

Transforming Higher Agricultural Education for Sustainable Food Systems in Egypt: Insights from an Erasmus+ Project

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Summary of the key messages

The following policy recommendations can help moving government and society in Egypt towards a transformation in the higher agricultural education (HAE) system to advance food system sustainability:

1. HAE institutions in Egypt should develop better strategic alignment to the national strategic priorities for agricultural development, and strengthen linkages with stakeholders, employers, and the productive sectors in order to make the expected contribution to national agricultural innovation systems.
2. HAE institutions should consider setting up innovative mechanisms for monitoring the job market and adapting their curricula in response to changing employment opportunities and technological advances. In connection with this, there is a need for increasing work practice programmes and career training by offering trainings or internships to students to gain more skills and experience for the future job market.
3. HAE institutions need to move away from a mere transfer of information to the development of students' skills in accessing and applying available information for solving sustainability issues within the food system. Therefore, system thinking and interdisciplinary approaches towards HAE are needed to consider the entire food system and treat dimensions of food system sustainability as an "indivisible whole".
4. HAE programmes and curricula should be designed in ways that provide students with knowledge in different fields and from across disciplines in relation to food system sustainability, since transformation towards a more sustainable food system in practice requires integrated knowledge and understanding of science, economics, the environment and social values. Especially, HAE institutions must incorporate the concepts of sustainability and social responsibility into all HAE programmes and curricula in order to root the ideas and values of sustainable agriculture into students.
5. A transition towards sustainability in the food system requires HAE institutions to have a cadre of educators with a new mindset and the relevant knowledge and pedagogic skills to provide students with up-to-date scientific knowledge and practical skills that increase their technical expertise and ability to apply knowledge in practice and adopt new and creative solutions to food system challenges.
6. Egyptian HAE institutions need to open themselves up towards international sources of knowledge and strengthen their partnerships and collaborations with international universities. Developing such partnerships can help Egyptian HAE institutions promote access to quality academic

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programmes, strengthen inter-regional, inter-cultural exchange and collaboration to create and reconfigure human capital and provide more capacity for research and teaching.

7. Making these shifts in policy stance operational requires reformed institutional frameworks, high-level political commitment and an inclusive vision of a sustainable food system. More flexible HAE policies and practices through modifying institutional governance structures for greater institutional flexibility and increased responsiveness to stakeholders are crucial.

Context

Even though a substantial progress in recent decades has been achieved in reducing both poverty and malnutrition in the Middle East and North Africa (MENA) region, food systems in the region, as they are today, fail to deliver the affordable, diverse, safe and healthy foods to meet the region's food security and nutrition needs (FAO et al., 2020). Recent estimates show that the MENA region is home to 20% of the world's acutely food insecure people and over 55 million of the population is undernourished (World Bank, 2021). Egypt is no exception, where the food system is facing a mixture of socioeconomic and environmental challenges that collectively make feeding the ever-growing population an unachievable goal (Perez et al., 2021). In particular, climate change, natural-resource scarcity, rapid population growth, urbanization and demographic changes, and dependency on food imports are worryingly, posing significant sustainability threats to the country's food system and increasing its vulnerability to socioeconomic shocks and natural disasters (Abu Hatab et al., 2020). Furthermore, the outbreak of the coronavirus disease-2019 (COVID-19) pandemic in 2019 had resulted in unprecedented stresses on food supply chains, created profound challenges for farm labor and production, processing, transport, and logistics as well as major shifts in demand and consumption, and put food chains under the risk of disruption (Abu Hatab et al., 2020; Abu Hatab et al., 2021).

Agriculture sector

Agriculture is a key sector in the Egyptian economy, contributing 11.3% to gross domestic product, providing livelihoods for 57% of the population, and directly employing about 28% of the labor force (MALR, 2020; World Bank, 2022).

Around 90% of the total territory is arid desert, and the food system relies on as few as 3.6% of the land that is usable for agriculture to feed the country's 102 million inhabitants (World Bank, 2022).

Egyptian agriculture relies on irrigation, as the rainfall does not exceed 60mm in the Nile delta, and agriculture is the largest consumer (about 80%) of the total water supply.

Egypt relies heavily on food imports to meet 45% of the domestic food demand of the population (CAPMAS, 2017). It is one of the most-at-risk countries regarding the effects of climate change, while low-lying areas in the Nile Delta and coast, where around 40% of Egypt's agricultural production takes place, are susceptible to sea-level rise (Badreldin et al., 2019).

Poverty & Food security

Poverty is widespread in Egypt, while around 60% of the population is either poor or vulnerable, the national poverty rate grew from around 19.6% in 2004 to around 30% in 2019 (IndexMundi, 2019; World Bank, 2022).

Gini index, which measures inequality in distribution of per capita consumption, was 31.5 in 2017-18 (World Bank, 2021)

Egypt scored 12.5 on the global hunger index in 2021, and was ranked 56 of 116 countries (GHI, 2022), and nearly 28% of the population was moderately or severely food insecure in the period 2018-2020 (FAOSTAT, 2022).

The percentage of wasting, stunting, severe underweight, and overweight among children under 5 years of age is 9.5%, 22.3%, 1.3%, and 15.7%, respectively (World Bank, 2022).

Tertiary education

Government expenditure on all levels of education including tertiary education represents around 11% of government expenditure, and about 4% of the gross domestic product (World Bank, 2021)

Gross enrolment ratio for tertiary education for both sexes is 39%, including about 40% of females and 39% of males (UNESCO, Institute for Statistics, 2022)

In 2019, the number of enrolled students in tertiary education in Egypt was estimated at 3.3 million.

In 2019, 604 thousand students graduated from tertiary education programmes, of which 71% graduated from public universities and the remaining 29% from private universities and higher institutes (CAPMAS, 2020).

In 2019, 200 thousand students were enrolled in postgraduate education in Egyptian universities, consisting of 53.4 % in postgraduate diploma programmes, 34.4 % in Master programmes, and 12.2 % in Ph.D. programmes.

Fueled by these burgeoning socioeconomic and environmental changes and their subsequent food security challenges, Egypt has witnessed rapid uncontrolled migratory movements, both internally and internationally, during the past few

decades (Herrera and Badr, 2012), adding another major challenge to food system sustainability. Although the push and pull factors of migration in Egypt are varied and multifaceted, it is undoubtedly that the “food system” performance is part of this picture (Black et al., 2011). Especially since the last decade, major migratory flows within and from Egypt have been prompted by the disruption of the food system, because of inadequate food and agricultural policies as well as the abovementioned socioeconomic and environmental changes. From a literature perspective, the food system and migration can be directly interlinked, when people do not see other viable options than migration to escape poverty and hunger. The linkages between the food system and migration can also be indirect, when people utilize migration as a strategy to cope with food insecurity risks and livelihood uncertainties (Abu Hatab et al., 2018). In light of these complex interdependencies between the food system and the ambitions of the Sustainable Development Goals, particularly those related to food security (e.g. SDG1 and SDG2) and migration (SDG 10), the urgent need for transforming the Egyptian food system towards a more resilient and sustainable one has gained increasing relevance to research and policy. That is, it increasingly recognized that achieving food and nutrition security and making migratory movements more sustainable would chiefly depend on Egypt’s ability to build a resilient food system that is more productive, more efficient in using inputs, less variable in its outputs, less damaging to the environment, and more resilient to risks and shocks.

To facilitate a transition to a more sustainable food system, there is an urgent need for Egypt to transform its current higher agricultural education (HAE) system to empower educators and subsequently learners with the knowledge, skills, values and behaviors that are required for this transition. For many decades, the training of human resources in agriculture has not been a high priority in the educational and agricultural

development strategies of Egypt. As a result, the poor training of agricultural engineers and extension officers has always been identified as part of the challenge to transform the Egyptian food system to address food security and other sustainable development issues. Specifically, curricula and teaching programmes of HAE institutions have become particularly irrelevant to the needs of the food system actors and unable to keep up with the increasingly sophisticated labor demands of the private sector. In this respect, HAE educators in particular remain key actors in facilitating learners' transition to change makers of sustainable agriculture by helping them understand the complex challenges and choices that sustainable agricultural development requires and motivating them to transform society. Therefore, building capacity of HAE educators through creating new innovative curricula and adapting teaching practices and learning processes to provide the appropriate knowledge to students is crucial to improve productivity and efficiency of food production and enhance the sustainability of the Egyptian food system.

In response to the imperativeness of reforming the HAE system in Egypt for food system transformation, the co-funded Erasmus+ Project "Steering Migration through Sustainable Development: Euro-Egyptian Program for Agriculture and Rural Development" (DeVilag) aims to support the Egyptian rural community with qualified graduates and university expertise to improve agricultural productivity, enable more sustainable food production, enhance farmers' income and their living conditions to prevent migration to cities or beyond (Read more about DeVilag here: <https://www.devilag.eu/>). In the framework of DeVilag, a programme for building capacity of the teaching staff at Egyptian universities was co-developed and implemented by the Swedish University of Agricultural Sciences in Uppsala, Sweden, along with members of the DeVilag consortium to

strengthen the capacities of Egyptian universities to address the needs of smallholder farmers and stakeholders through the training of high quality teachers who can ensure that graduates have the skills and know-how to meet labor market needs and to address various challenges facing agricultural production and food systems. In the long-run, DeVilag interventions are envisaged to contribute to enhancing the resilience of the food system in Egypt, enhance farmers' income and improve their living conditions, which subsequently would reduce unsustainable forms of rural out-migration and irregular international migration.

In this policy brief, we summarize our findings from investigating the major challenges facing HAE institutions in Egypt and assessing the knowledge gaps and training needs of the teaching staff of these institutions. Based on that, we briefly present our key conclusions and highlight some important policy implications to transform the HAE system in Egypt and build a more sustainable food system.

Approach

The theory of change (ToC) of DeVilag hypothesizes that building capacity of Egyptian universities' teachers, by equipping them with the knowledge and tools to address different dimensions of sustainable agriculture and rural development, will enable them to produce well-qualified graduates who can enable furthered sustainable food production under the increasing uncertainty of socioeconomic and environmental challenges. In the long-run, sustainable rural- and agricultural development will not only function as a counteractive mechanism to these challenges but will also provide opportunities for livelihoods and employment that could prevent unsustainable migratory flows from rural to urban areas. To accomplish DeVilag's long-run goal (impact), the project consisted of a set of interrelated work packages.

First, the project team identified the main push factors for migration from Egypt's rural communities and related them to labor market needs within these communities. The second work package of DeVilag focused on modifying and re-orientating existing post-and undergraduate curricula taught in Egyptian universities to supply the agricultural labor market with a highly qualified workforce possessing adequate professional knowledge and practical skills i.e. knowledge and understanding of the sustainability aspects of agriculture, practical training in the field, organic and sustainable pest protection methods, byproducts management, marketing of agricultural products along with soft skills like communication and teaching skills that is ready to take on the challenges faced by the Egyptian agricultural and food sectors. The third work package was devoted to establishing DeVilag Service Offices at the partner universities in Egypt to provide extension services and technical support to farmers and stakeholders. These offices also present a rich source of up-to-date information on the dynamics of the Egyptian food system and the emerging issues and challenges faced by stakeholders.

The outputs from the preceding work packages were then used to assess the knowledge gaps and training needs i.e. sustainable resource use and management, agribusiness, management and entrepreneurship, sustainable agricultural systems, pedagogic skills and soft skills along with technical and analytical tools (e.g. GIS, statistical analysis and green building software) of the teaching staff of Egyptian universities (The American University in Cairo, Fayoum University and the Heliopolis University for Sustainable Development). These subsequently guide the design and implementation of a comprehensive training programme to build their capacity in teaching the modified and newly introduced courses that address various sustainability issues facing the Egyptian agricultural and food sector

from economic, environmental and social dimensions.

From a methodological perspective, the implementation of DeVilag work packages was based on using a participatory bottom-up approach in conjunction with qualitative and quantitative methods. Specifically, the results presented in this policy brief are based on:

- i) a comprehensive review of the literature on the challenges facing the food system and the HAE system in Egypt
- ii) an in-depth survey with a representative sample of the teaching staff working at the DeVilag partner universities in Egypt (Fayoum University, Heliopolis University for Sustainable Development, Cairo University, and The American University in Cairo) using semi-structured questionnaire, to identify the training needs of university teachers
- iii) a series of focus group discussions with stakeholders to identify the major challenges they face in relation to the farming and other agribusiness activities and to assess their perception of the desired HAE graduates' profile

Results and teachings

This section presents key challenges identified based on our assessment of knowledge gaps and training needs of the teaching staff at HAE institutions in Egypt, as well as the key lessons learned from the implementation of the DeVilag capacity building program. It should be highlighted that more findings and more implications were obtained from DeVilag and subsequently much work is required beyond that which is outlined in this policy brief.

- **HAE and emerging paradigms in sustainability and system thinking:** our results showed that existing curricula at HAE institutions in Egypt are too often narrowly focused on agricultural production techniques but

do not establish a bigger socioeconomic and environmental picture of the food system, which is relevant for future strategic decision-making in the agribusiness. More specifically, we found that existing curricula of HAE institutions tend to focus more on the “food value chain” than broadly on the “food system”. In most cases, HAE educators focus their teachings on topics and questions relevant to food production and food chain actors who participate in the coordinated production and value-adding activities. However, the “food system” concept is a much bigger concept that encompasses all the elements (e.g. environment, people, inputs, processes, infrastructures, institutions, etc.) and activities that relate to the production, processing, distribution, preparation and consumption of food, and the outcomes of these activities – namely nutrition and health status, socio-economic growth, and equity and environmental sustainability (HLPE, 2017). This means that a food system constitutes multiple activities as well as its associated actors, including those who are directly involved in the food chain and those forming the enabling environment in which the food chain exists. Among the key manifestations of sustainable food systems is the emergence of new inter-linkages between agriculture and society, which requires systemic approaches that recognize the interrelationships between various components of the food system and the way these components interact in various spatial, agronomic, and socioeconomic contexts. Accordingly, such misconceptions about the food system by HAE educators do not help students gain deep understanding of the complex range of factors at work in the

food system, including those affecting agricultural production, price transmission through the chain, and demand for healthier or more nutritious foods.

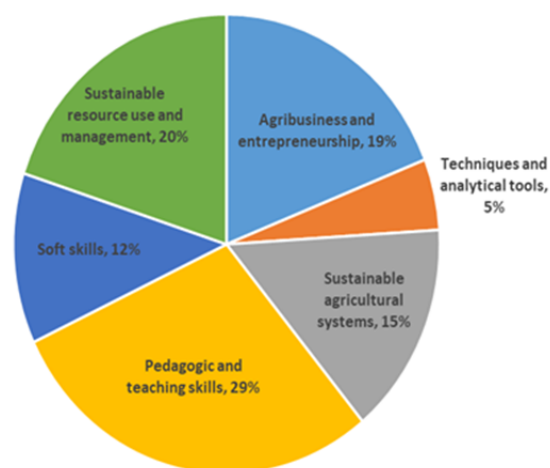


Figure 1. Thematic clusters of the training needs of the surveyed staff of Egyptian universities
Source: DeVilag WP4 report 4.1 & 4.2

▪ **Multi- and interdisciplinary approaches for addressing sustainability issues in the food system:** our results revealed a widespread acceptance among HAE educators of why the integration of the economic, social and environmental dimensions is key to achieving sustainable food systems. However, the learning content in many courses address the three dimensions of food system sustainability independently from each other, and does not address trade-offs and synergies among goals and targets related to these dimensions and how to better align and realize the synergies that move them forward simultaneously. Articulating these interlinkages in HAE programmes and treating dimensions of food system sustainability as an “indivisible whole”

can enable students to establish links between resources and impacts associated with the use of resources from various sub-sectors or locations of production throughout the supply chain to the consumers of food commodities. In connection with this issue, our results showed also that educators in HAE institutions in Egypt are often reluctant to teach topics that do not correlate with their own discipline or are not directly related to their areas of expertise. As discussed above, one of the challenges of addressing sustainability issues in Egypt is their multifaceted nature, as they involve social, cultural, political and economic aspects. Therefore, HAE programmes that aim to achieve sustainable food systems should unceasingly quest to find innovative ways of teaching about these multifaceted and critical issues to students by shifting from "stand-alone" to "cross cutting" interdisciplinary approaches, which often require that many different disciplines must cooperate. Concrete policy interventions should be implemented to encourage multi- and interdisciplinary teaching and research activities on sustainable food systems among Egyptian scholars by providing new incentives, such as increased research funding, new facilities and payments for teaching activities that combine multi- and interdisciplinary approaches to sustainable agriculture.

- **Teaching methods in HAE institutions:** In spite of the efforts made in recent years to modernize and digitalize higher education in Egypt, teaching methods at HAE in particular are overwhelmingly traditional in their heavy use of classroom lectures, which are rarely updated and falling behind in new

knowledge. Generally, curricula at most of HAE institutions are teacher-centered with little active collaboration between educators and their students and between students themselves. Students depend largely on their teachers and completely stick to the textbooks with very little emphasis being placed on group problem solving methods or peer-to-peer learning. Although the majority of HAE educators recognize that practical training exposes students to actual problems of the food system and connects classroom teaching with the real world, the results showed that practical instruction receives insufficient emphasis and work placements are limited. Students have little opportunity to develop technical competencies, problem-solving experience, or communication and organizational skills. Indeed, many of the deficiencies in the teaching methods at HAE institutions are a result of the widely deficient learning infrastructure due to insufficient budgets and overdependence on public financing.

- **Relevance enhancement of HAE programmes:** HAE programmes focus on theories that are not necessarily relevant or related to real-world problems. That is, current curricula are theory-oriented and focus mainly on specific technical knowledge that will quickly become obsolete. Therefore, HAE supply is often mismatching labor market demands in terms of knowledge and practical competencies, especially agribusiness, basic management, and problem solving. Improving the

employability of HAE graduates requires more balanced curricula that focus on technical knowledge, as well as on abilities of students to think and solve problems that are relevant to societal needs and on skills that are transferable to a wide range of occupations. To reorient HAE programmes to labor market needs, HAE institutions need to develop ways of keeping in touch with the stakeholders and employers in the food system. Specifically, HAE should develop and maintain mechanisms for observing labor market dynamics and continuously adapting their education programmes. For example, HAE institutions could set up committees to study and analyze the trends in the agricultural employment market and identify related training needs. In addition, involving potential employers and agribusiness firms in the curriculum development process can make it possible to ensure that HAE will result in gainful employment for graduates. In connection with this, our knowledge gap assessment showed that the majority of HAE educators (around 88%) perceive their teaching skills in general as very good. However, the level of their satisfaction about their teaching skills decreased when they were asked specifically about their perception of their pedagogic skills and preparedness. In particular, our survey results highlighted that improving the pedagogic skills of HAE educators is indispensable to complement subject-specific knowledge and effectively build capacity of the educators. Examples of these pedagogic skills include

interactive learning and teaching strategies, effective course design, the use of instructional materials, and assessing learning outcomes.

- **Links between HAE institutions and national and international institutions: HAE institutions in Egypt need to focus on building and strengthening their networks across national, institutional and disciplinary boundaries to enhance the relevance of their outputs**

and play the roles envisioned for them within the framework of agricultural innovation systems. Likewise, another great handicap for Egyptian HAE institutions is their remoteness from global sources of knowledge and scientific literature and international agricultural networks and think tanks due to their weak and poorly developed external institutional linkages. This disconnect inhibits the ability of academic programs to prepare students for the labor market due to their lack of knowledge of the most recent findings and methods in their areas of specialization.

- **Transcending bureaucratic rules and regulations of HAE institutions:**

A common refrain echoed by the surveyed educators was the bureaucratic rules and regulations of HAE institutions that largely hamper the process of reforming and transforming the education programmes towards focusing on food system sustainability. For instance, several educators indicated that there are HAE leaders and administrators who are satisfied with the business-as-usual models of education and teaching and are not interested in implementing reforms

in the way agriculture and other related subjects are taught. Therefore, knowledge and understanding of the need for and importance of sustainable farming and food systems, as well as successful examples and models to showcase how to integrate sustainability in teaching and research at HAE are needed to help university leaders implement and achieve the desired transformation to sustainable agriculture in higher education. Another important challenge is relevant methods to convert these policies into action and assess their impact have been absent at many universities, in spite of the several reform initiatives that have been developed by respective government institutions in recent years to reform the agricultural sectors and HAE in Egypt, such as the [Sustainable Agricultural Development Strategy](#) towards 2030, and other initiatives aiming to upgrading higher education, scientific research and innovation. Governance of HAE institutions is generally centralized at the national level, which means that decision making and approval authority remain with the central government.

Centralized governance tends to slow decisions, limit flexibility, distort incentives, and stifle initiatives. At the HAE level, it is appropriate to provide greater autonomy to institutions and install governing councils that include representatives of all stakeholders, especially end-users (e.g., agricultural businesses, research institutions, and extension organizations).

Implications and recommendations

Egypt faces many multifaceted environmental and socioeconomic challenges that raise major concerns for food system sustainability. To guide and facilitate an agricultural transformation process, structural reforms in the HAE system are required to produce a workforce that has capacity to build and strengthen the resilience and enhance the sustainability of the Egyptian food system. To accomplish this, several hurdles will need to be holistically addressed and overcome.

First, HAE should establish meaningful institutional linkages with national stakeholder organizations, through knowledge networks, public-private partnerships, alumni clubs, exchange with professional associations, and partnerships with national and multinational companies. These institutional linkages can help HAE institutions develop strategic alignment to national agricultural development priorities, achieve their expected contribution to national agricultural innovation systems, and meet the evolving needs of agrifood labor markets. In connection with this, consulting stakeholders, particularly private sector employers, on program definition and conducting periodic employer surveys and tracer studies can help HAE institutions assess the effectiveness of their programs and link curricula to the market for graduates.

Second, HAE curricula need modernization and reorientation to adopt more systemic and inclusive approaches embracing and encompassing the entire components of the food system and to treat the social, economic and environmental dimensions of food system sustainability from an interconnected perspective. In this regard, the development of HAE programmes needs to be more participatory, involving not primarily HAE experts but also those who can articulate demands, i.e., producer organizations, NGOs, private sector employers, researchers, and extensionists. This

can also help HAE institutions offer more practical training opportunities to students in association with stakeholder organizations since technical know-how and the capacity to apply that knowledge in practice comes first for employers.

Third, HAE institutions should build and strengthen networks and partnerships with universities from the rest of the world. Egyptian HAE institutions would benefit from opening up with respect to information sharing, scientific discussions, and exchange programs for students, visiting scholars, and international academic networks in enhancing the quality of their academic programmes and in providing more capacity for research and teaching.

Fourth, for HAE institutions to instill a new mindset, new course content, and new pedagogy, it is necessary to train teachers on how to do it and to make educational resources available to assist them. To accomplish this, a greater autonomy would enable HAE institutions to raise resources and find their markets. In addition, better accountability mechanisms need to be introduced simultaneously with greater autonomy, including transparent processes for decisions and clear systems for financial accounting and audits.

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