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Strategic Research Initiatives for Elevating Young Universities

Serhan Hakgudener

The American University of Kurdistan

Abstract: Emerging universities encounter distinct challenges and opportunities in their pursuit of attaining elevated standards of academic excellence within the swiftly transforming domain of higher education. Whereas conventional educational frameworks have predominantly concentrated on pedagogical methods, an institution such as The American University of Kurdistan must incorporate comprehensive research initiatives that not only bolster its academic standing but also contribute to the corpus of global knowledge. By emphasizing interdisciplinary inquiry, cultivating partnerships with industry leaders and established academic entities, and allocating resources to cutting-edge research facilities, AUK can establish an invigorating milieu that fosters innovation and critical analysis. This study investigates two strategic research initiatives that possess the potential to advance the Department of Architectural Engineering at AUK, highlighting the crucial importance of scientific inquiry in promoting educational progress. This methodology not only enhances the academic journey for students but also positions the university as a key contributor to societal advancement. The results accentuate the imperative for nascent universities to reconcile their educational objectives with a profound dedication to research, thereby ensuring enduring growth and long-lasting success within the competitive landscape of academia.

Keywords: Research initiatives, Young universities, Educational excellence, Post graduate education

Introduction

Young universities encounter distinctive challenges and opportunities in their quest for academic excellence, particularly in the integration of research into their fundamental operations. These entities, typically marked by their responsiveness and flexibility, occupy a favorable position to innovate and address global challenges. Nevertheless, they must traverse structural, financial, and cultural impediments to realize their objectives. This discourse examines these challenges and opportunities, with an emphasis on the integration of research and its implications for education and society. A principal challenge confronting young universities is the insufficiency of resources and infrastructure. Established institutions frequently benefit from decades of investment in research facilities, libraries, and faculty expertise, which emergent institutions may lack. For instance, the absence of cutting-edge laboratories, research funding, and seasoned faculty can impede the capacity of young universities to compete on an international level. Moreover, financial limitations may restrict their capability to attract premier talent, both among faculty and students, thereby intensifying the challenge of cultivating a robust research environment (Lim & Boey, 2014). Young universities may also encounter institutional obstacles that impede the incorporation of research into their academic missions. Such obstacles may encompass rigid administrative frameworks, a deficiency in interdisciplinary collaboration, and an emphasis on teaching rather than research. For example, the conventional delineation of academic disciplines can complicate the promotion of multidisciplinary research, which is vital for addressing intricate global challenges (Amey et al., 2002). Furthermore, the lack of a vigorous research culture can dissuade faculty and students from participating in innovative scholarship. Another critical challenge for young universities is the equilibrium between their dual mandates of teaching and research. While teaching often serves as the predominant focus, especially in institutions with constrained resources, neglecting research can impede academic excellence and institutional reputation. Research-intensive universities are frequently accorded higher rankings in global assessments, imposing pressure on young universities to prioritize research without compromising the quality of teaching. This balancing act necessitates strategic

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planning and resource allocation to ensure that both mandates are effectively realized. Thus, the global higher education arena is exceedingly competitive, with rankings typically favoring older, more established institutions. Young universities must navigate this competitive landscape while cultivating their reputation and attracting international students and faculty. The pressure to ascend in rankings can induce a concentration on short-term metrics, potentially diverting focus from long-term strategic objectives such as establishing a robust research foundation.

Emerging universities possess the advantage of agility and the capacity to innovate expeditiously. In contrast to older institutions, which may be encumbered by tradition and bureaucracy, young universities can more readily adopt novel educational models, technologies, and research methodologies (Lee, 1997; Wowk et al., 2017). For instance, they can harness emerging technologies such as artificial intelligence and virtual reality to create innovative learning experiences and research opportunities. This agility equips them to respond swiftly to societal demands and global challenges. Additionally, young universities can gain from collaboration with industry, research organizations, and international institutions. These partnerships can furnish access to resources, expertise, and networks that might otherwise be inaccessible. For example, industry-university collaborations can enhance research capabilities, offer practical training for students, and stimulate innovation (Perkmann et al., 2013), (Schofield, 2013). Additionally, global collaborations can enhance the exchange of knowledge and the establishment of transdisciplinary research initiatives, effectively tackling intricate issues such as sustainability and public health. Emerging universities possess the potential to prioritize societal impact within their research and educational objectives. By concentrating on pressing real-world challenges, these institutions can substantiate their relevance and contributions to society. For instance, initiatives aimed at community engagement and outreach can cultivate trust and foster collaboration between universities and local stakeholders, resulting in more significant research outcomes (Pasque et al., 2005; Whitmer et al., 2010). This emphasis on societal impact may also attract funding, talent, and recognition, thereby further elevating the university's standing and academic distinction. Emerging universities can adopt interdisciplinary and transdisciplinary research as an integral component of their academic ethos. By dismantling disciplinary barriers and promoting collaboration across various fields, they can confront complex issues such as climate change, inequality, and technological disruption. This methodology not only enhances the caliber of research but also equips students with the interconnected realities of contemporary society (Roncancio-Marin et al., 2022). Moreover, emerging universities can spearhead the integration of sustainability and social responsibility within their curricula and research endeavors. By embedding the United Nations' Sustainable Development Goals (SDGs) into their academic frameworks, they can prepare students to confront global challenges and advocate for sustainable development (Killion et al., 2018), (Filho et al., 2015). This commitment to sustainability can further bolster the university's reputation as a responsible and progressive institution. The integration of research into educational paradigms can markedly enhance student learning and competencies. By participating in research initiatives, students cultivate critical thinking, problem-solving, and analytical abilities, which are indispensable for their prospective careers. For example, project-based learning and experiential research opportunities can furnish students with pragmatic skills and real-world applications of theoretical knowledge. Therefore, research opportunities can instill a sense of curiosity and inquiry, equipping students to become lifelong learners in an ever-evolving world.

The integration of research can also stimulate innovation and entrepreneurship among students. By exposing students to pioneering research and collaborative projects, universities can inspire them to engage in creative thinking and develop inventive solutions to societal issues. Thus, partnerships between industry and academia can provide students with avenues to tackle real-world challenges, nurturing entrepreneurial mindsets and preparing them for future employment (Sanno et al., 2019).

By incorporating research into the educational framework, young universities can furnish students with the knowledge, skills, and mindset requisite for navigating these challenges. For instance, interdisciplinary research initiatives can offer students a broad understanding of complex issues, enabling them to devise holistic and innovative solutions (Harris, 2010). The integration of research can propel innovation and economic development by fostering synergies among universities, industries, and government entities. For instance, collaborations between industry and university research can culminate in the creation of new technologies, services, and products, thereby contributing to economic growth and competitiveness (Woolcott et al., n.d.). Furthermore, research-intensive universities can function as innovation hubs, attracting investment and talent to their respective regions.

Department of Architectural Engineering Initiatives

The Department of Architectural Engineering in the College of Engineering at The American University of Kurdistan was founded in the fall of 2016 to offer a five-year Bachelor of Science degree in Architectural Engineering that provides students with a background in structural engineering and construction management skills necessary to be a successful architectural engineer. The curriculum is more extensive than traditional architectural engineering programs. The program aims to graduate productive members and leaders within the profession who can contribute to society by furthering the quest for a safe, healthy environment and a more sustainable surrounding economy (AUK, 2024).

AUK Towards Sustainable Energy Production Initiative roots back to a 2019 study. The study explores the potential for renewable energy production in Duhok, Kurdistan Region, Iraq, focusing on the feasibility of micro-hybrid power stations that combine solar and wind energy. Thus, the data shows the photovoltaic (PV) power generation potential in Duhok ranges from 1600 kWh to 1900 kWh average in a year, and the mean wind speed varies between 3 m/s to 7 m/s at 50 meters above ground level. Since 2019 until today, the region's limited national electric grid has not fulfilled the power requirement, and this situation has pushed the residents to continue to use diesel generators, which also foster significant air and noise pollution. Fortunately, the region has the full potential of solar and wind power. On-site energy production might be a way of resolving these issues (Hakgudener & Prvanov, 2019). Therefore, increasing power demand naturally mapped the framework of the first initiative, which is titled "AUK Towards Sustainable Energy Production: Solar and Wind." The initiative is proposed on September 4, 2022. Currently, solar panel installation and energy production at the campus project have been adopted.

The second initiative is titled "Framework for Establishing the Center for Sustainability at the American University of Kurdistan." This center aspires to concentrate on pioneering research and development in the domain of sustainable technologies and methodologies. Consequently, the center intends to accommodate multiple state-of-the-art research laboratories, each developed to a distinct aspect of sustainability. These laboratories may be outfitted with sophisticated apparatus, hardware, software, and testing instruments to promote high-caliber research and innovation with the following aims:

1. Promote sustainable practices in architectural engineering: Implementing sustainable design principles such as a healthy environment, durability and longevity, adaptability, energy efficiency, water conservation, and the use of renewable materials.
2. Develop innovative solutions for energy efficiency and environmental conservation, focusing on advancements in renewable energy technologies, smart grids, and eco-friendly materials.
3. Enhance research capabilities in sustainable technologies: Leveraging interdisciplinary methodologies and stakeholder collaboration to drive technological advancements.
4. Collaborate with industry partners to implement sustainable solutions: Engaging with businesses, NGOs, and government entities to drive collective action towards sustainability goals.

The establishment of the Center for Sustainability at the American University of Kurdistan represents a significant step forward in the field of sustainable technologies and practices. By focusing on cutting-edge research and development, the center aims to promote sustainable practices in architectural engineering, develop innovative solutions for energy efficiency and environmental conservation, enhance research capabilities, and collaborate with industry partners to implement sustainable solutions. The center aimed to house several state-of-the-art research labs, each dedicated to a specific area of sustainability and equipped with advanced equipment, software, hardware, and test instruments. These labs can facilitate high-quality research and innovation in areas such as lighting design and analysis, solar and wind turbine studies, acoustical design, electromagnetic wave propagation studies, healthy HVAC design, and sustainable plumbing solutions.

AUK's 2021-2026 Strategic Plan and Operational Map

The strategic plan of the American University of Kurdistan is developed in line with its vision and mission statements. The University aims to provide an environment that nurtures the future leaders of the community by offering a high-quality education. Furthermore, the plan focuses on enriching the student experience and heightening the quality of campus life (AUK, 2025). The following Operational Map outlines the progress and updates on various initiatives aimed at enhancing AUK's campus facilities, academic programs, community engagement, student support, faculty and staff recruitment, communications, financial operations, advancement activities, and assessment and accreditation processes.

Table 1. AUK institutional strategic plan operational map 2024-2025

[illegible]

The first initiative, which is Solar Energy Production on site, is a part of the Campus Master Plan Development, and it is an ongoing process. Arer Enerji developed the power plant layout plan (Arer Enerji, 2025). The scope of work is to reduce the use of AUK's two generators, which are to run during the power outages. One of these generators is in the Mustafa Barzani Building (Main Building), which is 2MW, and the other one is in the Residence Facility for Women, which is 1.25MW. These generators normally run for three hours at night when the national power goes out. AUK aims to install lithium-iron phosphate batteries to store energy to use during the three hours of power outage. The batteries must be enough to supply power to run several AC units and emergency lights in addition to the data center of MBB and RFW. The plan is to have the lithium iron phosphate batteries that will save energy from the solar system, also acting as UPS batteries. During the daytime, the whole solar system will be on the grid.

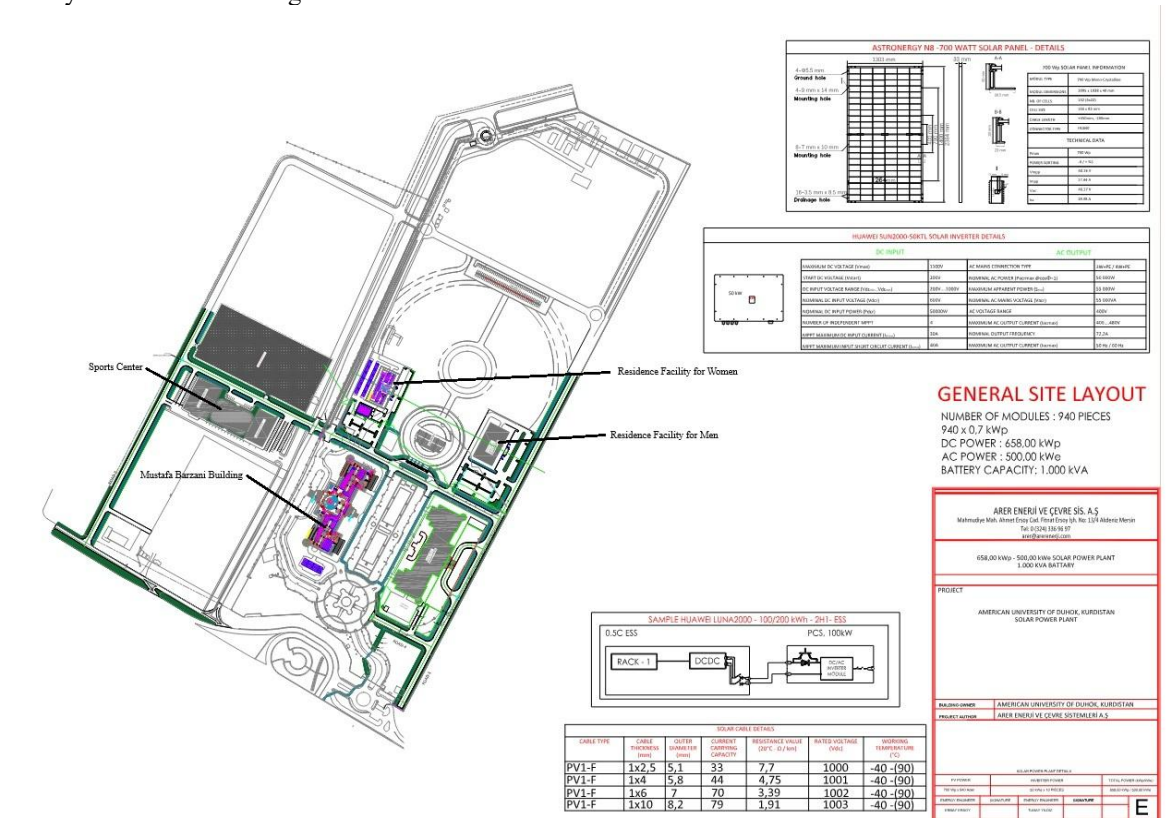


Figure 1. Solar panel locations plan by author

Figure 1 distinctly illustrates and delineates the specifically proposed locations that have been selected for the roof areas associated with each building within the architectural layout, thereby providing a comprehensive visual representation of the intended solar panel placements.

Methodology for Sustainable Architectural Engineering Initiatives

The comprehensive methodology employed for the advancement of Sustainable Architectural Engineering Initiatives at AUK is intricately structured, effectively blending educational, research-oriented, and practical dimensions to foster a robust framework for sustainability. The elaboration provided herein delineates the systematic approach adopted to establish correlations among these diverse yet interconnected initiatives. For instance, the following Venn diagram in Figure 2 clearly shows these dimensions between the variables.

The initial phase of this methodology was centered around the critical task of identifying the fundamental components that constitute the two initiatives, notably the Department of Architectural Engineering, which is resolutely committed to providing an extensive education in the specialized field of architectural engineering. In addition, the AUK Towards Sustainable Energy Production Initiative is strategically focused on the exploration, assessment, and subsequent implementation of innovative renewable energy solutions that can significantly contribute to the sustainability agenda. Lastly, the establishment of the Center for Sustainability is dedicated to advancing research and development initiatives that specifically target the creation and enhancement of sustainable technologies, thereby addressing pressing environmental concerns.

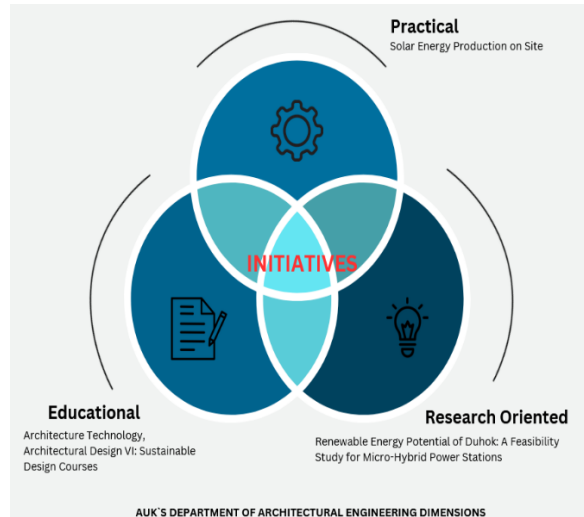


Figure 2. Department of architectural engineering's unified strategy by author

To gain a deeper understanding of the specific objectives associated with each component, the goals and strategies of each initiative were extracted and analyzed. For instance, the Educational Objectives set by the Department of Architectural Engineering are designed to equip students not only with fundamental knowledge but also with practical skills in structural engineering and construction management, thereby preparing them for future professional endeavors. Furthermore, the Renewable Energy Projects initiative specifically emphasizes the feasibility studies and practical implementation strategies for harnessing solar and wind energy solutions, which are pivotal in the transition towards sustainable energy practices. Lastly, the Research and Development efforts spearheaded by the Center for Sustainability aim to establish cutting-edge research laboratories while simultaneously promoting best practices in sustainability across various sectors.

The final stage of this methodological framework involved the summarization and integration of all identified elements into a cohesive and comprehensive methodology. This synthesis was achieved by thoughtfully combining educational, research, and practical aspects, which collectively contribute to the formulation of a unified strategy aimed at promoting sustainability within the realm of architectural engineering. Through the systematic organization and correlation of the gathered information, the methodology has been developed, which is meticulously aligned with the overarching goals of sustainable architectural engineering. This structured approach not only ensures that the initiatives at AUK are effectively interwoven but also underscores a focused commitment to promoting sustainability through a triad of education, research, and practical implementation strategies.

Results and Discussion

The methodological framework serves the purpose of advancing the course AENG5302 Architecture Technology, which rigorously investigates the multifaceted aspects of building construction through a comprehensive lens that encompasses not only the critical dimensions of health and life safety—such as zoning ordinances, fire safety regulations, and adherence to the international building code—but also extends to considerations of security, various building service systems including HVAC (which comprises plumbing, electrical systems, heating, air conditioning, and ventilation), vertical circulation, and fire protection measures. Furthermore, this framework delves into the principles of sustainability, scrutinizes the selection and application of materials, assesses structural components, conducts life-cycle analyses, evaluates accessibility, and engages with the technical documentation and outline specifications necessary for effective architectural practice, while also incorporating POE (post-operative evaluation) methodologies. Concurrently, the course AENG4304 Architectural Design VI: Architecture Sustainability is designed to build upon and synthesize knowledge acquired in previous studios, as well as current coursework focused on Green Buildings, and challenges students to conceptualize and design intricate architectural projects that are situated within demanding contexts, taking into account a variety of factors including the programmatic requirements, climatic conditions, cultural influences, site characteristics, and the overall representation of the architectural work. In addition to the anticipated deliverables that are typically associated with architectural projects, the final undertaking necessitates the incorporation of digital animation and active engagement with the public in order to emphasize critical themes of sustainability, assess environmental impacts, and promote equity within the design process (AUK, 2023). Moreover, a collaborative partnership has been

established with Arer Energy, in conjunction with the College of Engineering at AUK, aimed at fostering innovative approaches to architectural design. The initial results of this collaborative initiative are currently in the execution phase and can be deemed a success, as noted in reports from AUK dating back to 2023. The subsequent initiative is also poised to represent the next stage of the integrated strategic plan formulated by the department, further reinforcing the commitment to advancing architectural education and practice. Consequently, these initiatives are anticipated to serve as pivotal catalysts that not only propel the pursuit of academic excellence but also enhance practical knowledge and foster a positive impact on society as a whole.

Conclusion

Emerging institutions of higher education, often referred to as young universities, encounter a multitude of formidable challenges that significantly hinder their pursuit of achieving a high standard of academic excellence. These challenges encompass a range of factors, including but not limited to defined financial resources, existing institutional barriers that may impede progress, and an ever-increasing level of competition on a global scale from more established universities. Nevertheless, it is imperative to recognize that these young universities also possess distinct and unique opportunities that enable them to innovate in their approaches, foster collaborative efforts across various disciplines, and maintain a concentrated focus on the societal impact of their educational initiatives. By adeptly integrating rigorous research endeavors into the very core of their institutional activities, young universities stand to significantly enhance the learning experiences of their students, stimulate an environment conducive to innovation and entrepreneurship, and proactively address some of the most pressing global challenges that confront society today. Ultimately, the capacity of these institutions to effectively navigate the complex interplay of challenges and opportunities that they face will play a crucial role in determining their overall success in not only achieving academic excellence but also in making a profound and meaningful impact on the realms of education and society at large. Since the year 2019, the Department of Architectural Engineering at AUK has diligently pursued this innovative path. It has begun to observe the positive ramifications of these efforts, particularly in relation to the experiences of their alumni as well as the broader local industry. Therefore, the initiatives undertaken by this department exemplify how emerging universities can leverage their unique positioning to create beneficial outcomes for both their graduates and the communities they serve. Through continued commitment to these principles, young universities can aspire to redefine their roles in the global educational landscape while simultaneously contributing to the advancement of society as a whole.

Scientific Ethics Declaration

* The author declares that the scientific, ethical, and legal responsibility of this article published in the EPESS Journal belongs to the author.

Conflict of Interest

* The author declares that there is no conflict of interest.

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Author Information

Serhan Hakgudener

The American University of Kurdistan
College of Engineering Department of Architectural
Engineering, Zakho Rd. 42003 Sumel, Duhok, Kurdistan
Region of Iraq, Iraq.
Contact e-mail: serhan.hakgudener@auk.edu.krd

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