineering and the rest. There should be awareness created on the importance of Agricultural Engineering to the economy.
- 13 Through public lectures on the nitty-gritty of agricultural engineering.
- 14 Through the use of home made goods.
- 15 Public understanding could be improved by integrating social aspect because engineer should be part and parcel of social change.
- 16 To have more universities offer agricultural engineering.
- 17 There should be more articles about this field in newspapers and it should also be offered at more universities.
- 18 Agricultural policies should be made to improve agricultural practices in Nigeria. Poor policy implementation has been the bane of Agricultural development in Nigeria.
- 19 It could be improved by high payment of salary to agricultural engineers. This will enable the youths and teens in school look forward to being an Agricultural Engineer hence, making them curious to want to Know more about Agricultural Engineering.
- 20 Awareness programmes (Ads, campaigns etc).
- 21 Not being called farmers or the use of the word agricultural.
- 22 First change the term “agricultural engineering” and make more information available.
- 23 Having national and international bodies or associations bringing agricultural engineers together.
- 24 Through education and rebranding.
- 25 This may be done when agricultural engineers gain relevant and decent paying jobs specifically requiring agricultural engineers. (Job Security).
- 26 Very poor. Mechanised agriculture should be encouraged and many adverts on prospects should be made available online.
- 27 Educating the public on the importance/role of agricultural engineering in the 21st century.
- 28 By changing the name.
- 29 There is no public education for the other engineering courses but then they are soaring. This is because they have large markets for employment and also recognised industry. I believe we should rather work hard as agricultural engineers and create an industry of our own. That way the public has to research into it.
- 30 Consultation of various industries dealing with agricultural machinery and equipment and the agro-industrial corporations that are coming up in each country in Africa and a suitable programme develop to suit their needs. Establishment of employment cadres at the government level as well as with the industries. Establishing a centre for a agricultural machinery technology in all countries in Africa even at local levels. Setting up industrial training institutes for agricultural engineers, with proper coordination and cooperation of all facilities effected throughout the country in the complete development of agricultural engineering fields. Proper orientation of agricultural engineering graduates to practical agriculture in all areas of agricultural engineering fields.

- 31 By teaching the community publicly on what agricultural engineering really means.
- 32 Through setting up seminars to the general public & visiting high schools to let them know about Agricultural Engineering.
- 33 By redefining the word Agriculture not to mean only food, tractors but other sectors like water, renewable energy.
- 34 Communities should be educated on the key roles played by agricultural engineers in developing agriculture and transforming our continent.
- 35 Very many people think that agricultural engineering is all about managing tractors and so most of the engineers in this field are not recognised. This can be improved by increasing[ly] explaining the work done by agricultural engineers through media.
- 36 By setting up a body that unites agricultural engineers in the country. Also, by encouraging the implementation of an agricultural engineering post for each district and by so doing this will improve on the publicity of the course and its relevance. Also through frequent seminars both at district and school level.

of African agri-food systems. Among these, mechanisation ranked highest (Figure 41.8): mechanisation > biofuel > irrigation and drainage > postharvest handling and processing > conservation agriculture > environmental management. The ranking of mechanisation as the top priority impact area (Figure 41.8) also corresponds to the emergence of agricultural machinery management as the top priority among the desired skills and competencies (Figure 41.5) that would enable them to meet the expectations of future workplaces.

Very low levels of mechanisation in African agri-food systems, symptomised by very limited use of mechanical power and associated implements, improved machinery, in combination with other productivity-enhancing technologies such as irrigation and improved inputs, has contributed to the long-term low productivity of agri-food systems in Africa. By putting mechanisation as the top of the key priority areas for agricultural engineering in Africa, the students have aligned with and corroborated one of the critical challenges facing African agri-food systems. There is a plethora of literature which demonstrates the critical and foundational role of agricultural mechanisation as an effective push-pull factor for widespread rural transformation and agricultural modernisation (Opara, 2023a, 2023b, 2023c, in this book).

A synthesis of agricultural mechanisation approaches in China, including policy, resourcing, and the organisational changes and socio-economic consequences (Hau, 1979), showed positive widespread impacts towards the present-day economic development of the country. These included an improved image of modern farm workers often depicted as “rural folk heroes” and “the impact of rural industries and agricultural mechanisation in creating a ‘new type of peasant who is competent in mechanised, scientific farming and in industrial production’”. Furthermore, as mechanisation proceeded, the high disparity in income between rural and urban areas diminished, and at the same time, “the interactions between the two areas” increased. To achieve this, and starting

Priority Impact Areas for Agricultural Engineering in Transforming and Modernising Agri-food Systems in Africa

Using a list of six (6) topical and priority areas contributing to sustainable agricultural intensification and industrialisation of African rural economies, students were asked to select three (3) priority areas where agricultural engineering could contribute towards the successful transformation and modernisation

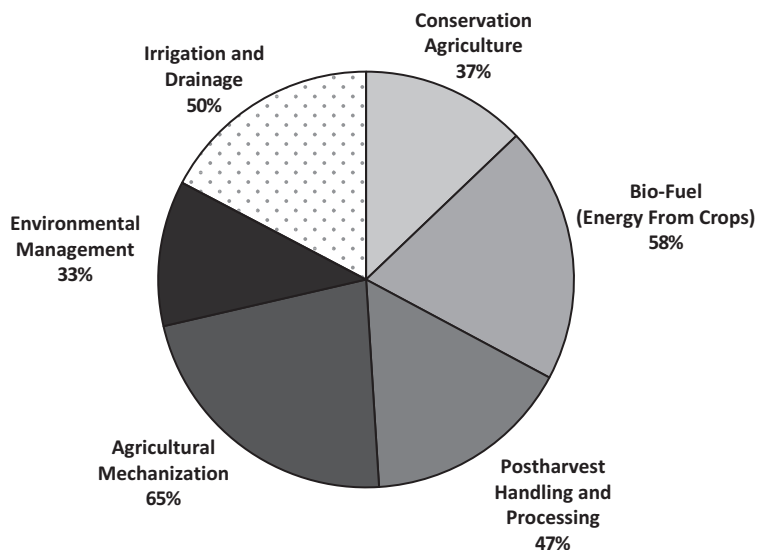


FIGURE 41.8 Priority impact areas where “agricultural engineering” could contribute towards successful agri-food systems transformation and modernisation for sustainable development in Africa.

in the 1950s and 1960s, China pursued a technology strategy that is peculiar to its socio-cultural and political economy, which necessitated “the initiation of indigenous technological advancement – addressing itself to the production and adaptation of mechanical techniques to meet the needs of agriculture and local industry” (Matthews, 1987). Similarly, China also pursued what is often referred to as a “gradualistic” approach to economic development push with a “dualistic character”, which promoted the advancement of agricultural mechanisation as a key element. In his much-acclaimed presentation on “The Ten Great Relationships” in 1956, the Chinese leader Mao described this dualistic character of development as: “taking agriculture as the foundation and industry as the leading sector” (Singh, 1979). Many would point to a strong link between China’s present-day economic stardom to these visionary insights and actions. Again, as Mao aptly put it, “the fundamental way out for agriculture lies in mechanisation” (Hau, 1979).

Studies elsewhere have also shown that combining agricultural mechanisation with the right public policy can bring long-term benefits that increase both individual and social welfare (Martin & Johnson, 1978; Anazodo et al., 1989). While we recognise that mechanisation alone is not the panacea to the socio-economic and development challenges facing Africa, we boldly argue that it is a necessary condition for the radical transformation, modernisation, and industrialisation of Africa’s agri-food systems into a global powerhouse for accelerated rural development. Through its benefits in reducing drudgery, achieving timeliness of operations along the value chain, and increasing factor productivity and total production, success in sustainable agricultural mechanisation will also enable Africa to transform and modernise the rural areas, and play its long-awaited role in contributing to a sustainable, competitive, secure, resilient, and equitable global food system.

The African Union has recognised this need and called for the banishing of the hand-hoe to the museum (Opara, 2012; Opara, 2023d, in this book; Fomunyam & Opara, 2023, in this book). The Food and Agriculture Organisation (FAO) of the United States has long been promoting agricultural mechanisation as a key input for sub-Saharan African smallholders (Sims et al., 2016), and subsequently, the FAO and the African Union Commission (AUC) have partnered to provide a framework for sustainable mechanisation of agriculture in Africa (FAO & AUC, 2018). To achieve these goals for agricultural mechanisation in Africa, and indeed elsewhere, the role of agricultural engineering education is important (Kienzle et al., 2023, in this book). Similarly, the AUC, through Agenda 2063 – The Africa We Want, has stated that “Africa’s agriculture will be modern and productive, using science, technology, innovation and indigenous knowledge. The hand-hoe will be banished by 2025 and the sector will be modern, profitable and attractive to the continent’s youths and women” (AUC, 2014). The African Development Bank (AfDB) has identified “Massively Increase Productivity” with “Agricultural Mechanisation” as a key component as one of the seven (7) enabling actions in fulfilling agricultural transformation in Africa (AfDB, 2017).

In additional comments provided to this section by some of the students, the following issues were listed as areas for potential impact by agricultural engineering: food security,

waste management, water, energy, and livestock (breeding, animal tourism, and avoiding poaching).

Additional Comments to Grow and Improve the Future of Agricultural Engineering in Africa

To allow each student to reflect on the objective of this study, the last part of the questionnaire asked for final brief comments with specific actional points to grow agricultural engineering and improve the future in Africa. A total of 116 distinct responses were recorded (Appendix A). Following a detailed review of each comment, those that are similar or seek to achieve the same objective were clustered together, and this yielded the following key results (the percentage in bold represents the proportion to the total comments recorded):

- Enhance the practical (skills) component of teaching and learning – teaching and experimental labs/facilities, fieldwork, vacation work, internships (42.24%); More exposure to the industrial sector (“real world”) (6.90%). **49.14%**
- Improve public image and understanding of agricultural engineering and its roles in society – including potential students; Fresh students need enlightenment and an improved understanding of the discipline and what to expect during the course. **23.28%**
- Bear on governments to prioritise agricultural engineering in economic development – including favourable policies. **5.17%**
- Establish and promote academic exchange programmes and international collaboration with the best universities over the world to increase cohesiveness.
- Change the name of the discipline/programme.
- More bursaries/scholarships to support students.

In addition, several students offered some unique insights – often expressing their sentiments and frustrations about their local situations, others focusing on the matters applicable to others (such as mentorship, lecturers that inspire, and standardisation of curricula), while some encapsulate several points into one and thereby provide a more nuanced response:

- “The public is very ignorant about Ag Eng and just assumes it has to do with just farming and thus don’t bother to educate themselves about it. My friends often ask me if I’m going to buy a farm after my studies and the youngsters find it to be an ‘unglamorous’ profession (since they perceive it to be farming), especially those from urban areas. I therefore think that, in addition to vigorous marketing, the name should be changed”.
- “Hosting agricultural engineering seminars for African students so they can interact with other successful engineers in the field of study”.
- “We rule the world, so we need more labs and workshops, the ones we have are not functional, and we

should be given a large area of land for our field activities. Thank you”.

- “Agricultural engineers should establish themselves so that people in the outside world will be attracted to it. Lecturers should be inspiring people”.
- “The agricultural engineering discipline should have a standard curriculum. Agricultural Engineering should be understood as being different from Agricultural and biosystems engineering”.
- “Agriculture engineering can allow a student to start his/her agric business”.
- “It is the most underrated Engineering degree, maybe if the sector could try find ways to promote the Degree, Most of us wanna leave this course because it’s unknown to industries mostly and that affect our chances of getting funding from Big companies. Also we struggle to get Vacation work at most, this is due to the little and background of this course. Sector should try at least market our Degree like other Engineering degrees, provide sufficient bursaries for the Agricultural sector. It is very important that we promote this degree as it is future to all the environmental crisis the world is about to face”.
- “Don’t know about Africa as a whole but for Nigeria, we need only prayer”.

Conclusion and Future Prospects

This is the first empirical study to assess student perceptions about growing agricultural engineering and the future prospects in Africa. The study contributes towards achieving the aspirations embodied in the African Union’s Agenda 2063 – The Africa We Want, regarding Aspiration 1 – “A prosperous Africa based on inclusive growth and sustainable development”, where “modern agriculture for increased production, productivity and value addition contribute to farmer and national prosperity and Africa’s collective food security”. Agenda 2063’s call to action also specifically identifies the need to “Catalyse an education and skills revolution and actively promote science, technology, research and innovation, to build knowledge, human resources, capabilities and skills for the African century” (AUC, 2014).

Similarly, agricultural engineering education, research and related technological innovations have an impact on achieving the United Nations Agenda 2030 for sustainable development with regards to Goal 1 (End poverty in all its forms everywhere), Goal 2 (End hunger, achieve food security and improved nutrition and promote sustainable agriculture), Goal 4 (Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all), Goal 8 (Promote sustained, inclusive, and sustainable economic growth, full and productive employment and decent work for all), and Goal 12 (Ensure sustainable consumption and production patterns), among others. Sub-Saharan African economies remain largely rural, with agriculture being a major contributor to the GDP and source of livelihood. However, the agri-food systems in Africa remain the least productive compared with

the rest of the world, and this is to a large extent attributed to the limited applications of modern agribusiness practices and related productivity-increasing technologies across the value chain. Agricultural engineering is central to addressing these challenges, and therefore, Africa needs a steady supply of endogenous skilled workforce, including knowledge workers, to champion the radical transformation and industrialisation of agri-food systems in Africa. However, agricultural engineering and practice in Africa faces many obstacles – some attributable to the nature of the discipline while others are external (socio-economic) forces impacting it. Stakeholder engagements are necessary to find lasting solutions to these problems.

Using a web-based online questionnaire, this preliminary study assesses the attitudes towards agricultural engineering education and the profession among undergraduate students in selected universities in Africa, including the prospects for impact in realising the Africa We Want (and African agriculture in particular). Low public image among the general public, low profile among other disciplines, especially engineering majors, and limited employment opportunities have contributed to low preference for agricultural engineering education among prospective students. A large proportion of students enrolled in the programme did not wish to study it *ab initio*, but took it when they could not enter their first choice. Nevertheless, students identified key priority actions which can help grow agricultural engineering in Africa, including a name change and related curriculum reform, funding opportunities for scholarships and bursaries, the industrialisation of Africa, including African agriculture to provide new employment and business opportunities for graduates, and aggressive and focused campaigns to raise awareness and enhance the image of agricultural engineering targeting the spectrum of stakeholders including secondary schools, first-year undergraduate students, industry, policy makers, and the general public. Agricultural engineering education must also offer more opportunities for practical experiential learning through functioning laboratories (inside and outside the classroom), and relevant industrial work experiences and internship, which expose students to potential employment and business opportunities.

The mechanisation of agri-food systems was identified by the students as the top-ranking priority impact area for agricultural engineering in Africa. With human muscle and the associated rudimentary tools (hand-hoe and cutlass) still being the major sources of power and equipment, respectively, while the African Union and other stakeholders have called for the banishing of the hand-hoe to the museum in the next couple of years (2025), the stage is set and the stakes are high for novel strategies to urgently realise the mechanisation and automation of Africa’s agri-food systems for sustainable and inclusive socio-economic development. While we delay in making the right policy and investment choices to realise these goals, the digitisation of agri-food systems, including the use of mobile networks across the value chain, and the use of drones, robotics, and related site-specific technologies to support precision agriculture, including pest and disease management, are already finding applications around the world and in selected value chains in parts of the continent. Why not? After all, drones are now regular features in many parts of rural Africa for recording events during weddings, funerals,

political rallies, and similar social gatherings, even for taking group photographs during local and international conferences.

With increasing rapid advancements in emerging and not-so-emerging technologies that are relevant to agriculture and food, such as biotechnology, nanotechnology, information and communication technologies, the seemingly ubiquitous and pervasive emergence of artificial intelligence and the related sciences such as data science, machine learning, and deep learning, etc., the future is here for Africa to lead the next agricultural revolution, having missed out on the Green Revolution. Given its low base in modern technology in the agri-food systems, Africa can leapfrog, just as it has done with the information and communication technology area, such as the use of the internet and mobile telephony. At the same time, the world is confronted with climate change and other grand challenges which have wide-ranging negative impacts on agriculture and are also impacted upon by agriculture.

All signals point to the fact that Africa at large, and Africa's agriculture in particular, will be worst affected at the current rate and future climate change predictions. Africa's agri-food systems remain highly vulnerable to external shocks and lack the resilience needed to absorb the shocks and adapt. It is through quality education, especially agricultural and biosystems/biological engineering education and research, that the workforce with the right skills and attitudes can be developed, mentored, and nurtured. This noble cause makes the case to grow and sustain agricultural and biosystems/biological engineering education in Africa.

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Appendix A. Additional final comments to improve the future of agricultural engineering education in Africa.

- 1 Governments through educational institutions should prioritise agricultural engineering in universities as to create a bridge between the industry and the farmers. Also Africa is behind on food processing techniques
- 2 More attention should be given to agricultural engineering because it lies in the faith of our nation
- 3 We need to start informing people about agricultural engineering and what it's all about. Make sure that all our students are well equipped and ready to impact Africa this can be done by educating students on what needs to be done, show students areas that current engineers are struggling with so that we may know what is expected of us in the future.
- 4 Tell the future generation what is agricultural engineering and its importance to the environment. Because very few people know about this career by so doing we will have more people doing agricultural engineering and more ideas we will get.
- 5 Agricultural Engineers should be proud of their profession and so be able to reach out to the future generation of potential engineers
- 6 ESTABLISH EXCHANGE PROGRAMS IN THE STUDY
- 7 People offering agricultural engineering must feel proud of the discipline and focus on what need to be done. There must be more practical approach to studies in the field than the theory aspect. Also people with brilliant ideas on this discipline must be given support financially to undertake researches.
- 8 Public enlightenment on its advantages and benefits. Also awareness campaign.
- 9 The public is very ignorant about Ag Eng and just assume it has to do with just farming and thus don't bother to educate themselves about it. My friends often ask me if I'm going to buy a farm after my studies and the youngsters find it to be an "unglamorous" profession (since they perceive it to be farming), especially those from urban areas. I therefore think that, in addition to vigorous marketing, the name should be changed.
- 10 I think students need career guidance when studying agricultural engineering because most of them have a negative perception about agricultural engineering.
- 11 Mmmmmmm...I will say that the government should look into agriculture properly...
- 12 I wanted to see in future, best and hard working agricultural engineering students to enhance improve the above survey.
- 13 The general public must be educated on what Agricultural Engineering is about.
- 14 More emphasis should be put on enhancing the public understanding of Agricultural Engineering.
- 15 I believe there must more practical stuff for the students.
- 16 Government should place emphasis on agricultural engineering.
- 17 Practicals should be emphasised more.
- 18 We rule the world, so we need more lab and workshops, the ones we have are not functional, and we should be given a large area of land for our field activities. Thank you.
- 19 Hosting agricultural engineering seminars for African students so they can interact with other successful engineers in the field of study
- 20 Practical aspect of the course should be encouraged
- 21 Our duties as an Engineer is to provide food everybody.
- 22 Provision of machines and good tools in Agriculture Engineering farms and schools.
- 23 We (agricultural engineers) should be united and focus in our quest to archive a healthy agricultural goods and products
- 24 It should be rather practical than theoretical. And a big part of the program should be spent on industrial training. I feel the 30 weeks are not enough
- 25 Agricultural engineers should establish themselves so that people in the outside world will be attracted to it. Lecturers should be inspiring people
- 26 Empower the young innovators
- 27 Agriculture is the key and basic sector of any African country's economy especially Nigeria.
- 28 Publicity, in the sense that agricultural engineers should be able to involve the youths in agriculture
- 29 Africa...should be the world best continent for arable land...and different species of animals...we have lots of youths out there stuck in crossroads of what to study in the university...if top governmental organisation and NGOs can team up...to create Positive awareness about Agricultural Engineering...we will have optimistic youths all over seeking to study...2: Those already studying should be provided with practical experiences, they should have a medium to express their inner thoughts on ways of improving the sector.
- 30 Agricultural engineering education in Africa should be 60% practical and 40% theoretical.
- 31 Practical aspect of the course should also be made compulsory.

- 32 I believe with the help of Agricultural engineering and its branches, erosional problems caused by water can be solved. For instance, Edo state and Anambra state are the most erosion affected states in Nigeria thereby reducing agricultural activities and land in states that are known to be highly agriculturally productive in Nigeria...with the help of soil and water conservationist this can be reduced.
- 33 If government invest and put interest into agricultural sector, it will help generate huge income and engineering aspect of it can play a big role.
- 34 taking the student on an excursion so as to appreciate the course more better.
- 35 I so much believe that the world needs us so much (Agricultural Engineering). We make the green
- 36 Agricultural Engineering Education in Africa needs to improve more in practical and Equipments
- 37 There should be a proper education on what Agric and bio resources can offer so to enlighten our youth
- 38 It could be improved in so many but I like to point out that the facilities used for teaching are very poor compared to those of other departments.
- 39 Creating awareness.
- 40 I think Agricultural Engineering Education should be more practical as well as theoretical
- 41 Let Agricultural Engineering be like other Engineering profession, by creating job opportunities for student and exposing student to field beyond Agriculture both in design of machinery that can save human labour. THANK YOU
- 42 Don't know about Africa as a whole but for Nigeria, we need only prayer.
- 43 Without reliable energy services, farmers and agribusinesses in developing countries are less able to increase food production and engage in value-added processing. New technologies, such as solar food dryers and solar water irrigation, allow farmers living off-grid to replace expensive diesel generators with cheaper and cleaner technologies. This segment of the energy access market is still in the early stages of development but much progress is being made in our work with companies that offer modern energy solutions to boost productivity and economic growth.
- 44 AGRICULTURAL ENGINEERS UPON GRADUATION SHOULD BE PROVIDED WITH IMEDIATE JOB OPPORTUNITY INTO INTERESTING AGRICULTURAL FIRMS SINCE THE
- 45 NUMBER OF ASPIRANTS IS USUALLY LOW. THIS WILL MAKE MORE PEOPLE TO ENROLL IN THE PROGRAMME. More should be expected from the graduates of the programme, this will make the student focus more on their studies to improve their abilities. THANKS FOR GIVING ME THIS OPPRTUNITY TO COMMENT. GREATER FUTURE FOR AGRICULTURAL ENGINEERING.
- 46 There should be change within the education system such that it encourages practical work in the agricultural engineering fields
- 47 agricultural engineering should be made more of practical, to enable us student know more about the application. THANKS
- 48 Let us think of innovations that apply in our different countries in Africa to feel the tangible success of agricultural engineering to our societies
- 49 Special seminars to enlighten secondary school students on the importance of agricultural engineering...
- 50 Let lecturers be well informed and less borrowing of courses
- 51 We need innovative minds
- 52 The agricultural engineering discipline should have a standard curriculum. Agricultural Engineering should be understood as being different from Agricultural and biosystems engineering.
- 53 Creating awareness and making people know the importance of Agricultural Engineering. This is so because in my country Nigeria many people believe that agriculture is very tedious and stressful. That is why at the mention of Agriculture many people will lose interest in it not knowing what it entails. In my suggestion, if mechanisation of agriculture will be improved more to reduce human labour and also using mechatronics in agriculture.
- 54 Thank you for this survey. Please I'd suggest you change the name to something more attractive like: Biomechanical engineering. Please read this very important comment which is about agricultural engineering also known as biomechanical engineering. [<http://typesofengineeringdegrees.org/agricultural-engineering-degree/>]
- 55 Did the same in India, they call Bachelor of Technology in Agricultural Engineering. Even if it is Bsc.Agricultural Engineering. (The practical oriented course are what important to make the aim of the course successful).
- 56 The policies, government frameworks are not conducive for agricultural engineering education this is the area that should start for future improvement
- 57 In the attempt to improve the future Agricultural Engineering education in Africa, I would recommend that the course agricultural engineering should be divided according to field of interest; agricultural mechanisation, soil and water resources engineering, Post harvest/Processing engineering, Biosystems engineering, etc.
- 58 Our curriculum is too theoretical, it would be of great help if heads of education systems make it more practical in Ghana for us... Thank you
- 59 Please let it be more practical because we still dont know anything. All we can do is solve math questions and memorise stuff
- 60 Agriculture engineering can allow a student to start his/her agric business
- 61 Many vocational work for agric students
- 62 There should be more bursaries for this study program. it seems like most companies they don't have enough knowledge about this whole course.
- 63 Students of agricultural engineering need to be exposed to bigger companies during their study period.

- 62 I would like if there could be at least more companies that offer scholarships and bursaries for agricultural engineering student because, there are literally few, like a hand full. e.g SAPPJ is an agricultural company but it offers bursaries for other engineering faculties except agricultural engineering, ironic.
- 63 Improving industrial training of agric engineering students Infrastructural development of Agricultural engineering facilities in tertiary institutions
- 64 Educating rural farmers on agricultural mechanisation and equipping the educated ones with the machinery.
- 65 For improvement, more years should be added to learning Agricultural Engineering ie it should be made a professional course. If a year or maximum two is added, students will have ample time in learning both practically and theoretically all there is to Agricultural Engineering.
- 66 Giving enough information of what is exactly Agricultural Engineering
- 67 we need to have one campus not howard and pmb please
- 68 Agricultural engineering is not popular, only a few knows about agricultural engineering in Secondary schools. I think we can try advertise more we can have more engineers in future.
- 69 Mechanisation of agricultural processes and production would increase the percentage of interest of the youth in the field and would also boost the attractiveness of agriculture generally as a course of study.
- 70 It is the most underrated Engineering degree, maybe if the sector could try find ways to promote the Degree, Most of us wanna leave this course because it's unknown to industries mostly and that affect our chances of getting funding from Big companies. Also we struggle to get Vacation work at most, this is due to the little and background of this course. Sector should try at least market our Degree like other Engineering degrees, provide sufficient bursaries for the Agricultural sector. It is very important that we promote this degree as it is future to all the environmental crisis the world is about to face.
- 71 Agricultural engineering is a lucrative discipline of study and impacts a lot in those partaking in the study. It increases their opportunities and possible achievements.
- 72 This strand of engineering is a little bit of everything and it becomes a concern for the working world
- 73 We need to spread the word of Agricultural Engineering.
- 74 there should be more practicals courses involved in the individual courses done from year one to year four especially in the universities.
- 75 Collaborations between the best universities over the world to increase cohesiveness. The intake of students at Bachelors' level should be more than be doubled.
- 76 UKZN needs to restructure the program and make its situated on one campus
- 77 Provide sponsor from previous disadvantages rural areas student
- 78 it should be more practical oriented.
- 79 Pls d program shd be more practical
- 80 It should be made public to the villages on how to make a quick study into agric engineering by teaching the unknown people who just apply the knowledge of engineering in agric any how while it can be corrected to generate a conservative income from losses and mismanagement or resources and land.
- 81 Public education should be done to educate the public on the importance of agricultural engineering.
- 82 Please should work on the issue of public awareness of the profession. Most People don't understand what the profession is all about.
- 83 the course should involve more practical aspect and research.
- 84 More companies are to be set up because agricultural engineers compete with mechanical engineers
- 85 Mentoring and encouraging more people to have interest in agricultural engineering
- 86 More industrial training and workshop for agricultural engineers to enlighten us on both current and advanced procedures required by industrial and commercial bodies.
- 87 I think more attention from our leaders is needed. more work and resources is the most important things. this will help produce more training to we students.
- 88 I think a name change will do
- 89 The students from day one should be coached to love the course. More agricultural engineering firms are needed out there to boost interest. Various achievements within the sector should be show cased for the world to see
- 90 Posting graduates to jobs after completion of the program into various agricultural companies
- 91 Planning and putting in place measures to conserve, preserve and save specific areas for agricultural work
- 92 I think it should more of practical work than the abstract we learn all the time. We should understand and practice what is being taught in class
- 93 Agriculture in itself must be given maximum attention by the state so that new systems that could be implemented to help the various sectors through Agricultural Engineering will be rightly supported and thereby implemented
- 94 Names of the program should be changed to change people concept about the program
- 95 specialisation should be introduced at the undergraduate level

96 There should be more investments in the study of agricultural engineering to make it attractive and appealing to students. Students should be made to obtain opportunities after study.
 97 Investments!!!
 98 More practicals and field tours
 99 Increase on the number of practical lessons taught while still in universities
 100 More research should be carried out in the field of agriculture.
 101 The program has to be funded and supported with research facilities.
 102 African should take the disciplines of Agricultural Engineering as a way to modernised and sustainable agriculture. Major focus should be laid on it, through practising extensive training and education activities to producing practical agricultural engineers engaged in agricultural engineering fields. Network and cooperation carried out among the industries, government and institutions in producing agricultural engineering in the 21st Century. More research and technologies should be developed in the agricultural sector for agricultural engineering application. Opening up wide field of jobs for agricultural engineering so that many people can see the good works of agricultural engineers.
 103 agricultural engineering should be intergrated with mechanical engineering to make one course
 104 The programme should focus more on practical skills atleast 60% hands on
 105 Governments in Africa should give first priority to agricultural engineers since most countries rely entirely on Agriculture, they should incorporate them most in processing activities since we are the future as we can do all around engineering.
 106 The course should be give students much more hands on experience and practicals during the four years of study other than theory.
 107 For the few months i have so far been looking for employment in my profession, i have really come to understand that most people (including potential employers) are not aware of agricultural engineering and do not understand what we can really do. So they end us devaluing us and the whole profession thinking that we can only drive farm tractors. So I think we should first promote our course through advertisements so that people can start recognising our value. Thanks for the survey. I pray that you achieve your goal. Regards.
 108 Agricultural Engineering students should be sensitised properly on what the course is all about and what they can expect after successfully finishing the programme. I personally was a victim. I didn't know how great the course was until it second year and this affected my performance.
 109 Implore students to like the course as soon as possible because this course could be a core player in this century given the immense challenges we are facing so the earlier students get to realise this, the better.
 110 Devote more work on practicals. There should also be exchange programmes between universities offering Agricultural engineering
 111 Agricultural engineering should be given the first priority on resource allocation because it can improve lives of very many people within a short period of time. most countries in Africa have got good fertile soils but lack the technology and knowledge of how to fully utilise land.
 112 We ought to inform the youth of African about the value that Agricultural engineering plays in the society. I would suggest independent Agricultural engineering workshops that are aimed at exposing all the fields of this profession to the young generation so as to enable them fully understand the necessity of the course. Thank you.
 113 Yes. The government should employ an Agricultural Engineer at every district level
 114 Student awareness about Agricultural Engineering and its role in society should be done in the earlier stages of education
 115 Availability of academic resources and funding since currently the teaching done is so theoretical due 2 limited funds.
 116 I think more effort should be put on practical skills rather than theory. Most students graduate and go out in the field and find it so hard to put into practice what was learnt in the classroom.