



The Egyptian Cabinet  
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**IDSC**  
**Policy Perspective**



**Egypt and Fifth Industrial Revolution:  
Specialized Universities as Pathway to  
Achieving Comprehensive  
Development Goals**



**Prof. Dr. Alaa Abdel-Hafiz Mohamed**

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## **IDSC Policy Perspective**

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## IDSC's Commentary

Amid the accelerating global transformations shaping the world today, the Fifth Industrial Revolution marks a pivotal shift in the course of human advancement, not only in terms of technology but also in terms of its foundational philosophy. While the Fourth Industrial Revolution focused on digitization, artificial intelligence, and the Internet of Things, the Fifth Industrial Revolution restored the centrality of the human being as the nucleus of development. It seeks to strike a balance between technological advancement and human aspirations by simultaneously employing technology to serve humans, society, and the environment.

Within this evolving framework, specialized universities emerge as a key pillar in supporting nations' efforts to adapt to the requirements of the Fifth Industrial Revolution. Traditional educational systems alone can no longer meet the evolving demands of the labor market, nor can they adequately prepare graduates with future-oriented skills that integrate technology, innovation, emotional intelligence, and social leadership. Accordingly, establishing and developing specialized universities in critical fields such as artificial intelligence, data science, biotechnology, renewable energy, and the green economy have become an essential priority.

Recognizing the importance of adapting to the Fifth Industrial Revolution, Egypt has taken steady steps toward building an integrated educational system aligned with the goals of Egypt's Vision 2030, which prioritizes sustainable development and human capital. Expanding technological and specialized universities, aligning educational outcomes with the labor market's needs, and improving scientific research infrastructure are effective pathways to comprehensive development.

Based on the above, this issue of the "Policy Perspective", published by the Cabinet's Information and Decision Support Center (IDSC), seeks to examine Egypt's strategic orientation to establishing specialized universities as a key entry point to achieve sustainable development and keep pace with the Fifth Industrial Revolution. It defines the specialized universities and clarifies their objectives and importance in creating future job opportunities for youth. Furthermore, it reviews the development of such institutions within the National Strategy for Higher Education and Scientific Research framework, focusing on technological universities as a model for Egypt's specialized higher education.

# **Egypt and Fifth Industrial Revolution: Specialized Universities as Pathway to Achieving Comprehensive Development Goals**

## **Prof. Dr. Alaa Abdel-Hafiz Mohamed**

Professor of Political Science and Dean of Faculty of Commerce, Assiut University.



## **Introduction**

Within the framework of Egypt's Vision 2030, the Minister of Higher Education has announced a strategic orientation toward establishing a new generation of specialized universities. This attitude is intended to bolster the comprehensive development goals and respond to the imperatives of the Fifth Industrial Revolution, an era defined by the convergence of human-centered values and technological advancement. It reflects the Egyptian government's acknowledgment of the pivotal role that universities play in realizing sustainable development by formulating cutting-edge academic programs that foster integration with industry, designing curricula attuned to labor market demands, and delivering multifaceted support to the communities within each university's geographic sphere.

The State's move to establish specialized universities constitutes a significant milestone in implementing the National Strategy for Higher Education and Scientific Research (2023–2030). The Ministry of Higher Education's vision aligns with Egypt's comprehensive national development plan 2030, which aims at achieving a comprehensive vision for Egypt across

various development sectors. It draws mainly upon the studies of Egypt's comprehensive development plan and aligns closely with the Sustainable Development Goals (SDGs) and the various dimensions of economic growth. The aim is to amplify the role of the Ministry's institutions in driving development across economic, social, urban, and environmental domains by identifying the Sustainable Development Goals, the concepts of 4<sup>th</sup> generation universities, and Egypt's economic activities, ultimately advancing the realization of Egypt's Vision 2030.

### **First: The Concept of Specialized Universities within the National Strategy for Higher Education and Scientific Research Framework**

The National Strategy for Higher Education and Scientific Research (2023–2030) has paid considerable attention to activating the role of universities and higher education institutions in serving society and their surrounding environments. This attitude is to be realized by keeping pace with advancements that strengthen the contribution of Egyptian universities to sustainable development. With their significant influence and vital societal role, universities act as true drivers of progress and engines of comprehensive development. This vision is reflected in the strategy's seven pillars: integration, interdisciplinarity, connectivity, active engagement, sustainability, international alignment, and entrepreneurship and innovation<sup>1</sup>.

Furthermore, The Ministry of Higher Education has developed a comprehensive reference framework for higher education in Egypt in response to the pressing need for unified standards and quality assurance according to the latest global trends. This framework constitutes a strategic roadmap for advancing higher education amid rapid economic and technological shifts. It underscores the imperative of restructuring curricula and academic programs in accordance with labor market requirements, with a focus on student-centered learning, interactive and constructive pedagogy, and the promotion of lifelong learning principles<sup>2</sup>.

The framework mentioned above provides academic institutions with a clear and coherent vision to ensure the quality of educational outcomes and enhance the competitiveness of graduates nationally and internationally. It is designed to conform to established quality and accreditation benchmarks while remaining sufficiently flexible to accommodate institutional diversity and excellence, reflecting each university's material and human capacities. The framework is fundamentally grounded in the guiding principles of the National Strategy for Higher Education and Scientific Research.

Below is a summary of these principles, how the higher education reference framework aligns with each, and how specialized universities contribute to their realization<sup>3</sup>:

### 1. **Integration:**

This principle refers to the merging of the higher education system with the country's productive sectors, aiming to bridge the gap between academic programs and the real needs of each region in Egypt based on its unique economic activities. The framework supports the principle of integration by emphasizing both theoretical and practical dimensions in university curricula. It links knowledge and skills across disciplines to promote a comprehensive and integrated understanding and enhances interaction between various subjects. This includes integration across different fields of study, academic content, theoretical knowledge, practical application, and engagement with the business sector.

## 2. **Interdisciplinarity:**

This principle addresses complex societal challenges by developing university and higher institute programs based on grouping faculties into homogeneous sectors. The philosophy of the reference framework aligns with the principle of interdisciplinarity by drawing on the contributions of interdisciplinary studies to develop comprehensive academic programs. These programs help students acquire diverse skills, enhance their readiness to meet the demands of the modern labor market, expand their opportunities to gain varied competencies, apply knowledge effectively, and foster innovation and creativity.

## 3. **Connectivity:**

It emphasizes the dynamic interaction between universities, the industrial sector, and governmental bodies, particularly in aligning educational outputs with labor market needs and advancing technological innovation. It also underscores the importance of international academic cooperation across global scientific communities. The COVID-19 pandemic catalyzed the adoption of distance learning, significantly enhancing students' access to global technological resources and enabling rural students in Egypt to use tablets for the first time. The philosophy of this framework is deeply rooted in the value of connectivity, recognizing it as a foundational pillar for redesigning university programs. It fosters multidimensional connectivity—internally and externally—by integrating national, regional, and international components. This multidirectional engagement enhances the quality of education, broadens employment prospects for graduates, and generates economic benefits.

#### **4. Active Engagement:**

This principle is founded on the involvement of university hospitals in delivering services to citizens and local communities, as well as the proactive engagement of universities in dialogue with domestic and international stakeholders to cultivate a progressive and adaptive educational environment. The alignment of the framework's philosophy with the principle of "active engagement" strengthens collaboration among higher education institutions and between them and various professional sectors. Active engagement plays a pivotal role in co-creating and continuously enhancing academic programs, drawing on the collaborative efforts of faculty members, students, industry partners, experts, and supporters. This inclusive approach ensures the alignment of academic programs with the diverse needs of society and improves the quality and relevance of graduates in the labor market.

#### **5. Sustainability:**

Sustainability is pursued through making efficient use of available resources and minimizing waste. It is realized across the Ministry of Higher Education and universities by integrating the three dimensions of sustainable development: economic, social, and environmental. The alignment with the principle of sustainability is realized through the pursuit of long-term viability for university programs by integrating environmental, social, and economic dimensions. This is supported by effective partnerships with work sectors and society, the promotion of research and innovation, the strengthening of community engagement, and responsiveness to ongoing technological transformations. Furthermore, the framework emphasizes the advancement of inclusivity and accessibility in education, alongside integrating the humanities into academic curricula, to foster ethical awareness and a sense of personal responsibility toward pressing human issues.

## 6. **International Alignment:**

Higher education institutions are envisioned to become globally oriented, allowing Egyptian students to move easily across borders and benefit from scientific advancements in foreign universities. The framework's philosophy supports curriculum design based on concepts such as globalization, internationalization, fostering international cooperation, and understanding diverse cultures. The aim is to attract international students and prepare students for the global business environment.

## 7. **Entrepreneurship and Innovation:**

This principle emphasizes that innovation must be supported by appropriate regulations, legislation, and policies that encourage creativity and reward success. It also requires the provision of human and material resources to support innovations. The framework underscores the vital role of technology, research, and innovation in enhancing educational experiences, ensuring accessibility, and aligning institutions with the demands of the digital age. Hence, it becomes imperative to prioritize research and innovation, recognizing them as essential pillars for ensuring the continuity of any educational institution.

## **Second: Definition of Specialized Universities**

Specialized universities are higher education institutions designed to foster robust and strategic linkages with the industrial community. They contribute significantly to addressing the Fifth Industrial Revolution's imperatives and fulfilling national demands for highly qualified professionals in advanced and niche disciplines aligned with the dynamics of the labor market<sup>4</sup>. In contrast to comprehensive universities that offer a wide spectrum of academic programs, specialized universities concentrate on a specific domain or a cluster of interrelated disciplines. These institutions are structured to provide targeted and adaptive education that reflects the evolving demands of the labor market. Notable international models include German technical universities.

The defining characteristics of specialized universities lie in their focus on a specific discipline or a cluster of closely related fields and their provision of flexible academic programs responsive to the dynamic demands of the labor market. These institutions support interdisciplinary research aimed at addressing real-world challenges through integrated approaches across diverse fields. They equip students to adapt to rapidly evolving work environments shaped by emerging artificial intelligence and robotics technologies. Moreover, they offer sector-specific training opportunities, establish research and production partnerships with the private sector, enhance students' cognitive and social competencies, and prepare them for future-oriented careers related to multidisciplinary fields and green jobs.

### **Third: Objectives of Specialized Universities**

Specialized universities seek to contribute to fulfilling the requirements of the Fifth Industrial Revolution by developing human skills, providing project-based learning, promoting principles of the circular economy and sustainability, fostering interdisciplinary research, driving innovation and business acceleration, and encouraging innovation and business accelerators, aligning with priorities set by industry partners, and focusing on areas such as artificial intelligence, robotics, the Internet of Things, cloud computing, multidisciplinary fields, and green jobs.

Moreover, specialized universities actively build strong and close ties with industry and all relevant stakeholders, enhancing role integration and supporting development goals. They encourage advanced interdisciplinary research that addresses contemporary challenges, and prepare students for more diverse and competitive job opportunities by offering academically specialized programs and flexible curricula that respond to labor market changes.

## Fourth: The Role of Specialized Universities in Creating Job Opportunities and Future Careers

The Future of Jobs Report 2025, issued by the World Economic Forum, highlighted the technological trends driving business transformation and the requirements of university programs. They include artificial intelligence, big data, networks and cybersecurity, creative and analytical thinking, talent management and environmental responsibility, leadership and social impact, adaptability and resilience, curiosity, and lifelong learning<sup>5</sup> Meeting these requirements calls for a fundamental shift in graduate qualifications, curriculum philosophy and specializations, teaching and assessment methods, the nature of industry partnerships, and the role of applied scientific research.

The report underscores that technology will be the primary force shaping the future of employment, with rapid advances in artificial intelligence and information processing accelerating digital access. This shift is expected to redefine workforce dynamics, elevating the importance of three core skill areas—AI-driven data analytics, networks and cybersecurity, and technological literacy —as foundational competencies<sup>6</sup>.

In light of this, it becomes evident that specialized universities, through their targeted emphasis on equipping students with skills aligned to labor market demands, are well-positioned to prepare students to compete effectively for new and emerging job opportunities after graduation.



## **Fifth: The Ministry of Higher Education's Vision for the Anticipated Outcomes of Establishing Technological Universities**

Minister of Higher Education Dr. Ayman Ashour affirmed that the initial phase of establishing specialized universities will play a pivotal role in responding to the imperatives of the Fifth Industrial Revolution. This will be accomplished by cultivating robust linkages with the industrial community and all relevant stakeholders, enhancing role integration, and contributing to attaining development goals. These universities will implement flexible academic curricula and offer advanced, specialized disciplines, ensuring the graduation of highly qualified professionals aligned with the evolving needs of the labor market. Furthermore, they encourage cutting-edge interdisciplinary research that addresses contemporary challenges while equipping students with access to more diverse and competitive employment opportunities through discipline-focused academic programs<sup>7</sup>.

The empowerment framework encompasses key pillars, such as specialized sectors, industry partners, scientific diplomacy, and a high-quality educational system, achieved through active collaboration among various stakeholders, such as the Ministry of Higher Education, Egyptian universities, relevant ministries, major companies, chambers of commerce, and cultural offices. These entities are responsible for identifying sub-sectors and fields, organizing hands-on training in partnership with industry, supporting applied research, establishing international partnerships in areas of excellence, and designing and implementing specialized programs.

These efforts aim at producing key outcomes in industry and production-related fields, develop advanced skills, achieve international accreditation and mutual recognition, and ensure global quality standards. They also aim at preparing a highly skilled workforce to meet labor market needs and contribute to comprehensive development. This, in turn, is expected to generate significant economic returns, including increased national income, localization of advanced industries, attracting foreign investment, growth in exports, and higher employment rates—thereby supporting efforts to eliminate unemployment.

Technological universities will also implement the National Framework for Work Skills for Development as a central pillar for preparing national talent for future demands. This framework focuses on new job market skills such as advanced digital competencies (including AI and big data), adaptability, self-learning, and creative analytical thinking. It calls for a fundamental shift in university program requirements by transforming graduate attributes into innovative and proficient professionals, adopting flexible and integrated curricula, promoting active and applied learning, and fostering research-industry partnerships. It also emphasizes the integration of cognitive capabilities, social competencies, and technological skills through cooperation with relevant ministries.

### **Sixth: Implementation Policies for the Ministry of Higher Education's Vision and Priority Sectors**

The implementation policies of this vision include dividing some higher education institutions into smaller, more flexible units or merging scattered entities into integrated ones. The priority sectors targeted are among Egypt's top sources of national income, including agriculture, food, mining, energy, technology and software, tourism, services, construction and infrastructure, media and cinema, industry, and transportation.

**In the transport sector,** national projects have significantly increased, creating a greater need for trained and qualified technical personnel. The aim is to enable Egypt to localize technology in transport and logistics, support local manufacturing, and connect transportation with other sectors such as energy and food. This goal will be achieved through specialized technological disciplines, including railway technology, food manufacturing technology, autotronics/mechatronics, new and renewable energy technologies, automotive and tractor technology, electric power distribution networks and systems, water and environmental pollution technology, and petroleum production, processing, and transportation technology.

**In the energy sector,** reliance on traditional energy sources leads to global price fluctuations and environmental sustainability challenges. Therefore, renewable energy sources such as solar and wind energy must be developed. However, this sector faces technical and economic challenges, including the need to train human resources to address energy efficiency issues and improve energy use across different sectors.

**In the agriculture and food sector,** challenges include water scarcity, a lack of qualified personnel in smart agriculture, the need to increase agricultural exports, enhance competitiveness, and respond to population growth and rising demand for healthy food. This sector will also be linked to transportation by integrating academic disciplines such as agriculture, animal production, automotive engineering, road, airport, port, bridge engineering, irrigation and drainage engineering, and water resource management.

Accordingly, implementation policies envision establishing specialized universities in food, energy, and transportation by merging or splitting relevant faculties.

**In the media and cinema sector,** implementing presidential directives to support media is essential, given its major role in shaping public awareness and strengthening Egypt's soft power in the Arab region and Africa. Egypt needs qualified professionals in these key sectors, with modern and precise specializations that meet local, regional, and international labor market demands. Therefore, Egypt's focus on establishing specialized universities in the coming period will center on the above-mentioned fields.

**In the tourism and antiquities sector,** given that tourism is one of the most important sources of national income, there is a continuous need for qualified professionals to enhance the quality of tourism services, increase international competitiveness, and meet labor market demands in hospitality, travel, and tourism destination management. This sector will also be linked with other sectors, such as arts, creativity, and transportation, by integrating academic disciplines like media, cinema, directing, tourism and hospitality, and transportation.

Egypt needs well-trained professionals in these key sectors, with modern and specialized qualifications aligned with the needs of labor markets locally, regionally, and globally. These professionals will help advance the aforementioned sectors, contribute to industrial and production outputs, provide advanced skills, and secure international accreditation, mutual recognition, and global quality standards while ensuring the development of a workforce capable of meeting labor market needs and supporting comprehensive development efforts.

These efforts are expected to yield significant impacts, including increased national income, localization of advanced industries, the attraction of foreign investment, higher export rates, and improved employment levels, all of which will contribute to national efforts to eradicate unemployment.

## Seventh: Technological Universities as a Model of Specialized Universities in Egypt

The State is expanding the establishment of technological universities that leverage advanced technologies to serve society and offer modern academic programs focused on practical skills needed in the labor market. These universities have experienced a notable increase in student enrollment, reflecting a cultural shift in society and growing confidence in technological education as a suitable pathway for employment. The Ministry of Higher Education has announced a list of accredited technological universities in Egypt, which were established under Law No. 72 of 2019 and endorsed by presidential decrees. The study duration at these universities is four years (2+2), whereby students may obtain a professional intermediate diploma after the first two years and directly enter the labor market or choose to pursue the remaining two years to earn a professional bachelor's degree in technology.

Technological universities offer a range of specializations, including information technology, financial institutions management technology, medical equipment technology, tourism technology, electricity transmission and distribution technology, chemical industries technology, food industries technology, ready-made garments technology, among others<sup>8</sup>.

This initiative represents a significant step in creating a new pathway for technical education in Egypt. These universities are considered a natural extension for technical education students, aiming to provide them with scientific and practical skills aligned with the needs of local and international labor markets. The technological programs are implemented through the university's affiliated faculties and are designed based on the requirements of national projects and the geographical scope of each university<sup>9</sup>.

The list includes 12 technological universities: New Cairo Technological University, Delta Technological University, Beni Suef Technological University, New Assiut Technological University, Borg Al Arab Technological University, Thebes Technological University, 6 October Technological University, Samannoud Technological University, East Port Said Technological University, and Misr International Technological University (in Cairo, Faiyum, and Assiut). Another 17 universities are currently under construction, positioning technological universities as a promising pathway to meet labor market demands.

Academic operations have already commenced in the 12 universities mentioned above, which aim at establishing a fully integrated path for applied and technological education and training alongside traditional academic education. Graduates earn degrees in the advanced diploma, bachelor's, and postgraduate studies levels. These universities focus on applying and utilizing technology for societal benefit while preparing graduates from general and technical secondary education to meet the human and technological resource needs required for national socio-economic development plans—ultimately improving the societal perception of this type of education.

Technological universities also aim at providing high-quality technological education and training services that meet global standards, producing graduates capable of competing in local, regional, and international labor markets. They seek to prepare technologists with the capacity for lifelong learning, flexible mobility across sub-disciplines, and re-engagement with formal education following professional experience and applied training. These goals are pursued in accordance with the corresponding levels of the National Qualifications Framework and through establishing strategic partnerships with public and private sector education and training institutions.

Furthermore, technological universities seek to foster collaboration with both sectors to supply specialized technical human resources, offer technical assistance and administrative advice in education and training, and participate in regional and international organizations related to education and training.

Finally, these universities work to offer recommendations on education and training systems, regulations, and policies, propose necessary reforms, provide consultations and technical support to institutions and individuals, and conduct labor market studies to assess and respond to evolving workforce demands.

### **Conclusion:**

This paper explored the concept of establishing specialized universities within the context of the Fifth Industrial Revolution. It clearly defined such universities, outlined their primary objectives, and examined their potential contributions to achieving Egypt's comprehensive development goals. The paper also explained how the idea aligns with the National Strategy for Higher Education and Scientific Research and the guiding framework for higher education, both prepared by the Ministry of Higher Education and Scientific Research. It highlighted the Ministry's vision regarding the expected outcomes of establishing specialized universities and the implementation policies for this vision, focusing on key sectors of the national economy to meet citizens' needs and create future job opportunities.

The paper also showcased a model of specialized universities—technological universities—twelve of which have already commenced operation and demonstrated how these institutions serve society through the application of technology.

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**The Egyptian Cabinet**  
Information and Decision Support Center

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Government District, New Administrative Capital, Egypt

Postal Code: 4829902

PO BOX: 191- R3 District

Telephone: (+202) 20546600-1-2-3-4

Fax: (+202) 20532115

 [www.idsc.gov.eg](http://www.idsc.gov.eg)

 [info@idsc.gov.eg](mailto:info@idsc.gov.eg)

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