The Financing of Higher Education in Egypt: Issues, Politics, and Trends

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Abstract
The Strategic financing decisions of higher education have multifaceted effects on creating a knowledge economy and equitable access, quality, relevance, research and innovation in particular. This paper is based on the data sources and examines financing policies, programs, practices, trends and challenges. Low levels of funding, the inefficiency of the higher education system, inconsistent funding policies, programs and practices, weak financial management system, shadowed equity and access and the rising cost of higher education are traced. The general purpose of this work is to examine the existing funding system of higher education in Egypt and provide strategic funding modalities to achieve higher education goals of access, equity, relevance, quality research and innovation. More specifically, its aims are: a) to examine financing policies in higher education, b) To analyze the trends of public financing in higher education in terms of GDP, public budget and the education budget, c) To explore the status of per student allocation in public financing, d) To examine the diversification of source of higher education funding, and e) To identify major challenges associated with higher educational funding. We present suggested strategic funding measures using the operational research approach to achieve higher education goals of equity, access, relevance, quality, innovation and research.

Keywords: Higher Education, Financial Management, Operational Research

Introduction

At the intersection of growth, jobs, and competitiveness lies the critical role of higher education, which has the potential to drive economic transformation. Higher education serves as the pinnacle of the education system, supporting lower levels of education, preparing professionals and skilled labor, and acting as a hub for research. As developing nations expand their basic education systems and transition into the knowledge economy, higher education will play a crucial role, as recognized in the Sustainable Development Goals. It will serve as a hub for the knowledge base and human capital needed to foster and maintain development across various sectors. Specifically, Sustainable Development Goal 4 is committed to "ensuring inclusive and equitable quality education and promoting lifelong learning opportunities for all" (UNGA 2015).

There is a consensus that education plays a crucial role in accelerating economic growth and ensuring an equal sharing of the benefits from this growth (Birdsall and London, 1997; Lant Pritchett, 1996). It is no surprise that the majority of developing nations, such as Egypt, have pledged to offer free education to all their citizens at every educational stage following their independence. The Egyptian government still upholds its commitment to be the primary supporter and financier of education, including higher education, as seen by its ongoing legacy.

Egypt currently faces two main challenges: (i) the returns on investment in education are believed to be low, and (ii) the growing need for higher education is straining the government budget. The benefits of investing in education for economic growth, income distribution, and poverty reduction are limited in Egypt and the MENA region overall. Simultaneously, the increase in the need for advanced education is being driven by shifts in population, advancements in technology, and a more competitive job market amidst limited financial resources (World Bank, 2017; World Bank, 2022). In the previous research conducted by (Afifi and Ewiss, 2023; Zaki Ewiss, 2023), we explored the various influences that impacted the educational systems, academic offerings, and organizational frameworks of Egyptian higher education uniquely. The restructuring of the public education system aimed to generate financial resources independently due to decreased government funding; this led to the formation of a new educational model distinct from traditional public universities, making it challenging to categorize its characteristics as either a state-affiliated system or one executing state human development policies.

Nevertheless, evaluating the current condition of the Egyptian education system requires considering the standards that regulate its educational approach in the context of the information age. There is a consensus that in the third millennium, the higher education system is marked by various standards and criteria for assessing its services to society. These standards include knowledge production, accessibility, fairness, coherence, sustainability, and credibility in the knowledge age of the third millennium. The following are some key previous criteria: 1) quality and standing out from competitors, 2) Despite increasing interest in the standard validated by the Egyptian Constitution, 3) Entry to advanced education and 4) fair chances to deliver its offerings. The fourth goal of the Sustainable Development Goals in its second goal emphasizes controversy and significance in the Egyptian case. Indeed, the necessity of education nowadays should be viewed from multiple perspectives. Expanding availability without excessive tuition fees can help achieve social justice in education and equal opportunities, while higher enrollment rates in higher education align with international standards, human rights, and education for all initiatives. Ultimately, improving rates of

access aligns with the necessity to develop acquired human capital for cognitive abilities and mental skills, which are essential in the knowledge era, the rise of advanced technology, and contemporary labor markets.

In order to address the future financial needs of higher education, Egypt must explore different funding options. Contributing to the discussion of how to ensure equitable access to quality education for those unable to afford it is crucial.

This study seeks to evaluate the adequacy, efficiency, and equity of public spending on higher education in Egypt. A new EDUMOD-Egypt model (Zaki Ewiss, 2018) ends by proposing different approaches to address the issue of funding higher education in Egypt, taking into account demographic shifts, the need for high-quality education, and the shift towards private education.

Funding higher education in Egypt requires a combination of government support, involvement from the private sector, assistance from international organizations, and financial contributions from students. This addresses the increasing need for advanced education in the country, driven by a youthful population and the requirement for a more proficient labor force. The points below highlight the main elements and difficulties in funding higher education in Egypt.

Government Funding

The Egyptian government's funding of higher education is essential for public universities and technical institutes. Public funds are necessary to fund operational costs, salaries, and infrastructure development. Nevertheless, due to the growing student population and lack of state funding, the government encounters difficulties in upholding education quality and increasing capacity.

Private Sector and International Contributions

1. Private Universities have been established due to the need for higher education and the constraints of public institutions. Many times, these schools have higher fees but provide updated amenities and programs that meet global criteria.
2. International assistance and partnerships: International institutions and overseas governments provide support through grants, scholarships, and cooperative initiatives. Collaborating with international universities also contributes to improving the standard of education and research in Egyptian institutions.

Student Contributions

Tuition fees provide the main financial support for universities and colleges. Public universities in Egypt generally have lower fees than private universities. Nonetheless, these expenses can still pose a challenge for numerous families, prompting the need for financial assistance programs.

Financial Aid and Scholarships

Different financial aid programs and scholarships are accessible to assist students from disadvantaged financial backgrounds. The government, private universities, and international

organizations provide these. In spite of these initiatives, numerous students continue to face challenges in paying for their higher education.

Challenges

1. Insufficient government funding often restricts the budget allocated for higher education, not meeting the sector's increasing needs. This results in classrooms being overcrowded, facilities being outdated, and resources for research and development being inadequate.
2. Equity and Access: Making sure everyone has fair access to higher education is still difficult. Students from rural and low-income backgrounds frequently encounter substantial obstacles when trying to access high-quality education.
3. Ensuring high levels of education in both public and private institutions is vital for Quality Assurance. Robust quality assurance mechanisms are necessary to guarantee that all institutions adhere to the necessary educational standards.
4. Economic limitations: The overall economic difficulties in Egypt, such as inflation and unemployment, also affect the capacity of families to pay for higher education and the government's ability to fund it.

Potential Solutions

1. Collaborations between public universities and the private sector, known as Public-Private Partnerships, can assist in resource mobilization, infrastructure development, and improving educational programs.
2. Exploring new ways to finance higher education, such as income-contingent loans, education bonds, and philanthropic donations, can bring in extra resources.
3. Increasing efficiency in public spending for higher education by minimizing waste and focusing on key areas can optimize the use of available funds.
4. Enhancing Financial Aid: Increasing scholarship options and creating inclusive financial aid packages can lessen the financial strain on students and their families.
5. International collaboration is an important tool for enhancing higher education in Egypt through funding, knowledge sharing, and research opportunities.

Paying for college in Egypt is a complicated matter influenced by a variety of political, economic, and social elements. In this article, we explore the primary concerns, governmental relationships, and developing patterns impacting the funding of post-secondary education in Egypt.

Issues in Financing Higher Education

1. **Insufficient Public Funding:**
    - Budget limitations: Despite the Egyptian government dedicating a considerable amount of its budget to education, the funding often does not meet the requirements to sustain and enhance higher education standards due to the large population and various competing needs.
    - Lack of adequate funding results in overcrowded classrooms, outdated facilities, and insufficient resources for research and development, causing a negative impact on the quality of education.

2. **Equity and Access:**
   - Socioeconomic Inequalities: Students belonging to low-income households and rural regions encounter major obstacles to obtaining higher education, worsening social disparities.
   - Tuition Costs: Even though public universities have cheaper fees compared to private universities, they can still be unaffordable for many families. Private colleges, which provide superior amenities and curricula, have significantly higher tuition costs, thereby restricting entry to students from affluent backgrounds.
3. **Private Sector Involvement:**
   - Market Dynamics: The emergence of private universities has brought market forces into higher education, frequently placing a higher emphasis on profit rather than educational excellence.
   - Regulation is a challenge in private institutions due to different standards and practices, making it hard to guarantee quality and fair access.
4. **Economic Pressures:**
   - Economic instability impacts families' capacity to afford education and the government's ability to boost funding due to inflation and unemployment.
   - Changes in foreign exchange rates affect the expenses of global collaborations, grants, and imported educational resources.

Political Dynamics

1. **Government Policies:**
   - Education Reform: Despite the focus on education reform by successive administrations, consistent policy implementation and long-term planning are frequently hindered by political instability.
   - National Strategies: Egypt's Vision 2030 highlights education as a crucial factor for economic growth, with a focus on enhancing both funding and quality.
2. **International Relations:**
   - Egypt receives assistance and collaborations from foreign countries and educational institutions to enhance domestic financial resources and enhance quality. Nevertheless, these connections are shaped by wider political and diplomatic factors.
   - Foreign universities are being encouraged to set up branches in Egypt, introducing new educational models and more funding while also sparking concerns about regulation and national priorities.
3. **Political Stability:**
   - Policy Continuity: Educational policies and funding can be disturbed by political instability. Consistent support and development of the higher education sector rely heavily on stable governance.
   - Public Opinion: Education is a topic that creates political sensitivity. Public dissatisfaction regarding the quality or accessibility of education has the potential to cause social unrest, which can, in turn, impact political priorities and decisions made by the government.

Emerging Trends

1. **Digital Transformation**:
   - The COVID-19 pandemic sped up the implementation of e-learning and online education platforms. Prioritizing digital infrastructure and training is increasingly important to improve accessibility and flexibility.

- Blended Learning, which involves blending online and in-person classroom learning, is becoming increasingly popular, necessitating investments in technology and innovative teaching approaches.

2. **Public-Private Partnerships (PPPs)**:
   - Collaborations between public universities and private enterprises can be enhanced to fill funding gaps, enhance infrastructure, and match curricula with market demands.
   - Exploring fresh methods of funding, like income-based loans and education bonds, can offer sustainable financial solutions.
3. **Focus on Research and Innovation:**
   - Increasing spending on research and development is crucial for promoting innovation and driving economic growth. Collaborating with businesses and foreign organizations can improve research capacities.
   - Establishing centers of excellence in key fields can draw in funding and talent, leading to progress in crucial areas.
   - Globalization.
   - Internationalization: Egyptian universities are now more focused on obtaining international accreditation and forming partnerships in order to enhance quality and gain global recognition.
   - Encouraging student and faculty exchanges with international institutions boosts educational quality and promotes cross-cultural understanding.

Improving the Financing of Higher Education in Egypt Using an Operational Research Approach

Enhancing the funding of higher education in Egypt through an operational research (OR) method requires using quantitative methods for examining, improving, and executing successful financial plans. This organized approach can improve the sustainability and efficiency of higher education financing by dealing with funding distribution, resource usage, and policy execution complexities. Here is an in-depth overview of how Operations Research can be used to enhance the funding of higher education in Egypt:

Problem Definition

In order to make use of OR effectively, it is crucial to clearly identify the main topics concerning funding for higher education:

1. Poor and ineffective distribution of public funds.
2. Restricted entry to tertiary education for students coming from economically low-income families.
3. In addition to this, we must consider the impact that the new policy will have on our employees. Unequal allocation of resources in public and private institutions.
4. More funding is required for research and infrastructure.
5. Guaranteeing that educational outcomes match the demands of the labor market.

Data Collection and Analysis

Gathering precise and extensive data is the basis of the OR approach. Important information consists of:

- Data on financial support from the government, private investments, and international aid;
- Statistics on enrollment, fees for tuition, and characteristics of students;

- Costs related to running higher education institutions;
- Information on graduation rates, employment results, and faculty credentials.

Information on economic indicators and the requirements of the labor market:

- Economic information regarding government funding, private investments, and international aid;
- Statistics on enrollment, tuition costs, and the composition of students;
- The expenses related to running higher education institutions;
- Information regarding the rates of completing a program, job placements after graduation, and the qualifications of the teaching staff;
- Details on economic indicators and the labor market are needed.

Model Formulation

Different mathematical models can be used to tackle certain funding obstacles:

Resource Allocation Models:

- Linear Programming (LP) involves optimizing the distribution of scarce financial resources to achieve certain goals, like improving graduation rates, increasing research output, or ensuring equal access. Limitations may consist of minimum funding stipulations and budget constraints.
- Multi-Criteria Decision Analysis (MCDA): MCDA is useful for weighing various goals like enhancing quality, boosting accessibility, and maximizing cost-effectiveness.

1. **Simulation Models**:
   - System Dynamics (SD): SD models can replicate the connections among various parts of the higher education system, including funding, enrollment, and results. This contributes to comprehending the enduring effects of financial decisions and policies.
   - Monte Carlo Simulation evaluates how uncertainty and variability in financial projections impact risk assessment and planning.
2. **Forecasting Models**:
   - Time Series Analysis: Predicting future trends in enrollment, funding needs, and economic conditions through time series models aids in strategic planning and budgeting.
3. **Cost-Benefit Analysis (CBA)**:
   - CBA is able to assess the economic effectiveness of various funding approaches by comparing the expenses of education investments with the anticipated advantages in terms of enhanced results and economic expansion.

Solution Implementation

Once the models have been created and verified, the next stage involves putting the solutions into action.

1. **Optimized Funding Allocation:**
   - Utilize linear programming models to allocate government and private funding more efficiently, guaranteeing that institutions obtain sufficient resources to accomplish educational goals effectively.

- Provide extra funding to institutions and programs that show strong effectiveness and efficiency.

2. **Targeted Financial Aid Programs**:
   - Create financial assistance programs based on data that focus on students from less privileged backgrounds, utilizing models to enhance the allocation of scholarships and grants.
   - Introduce income-dependent loan programs to increase accessibility and sustainability of higher education.
3. **Public-Private Partnerships (PPPs)**:
   - Promote public-private partnerships to utilize private-sector funding for improvements in higher education facilities and research.
   - Utilize MCDA to determine and rank zones with the highest potential for private investment impact.
4. **Investment in Digital Transformation**:
   - Allocate money for digital infrastructure and e-learning platforms in order to improve both the accessibility and quality of education.
   - Utilize simulation models for strategizing and executing digital projects, guaranteeing they are both scalable and efficient.

Monitoring and Evaluation

Ongoing monitoring and evaluation are essential to guarantee the effectiveness of solutions that have been put into place.

1. **Key Performance Indicators (KPIs)**:
   - Set up Key Performance Indicators to assess the success of funding plans, such as enhancements in graduation rates, research productivity, and equality in opportunity.
   - Frequently assess and modify funding distributions according to performance data and input from stakeholders.
2. **Feedback Mechanisms:**
   - Establish systems for receiving feedback from students, faculty, and employers in order to maintain the relevance and effectiveness of financial strategies.
   - Utilize OR models to constantly improve and enhance funding strategies using up-to-date data and evolving circumstances.

The strategy is visually schematically represented in Figure 1.

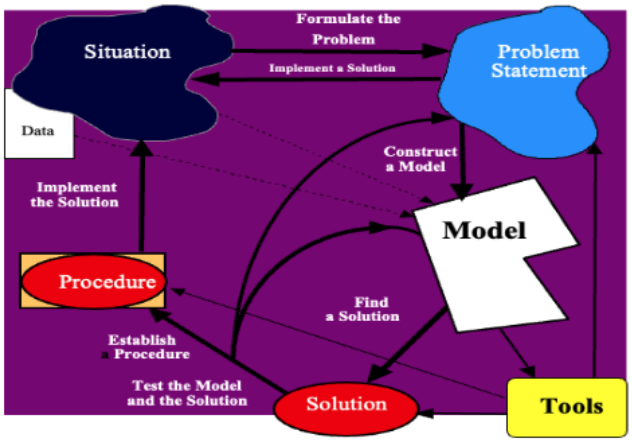

Figure 1: The Operational Research OR Model

Case Study

Egypt's higher education system is comprised of twenty-seven public universities, twenty-seven private universities, twenty semi-private universities, six foreign university branches, and four hundred higher institutes and academies. The public universities offer three hundred education programs at the undergraduate level and another three hundred programs at the postgraduate level, covering various scientific sectors such as medicine, engineering, basic sciences, and social and humanities. Conversely, private universities and other higher institutions and academies offer a more limited range of education programs (5-10 programs) to meet the students' demands. It is worth mentioning that 85% of 3.5 million Egyptian students are enrolled in public Universities, while only 15% of the students are enrolled in private universities and other higher institutions.

In Table 1, the trends in revenues and expenditures for public and private higher education are given.

Table 1: The Trends in Revenues and Expenditures for Public and Private Higher Education Are Given.

The primary source of revenue for public universities	The primary sources of institutional expenditure
1. Tuition fees, 2. Application from a government source 3. Grants and contracts from government source 4. Private gifts, grants, and contracts, 5. Endowment income, 6. Sales and services of educational activities, 7. Auxiliary enterprises, 8. Hospitals	1. Instruction 2. Research 3. Public services 4. Academic support 5. Student services, 6. Institutional support 7. Operation and maintenance, 8. Scholarships and fellowships, 9. Mandatory and non-mandatory transfers, 10. Auxiliary enterprises, 11. Hospitals, 12. Independent operations

Regrettably, the only revenue available stems from restricted sales and a few educational services and activities. This situation leads to deficiencies in crucial expenditures, particularly in providing academic support for students, which encompasses laboratory resources and infrastructure development. Conversely, funding for research initiatives and the organization of conferences and workshops remains constrained.

In this context, Egyptian public universities face significant challenges due to a budget deficit, which adversely affects the efficiency and quality of the continuation of the educational process. This is due to the recognition of education as a costly social service in the National Policy on Education in Egypt, the current underfunding of university education, the impact of poverty and population density, and the need to attract funding, enhance research capacity and output, and address discrepancies between education outputs and career opportunities, as well as issues related to quality and access. Moreover, the budget of the public university is centralized. University presidents make central decisions regarding spending terms without being held accountable or assuming the highest level of

responsibility. Accordingly, the higher education system is bureaucratic, lacks transparency, and has limited access to information.

Figure 2 shows the administration structure of the public university.

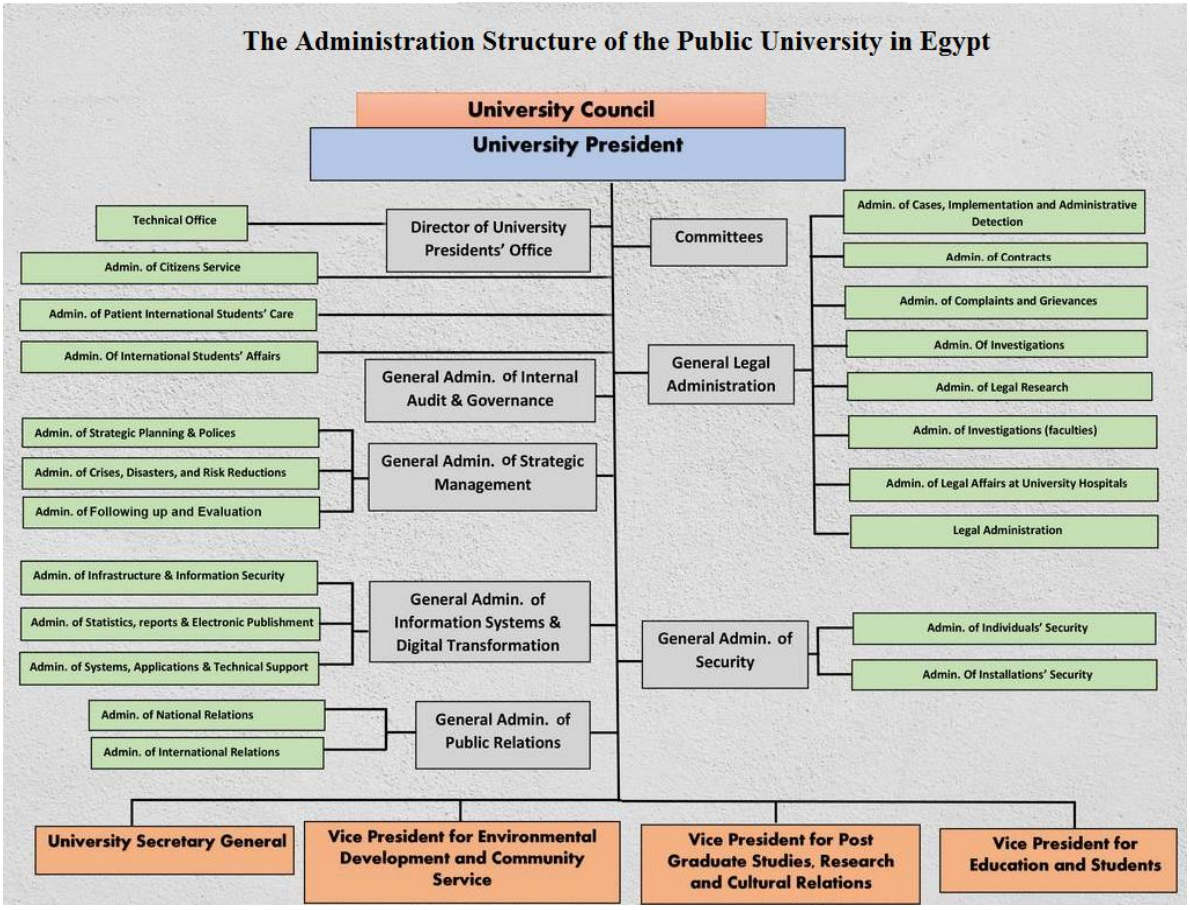

Figure 2: The Administration Structure of the Public University.

Proposed Solution

Operations Research in Higher Educational Budget

EDUMOD – EGYPT Model

The Edumod-Egypt model is described in more detail elsewhere (Zaki Ewiss, 2018). In this framework, ten education pillars are identified. These pillars are identified as follows:

1) Educational Policy
2) Educational Management
3) Educational Economy (Budget)
4) School/University Construction and Equipment
5) Educational Programs Curricula
6) Educational Teaching Methods
7) Teacher responsibilities
8) Educational Human Resources
9) Evaluation
10) Media and Educational Development

Figure 3 shows the tree model for the analysis of each pillar and its domains, including educational activities and processes.

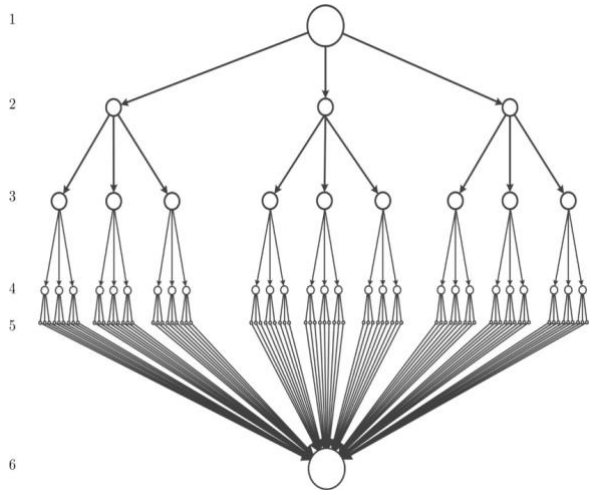

Figure 3: The Tree Model to Identify the Educational Domains, Activities, and Processes

Think about a scenario where OR is used to improve the distribution of government funds among public universities in Egypt:

1. Objective: The aim is to efficiently distribute scarce government funds to enhance educational results and ensure fairness.
2. Gather data on existing funding amounts, student characteristics, operational expenses, and performance measures.
3. Formulate a model to distribute funds through linear programming, taking into account goals like maximizing graduation rates and ensuring fair access. Budget constraints and minimum funding requirements for each institution will be considered.
4. Implement the optimal distribution of funds to universities and continuously monitor performance, making adjustments as necessary.
5. Evaluate the effectiveness of the funding strategy using key performance indicators such as changes in graduation rates and equity in access. Gather feedback to enhance the model and improve results.

In Figure 4 (a-c), the main activities of the higher education budget system are shown.

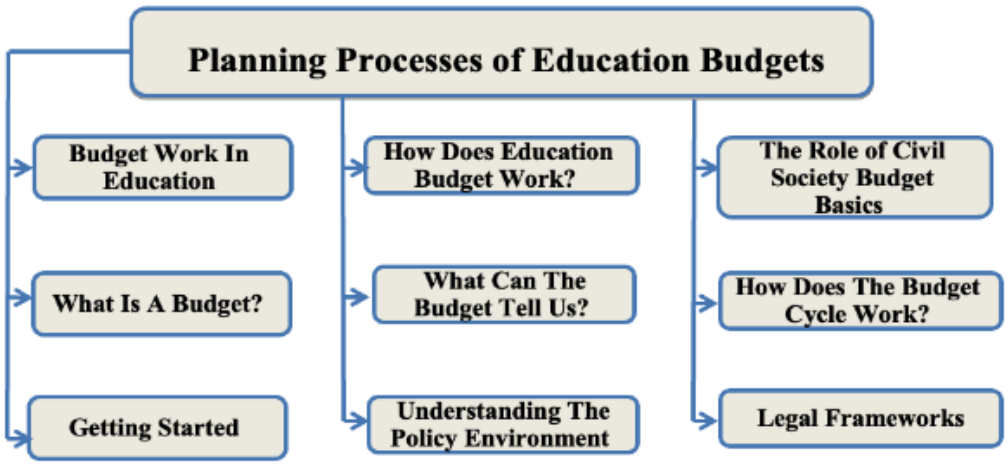

Figure 4a: The Activities of the Planning Processes of the Education Budget

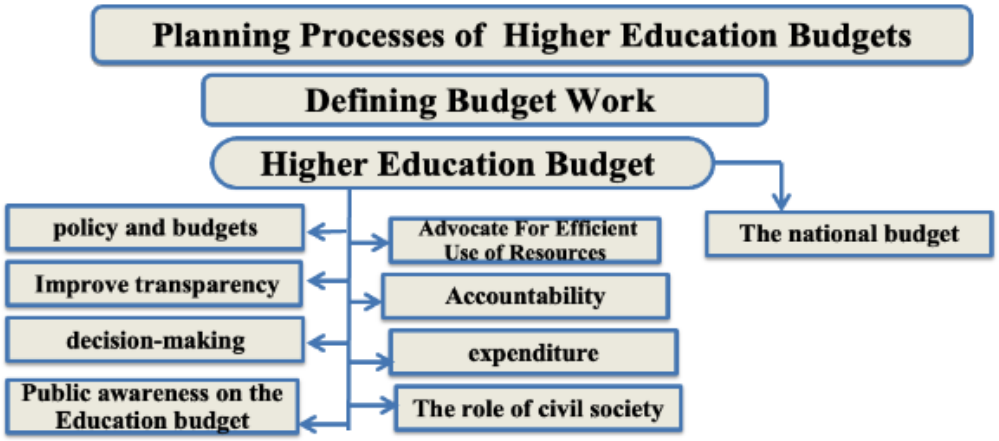

Figure 4b: The Defining Work of the Planning Processes of the Education Budget

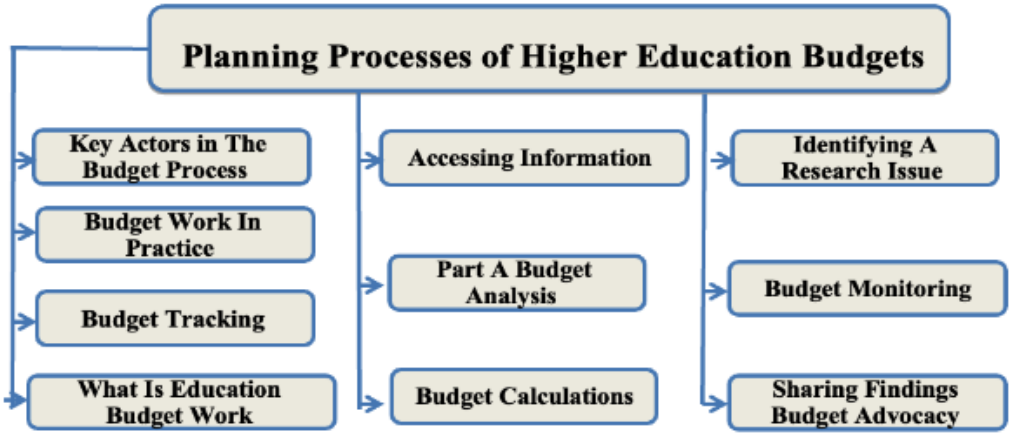

Figure 4c: The Key Actors of the Planning Processes of the Education Budget

Figure 5 shows the budget cycle of the higher education system:

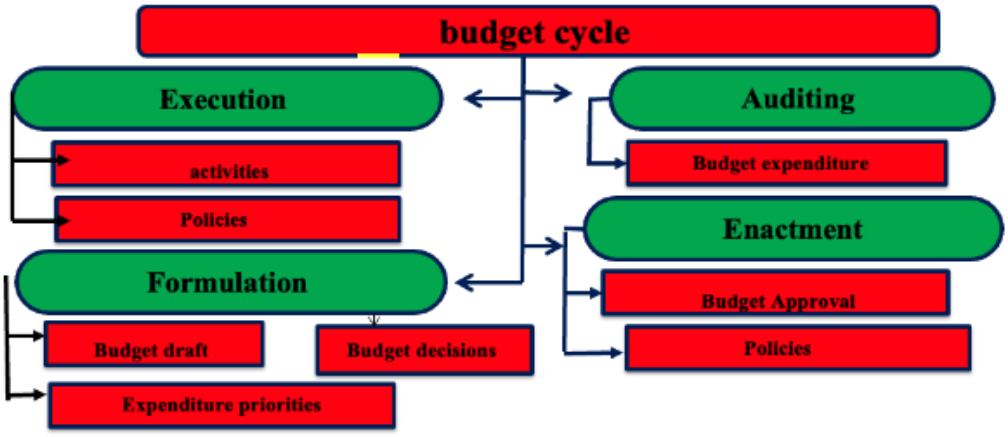

Figure 5: The Budget Cycle of the Higher Education System

From those mentioned above, the operational research approach provides a robust structure for enhancing the funding of higher education in Egypt. Through the use of data, analytical models, and systematic assessment, OR has the potential to improve resource distribution,

promote fairness and excellence, and establish viable financial plans. This method not only tackles present obstacles but also lays the groundwork for sustained growth and achievement in the higher education field.

Conclusion

In conclusion, funding higher education in Egypt presents a complex challenge that necessitates a well-rounded strategy involving strong government backing, engaged private sector participation, global collaboration, and efficient student financial assistance initiatives. It will be essential to tackle the obstacles and put into practice creative ideas in order to ensure the sustainable growth of higher education in Egypt. Dealing with the problems of inadequate funding, inequality, and economic challenges while maneuvering through the political environment is crucial for the long-term growth of the industry. By adopting new developments like digital transformation, public-private partnerships, and internationalization, Egypt can enhance its higher education system to be strong and of high quality.

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