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# Design and Validation of the Empowerment Model for Heads of Centers at the University of Applied Science and Technology

Zeinab Mirzaei[1], Baharak Shirzad Kebriya[2*], Mehdi Shariatmadari[1], Fereshteh Kordestani[1]

1. Department of Educational Management and Higher Education, Central Tehran Branch, Islamic Azad University, Tehran, Iran.
2. Department of Educational Management and Higher Education, Central Tehran Branch, Islamic Azad University, Tehran, Iran (Corresponding Author).

*** Corresponding author email address**: bsherzad86@yahoo.com

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A B S T R A C T

**Purpose:** The present study aimed to design and validate the empowerment model for heads of centers at the University of Applied Science and Technology.

**Methods and Materials:** This research followed a sequential mixed-methods approach with an exploratory orientation. The qualitative phase consisted of meta-synthesis and Delphi stages, while the quantitative phase adopted a descriptive approach with survey and correlational methods. In the qualitative phase, the meta-synthesis stage involved a review of theoretical foundations and relevant literature from national and international databases. In the Delphi stage, 13 experts were selected using purposive non-random sampling. In the quantitative phase, the statistical population included all heads of centers at the University of Applied Science and Technology in Iran, from which 216 respondents were selected using multi-stage cluster random sampling. Data collection in the qualitative phase included a systematic literature review for the meta-synthesis stage and worksheets for the Delphi stage. In the quantitative phase, a researcher-developed questionnaire with 136 items, derived from the qualitative phase, was used to assess internal validity, while a 34-item questionnaire was employed to evaluate the validity of the model. The validity and reliability of research instruments were examined in both qualitative and quantitative phases, with results indicating that the tools were valid and reliable. Data analysis in the qualitative phase included systematic analysis in the meta-synthesis stage and Kendall's coefficient of concordance in the Delphi stage. In the quantitative phase, data analysis encompassed descriptive and inferential statistics, including confirmatory factor analysis and one-sample t-test, using Maxqda-V2018, SPSS-V23, and Smart PLS-V3 software.

**Findings:** Findings revealed that the empowerment model for heads of centers at the University of Applied Science and Technology comprised the following dimensions: managerial competencies (18 indicators), communication skills (24 indicators), professional competencies (23 indicators), personal competencies (20 indicators), educational quality improvement (16 indicators), organizational learning (13 indicators), organizational effectiveness (10 indicators), and job satisfaction (12 indicators). Finally, based on the identified dimensions, components, and indicators, the research model was developed and assessed for internal and external validity, with results confirming its suitability.

**Conclusion:** This study developed a comprehensive empowerment model for university heads, emphasizing managerial, communication, professional, and personal competencies, with validated internal and external reliability, contributing to improved leadership, organizational effectiveness, and educational quality.

***Keywords:*** *Managerial competencies, Personal competencies, Educational quality improvement*

## 1. Introduction

In an era referred to by terms such as the Knowledge Age, the Information Age, the Age of Globalization, the Systems Age, the Age of Complexity, the Age of Rationality, and the Age of Disruptions, Discontinuities, and Knowledge Orientation, the pace of change is accelerating, and the complexity of societal issues is increasing. Addressing these complexities requires dynamic, strategic, and systemic thinking that can respond promptly to changes and adapt accordingly (Harnowo et al., 2022). The transformations observed in recent decades across all scientific, cultural, economic, and social dimensions of human societies have further underscored the crucial role of educational systems, particularly higher education and universities. Experts in higher education assert that change is no longer an opportunity for higher education institutions but a necessity (Ikromovna, 2022).

Today, the higher education system has outlined strategic goals such as achieving educational equity, knowledge commercialization, and a knowledge-based economy. However, according to statistics from the Ministry of Science, only half of these objectives have been realized, highlighting the need to examine the challenges within this system (Bigdeli et al., 2022; Ebrahimi Shad, 2021). A broad classification of these challenges divides them into two categories: internal system challenges and external system challenges. External challenges include political, social, cultural, and economic issues (Farastkhah, 2017). Internal challenges, on the other hand, include abstract and complex educational content, traditional teacher-centered teaching methods lacking clear objectives, and financial constraints. Given these factors, the role of educational leadership and the competence of university heads in addressing these challenges are of paramount importance (Habibi et al., 2022).

Educational institutions are among the largest management systems in any country, experiencing sudden changes and requiring adaptation to societal transformations. Therefore, the professional development of educational managers is a key factor in improving learning standards and plays a significant role in achieving educational goals. This issue is even more critical in higher education, where effective leadership and managerial empowerment are strategic imperatives in the twenty-first century (Ali Ghorbani et al., 2024; Bezi et al., 2024). Higher education institutions require competent, qualified, and effective leaders to navigate the threats and challenges of the modern world (Mohammadi Komroudi et al., 2024). Accordingly, designing an empowerment model based on universities' needs and competencies can serve as a guide for professional development programs aimed at training higher education administrators (Salari et al., 2017).

Given that managerial empowerment is likely a multidimensional concept influenced by numerous factors and composed of multiple components, it can be defined as a dynamic process resulting from the reciprocal interaction between an individual's personal traits, organizational culture, and structure (Alwali, 2024). Empowerment plays a strategic role in higher education institutions. Considering the dynamic and complex nature of universities in the contemporary era, university leaders' success depends on their ability to enhance institutional quality through strategic planning and the development and implementation of policies tailored to internal and external university conditions (Li, 2024). A lack of managerial competence in university leadership can lead to ineffective institutional operations and diminished influence on the broader environment. This dynamic interaction is a core component of empowerment (Mohammadi kia et al., 2024), as the ultimate goal of managerial empowerment is the ability to restructure, enhance operational capabilities, and apply new competencies to address an uncertain environment, thereby ensuring adaptability and avoiding rigidity (Sprafke, 2013).

However, it is important to recognize that while managerial empowerment aims to achieve these objectives, it is also highly dynamic. The environmental and organizational changes and the future-oriented nature of university administrators—who oversee educational and research institutions—differ significantly from non-educational organizations (Kurzhals, 2015). Given this significance, adopting a novel approach to empowering university managers appears inevitable. This approach should consider institutional values and visions while aligning universities with their external environments and future outlooks (Torkzadeh et al., 2017). The primary goal of managerial empowerment is to equip leaders with the necessary skills for independent decision-making. Additionally, empowerment dismantles traditional hierarchical structures, as its central focus is redistributing power between management and staff (Bigdeli et al., 2022; Ebrahimi Shad, 2021).

In the empowerment process, individuals must take responsibility for improving their jobs and daily tasks. It is up to them to enrich their roles and make them more fulfilling. When individuals take this initiative, they become


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better decision-makers, more responsible, and more engaged participants. Leach and Wall describe empowerment as a tool for enhancing employee performance, particularly by increasing their knowledge and abilities. Without empowerment, many organizational goals remain unachievable, leading to a lack of workforce development, an absence of justice within the organization, reduced commitment and enthusiasm among employees, underutilization of potential talents, and uncertainty among employees regarding their ability to succeed within the organization's mission, vision, and strategy (Sanati, 2007).

Higher education institutions, responsible for educating young individuals and shaping a better future for them—and, consequently, fostering national growth and prosperity—require competent leaders more than other organizations. These leaders must steer their institutions toward achieving high educational objectives. If managerial empowerment does not occur in higher education institutions, significant setbacks will arise, including ineffective responses to faculty and student needs, low job satisfaction among administrators, strained faculty-student relationships, and a lack of innovative ideas for institutional advancement (Beygzad et al., 2017; Habibi et al., 2022).

For the continuous improvement of the university system, it is essential to establish an effective managerial empowerment system that enhances the abilities of university administrators. This system must originate from within the academic framework and align with the specific characteristics and needs of higher education (Mirzamohammadi & Mohammadi, 2020). Reports from various countries indicate that advancing this process requires first recognizing the philosophy, objectives, role, and significance of empowerment in higher education. Moreover, the principles, methods, and operational mechanisms of empowerment must be clearly defined, specifying the tools, criteria, and standards necessary for effective managerial development. Finally, an empowerment model must be designed and proposed based on the cultural, social, economic, and institutional needs of the society in which it is implemented (Mohammadi & Zahed Babolan, 2022).

Within the national higher education system, a fundamental issue requiring attention in universities and academic institutions is the development of a modern empowerment system. Such a system should enhance the efficiency of educational, research, and student affairs activities while ensuring quality and dynamism in the higher education sector. The absence of such a system risks diminishing the quality of university education, as ineffective leadership can negatively impact teaching and learning processes. Given the importance of empowerment in higher education, policymakers strive to develop mechanisms to improve this area. The University of Applied Science and Technology is no exception, as it endeavors to empower its academic leaders to remain competitive in the educational landscape. Considering these factors, managerial empowerment within the University of Applied Science and Technology can ensure the continuous improvement of education and research quality, strengthen university-industry relations, and ultimately promote sustainable and dynamic development. However, the university appears to be progressing slowly in this regard, facing significant challenges before establishing a robust empowerment system. Obstacles include a lack of awareness among senior officials at the Ministry of Science regarding the necessity of institutionalizing an empowerment system, the absence of a structured model for managerial development, and insufficient governmental support for the university's initiatives. Additionally, the lack of training resources for university leaders in some branches and the low prioritization of managerial development remain persistent issues. Given these challenges, the present study seeks to answer the question: What model can be proposed to empower university center heads in higher education, specifically at the University of Applied Science and Technology?

## 2. Methods and Materials

### *2.1. Study Design and Participants*

This study is applied in terms of its objective. It employs a sequential mixed-methods approach regarding the type of data. The research paradigm follows a pragmatic or combined approach (interpretivism and positivism). In terms of nature (approach and design), it initially adopts an exploratory research design, followed by a descriptive-analytical design. Regarding reasoning (logic of implementation), the study follows a mixed-methods approach (inductive-deductive), utilizing both inductive reasoning (in the qualitative phase, including meta-synthesis and Delphi techniques) and deductive reasoning (in the quantitative phase, including survey and correlation methods).

**A: Qualitative Phase:** The statistical population in the first stage of the qualitative phase (meta-synthesis) included all scholarly articles and works available in national and


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international databases, as well as existing documents and regulations in the relevant field. At this stage, 20 articles were selected through purposive non-random sampling based on the PRISMA guideline for selecting articles. The selection criteria for the meta-synthesis method included relevance to the research topic, recency, high scientific quality and credibility, inclusion in reputable national and international databases, appropriate methodology, and diversity of perspectives.

In the second stage (Delphi technique), the statistical population comprised all professors and researchers in the field of management. Considering that the minimum number of experts in a Delphi panel is typically between 10 and 30 (Linstone & Turoff, 2011), 13 experts directly or indirectly involved in university leadership empowerment were selected using purposive non-random sampling. The selection criteria for experts included holding at least a doctoral degree, teaching experience in disciplines related to the research field, expertise, participation in practical projects and relevant research experience, familiarity with policies and procedures, awareness of challenges and barriers, ability to provide analytical insights, diversity of perspectives, commitment to participation, having a leadership position, involvement in decision-making, and practical experience related to the research field.

**B: Quantitative Phase:** The statistical population in this phase included all heads of centers at the University of Applied Science and Technology, who were considered key respondents. Based on the recommendations of leading scholars in structural equation modeling (SEM) and confirmatory factor analysis (CFA), such as Kline (2015), a minimum sample size of 200 is considered an appropriate general rule for SEM and CFA. In this study, to enhance generalizability and due to the use of confirmatory factor analysis, a sample size of 280 respondents was selected through multi-stage cluster random sampling. The questionnaire was distributed both online and in person, with 64 questionnaires excluded due to incomplete responses. Statistical analyses were conducted on the remaining 216 valid responses.

### *2.2. Data Collection Tools*

**A: Qualitative Phase:** In the first stage of the qualitative phase (meta-synthesis), data were collected through a systematic literature review of scholarly sources. This process involved an extensive and targeted search in academic databases, journal articles, books, and dissertations related to the research topic. Content validity assessment in the meta-synthesis stage confirmed that the examined content and concepts were comprehensively covered in the existing literature. Articles were meticulously selected, initially subjected to screening, and further assessed using a flowchart outlining the search and selection process. The screening process involved imposing restrictions based on time (domestic and international sources), location (national and international databases), research nature (synthesis, review, qualitative, and quantitative studies), and subject matter (keywords used in searches).

Additionally, internal validity findings indicated that the meta-synthesis results were not influenced by external factors and were correctly interpreted. A 27-item checklist based on the PRISMA model was employed, and independent analysis was conducted by the researcher and a statistics expert. Cohen's kappa coefficient was used to measure agreement, alongside standardized criteria, replicability (transparency in the execution process), tracking of analysis and coding steps using MAXQDA software, and expert review, feedback, and revision to resolve inconsistencies. To ensure reliability in the meta-synthesis method, precise documentation of the research process, intra-researcher alignment, and inter-researcher alignment methods were employed. The findings confirmed the reliability and validity of the meta-synthesis phase.

In the second stage of the qualitative phase (Delphi technique), a Delphi worksheet was used. Experts were asked to rate indicators and provide comments or suggestions regarding the identified indicators. They were also encouraged to propose new indicators if necessary. The Delphi worksheet's validity was ensured by designing clear, straightforward, and relevant questions. Simple and conceptually accessible language was used to ensure comprehensibility for experts in the field. Before implementation, content validity was assessed using the content validity ratio formula, confirming that the worksheet adequately covered the intended concepts. Internal and temporal reliability tests were conducted, and findings indicated the validity and reliability of the Delphi worksheet.

**B: Quantitative Phase:** In the quantitative phase, researcher-developed questionnaires were used to assess both internal validity (derived from the qualitative phase's identified indicators) and external validity (derived from the final model). The process of constructing the questionnaire to evaluate internal model validity involved systematically reviewing the literature in national and international


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databases, following the PRISMA protocol as a standard approach. Identified articles were screened based on specific criteria, resulting in 20 retained articles, which were analyzed thematically to extract key assessment dimensions. These dimensions were subsequently used as a basis for designing the Delphi worksheet questions. The identified indicators, components, and dimensions were refined and localized through expert consensus over three Delphi rounds.

The final questionnaire contained 136 items, measured using a Likert scale ranging from "very high" to "very low." It evaluated the empowerment of heads of centers at the University of Applied Science and Technology across eight dimensions: managerial competencies (18 indicators), communication skills (24 indicators), professional competencies (23 indicators), personal competencies (20 indicators), educational quality improvement (16 indicators), organizational learning (13 indicators), organizational effectiveness (10 indicators), and job satisfaction (12 indicators).

Content validity was assessed using Lawshe's content validity ratio and content validity index with the input of ten experts. The questionnaire's content was reviewed to eliminate redundant questions and refine phrasing before distribution. Additionally, construct validity was measured using convergent and discriminant validity assessments with Smart PLS 3 software. The findings are presented in the subsequent table.

Reliability was evaluated using Cronbach's alpha coefficient, composite reliability, and McDonald's omega. The reliability coefficients for all questionnaire variables exceeded 0.70, indicating that the measurement instrument was reliable.

**Table 1**

*Questionnaire Information and Calculation of Validity and Reliability of the Instrument*

| Component | Cronbach's Alpha | CR | AVE | MSV | ASV | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Managerial Competencies | 0.71 | 0.801 | 0.54 | 0.40 | 0.21 | 0.73 | | | | | | | |
| Communication Skills | 0.81 | 0.825 | 0.57 | 0.43 | 0.25 | 0.55 | 0.75 | | | | | | |
| Professional Competencies | 0.75 | 0.869 | 0.62 | 0.47 | 0.29 | 0.51 | 0.61 | 0.79 | | | | | |
| Personal Competencies | 0.82 | 0.871 | 0.55 | 0.41 | 0.22 | 0.54 | 0.58 | 0.64 | 0.74 | | | | |
| Educational Quality Improvement | 0.74 | 0.847 | 0.59 | 0.44 | 0.26 | 0.57 | 0.59 | 0.61 | 0.63 | 0.77 | | | |
| Organizational Learning | 0.72 | 0.823 | 0.64 | 0.49 | 0.31 | 0.53 | 0.56 | 0.58 | 0.57 | 0.63 | 0.80 | | |
| Organizational Effectiveness | 0.77 | 0.882 | 0.63 | 0.42 | 0.24 | 0.49 | 0.57 | 0.48 | 0.55 | 0.59 | 0.66 | 0.79 | |
| Job Satisfaction | 0.76 | 0.871 | 0.61 | 0.45 | 0.27 | 0.47 | 0.53 | 0.46 | 0.61 | 0.63 | 0.69 | 0.77 | 0.78 |

The reliability of the dimensions was confirmed as Cronbach's alpha and composite reliability (CR) exceeded 0.7. Convergent validity was established since CR > 0.7, CR > AVE, and AVE > 0.5. Discriminant validity was also confirmed as MSV < AVE and ASV < AVE.

In addition to the aforementioned internal validity questionnaire, a researcher-developed questionnaire adapted from Shoghi (2024) was used to assess model validity. This questionnaire consisted of two sections: external validity (24 items) and internal validity (10 items), totaling 34 items measured on a five-point Likert scale ranging from "very low" to "very high." The questionnaire was distributed both online and in person, and respondents were asked to express their opinions on each item. To ensure the accuracy and validity of responses, supporting theoretical and empirical documents, along with the designed model and necessary explanations regarding the research objectives and questionnaire completion process, were provided to the experts. Content validity was assessed using content validity measures, and reliability was evaluated using Cronbach's alpha, confirming the validity and reliability of the questionnaire.

### *2.3. Data Analysis*

**Qualitative Phase:** In the qualitative phase, thematic analysis was employed using MAXQDA Analytics Pro 2018 to identify dimensions, components, and indicators of the empowerment of heads of centers at the University of Applied Science and Technology. Themes and common patterns were extracted from selected articles and open-ended questions in the Delphi worksheet. In the Delphi phase, mean and standard deviation were used to assess results and determine expert consensus, while Kendall's coefficient of concordance was applied to evaluate agreement among experts regarding prioritization in the closed-ended questionnaire using IBM SPSS-16 Statistics.

**Quantitative Phase:** In the quantitative phase, descriptive statistics were used to describe demographic


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characteristics, including age, gender, education, and work experience, through frequency distribution, tables, and charts. To analyze research variables, measures such as mean, standard deviation, skewness, and kurtosis were calculated. Inferential statistics included confirmatory factor analysis (CFA) for internal validity assessment and a one-sample t-test for external validity assessment, performed using IBM SPSS-23 Statistics (2015) and SmartPLS-V3 (2016).

## 3. Findings and Results

Table 2 presents the demographic characteristics of the participants and respondents.

**Table 2**

*Demographic Statistics of Interviewees*

| Variable | Category | Frequency | Variable | Category | Frequency |
|---|---|---|---|---|---|
| Education | PhD | 13 | Age | Below 40 years | 2 |
| | | | | 41–50 years | 5 |
| Gender | Female | 4 | | Above 50 years | 6 |
| | Male | 9 | Work Experience | Below 10 years | 4 |
| | | | | 11–20 years | 4 |
| | | | | Above 20 years | 5 |

To collect qualitative data, 13 experts knowledgeable in the research field were interviewed. Subsequently, the study proceeded with the design and validation of a human capital assessment model with a cultural approach in education, based on findings from both the qualitative and quantitative phases.

**Table 3**

*Empowerment of Heads of Centers in Higher Education*

| Comprehensive Themes (Dimension) | Organizing Themes (Component) | Basic Themes (Indicator) | Frequency |
|---|---|---|---|
| Managerial Competencies | Human Resource Management | Ability to attract and retain human resources through processes such as recruitment, development, and career progression | 5 |
| | | Ability to provide performance evaluation and career development processes for staff to enhance work quality and efficiency | 3 |
| | | Ability to offer reward and benefits packages to staff and faculty at the University of Applied Science and Technology to encourage and retain them | 2 |
| | | Ability to be effectively present, lead appropriately, and serve as a positive role model for staff and faculty at the University of Applied Science and Technology | 3 |
| | | Ability to manage cultural diversity among staff and faculty at the University of Applied Science and Technology | 2 |
| | Financial Management | Ability to plan and budget appropriately, considering financial constraints and focusing on priorities | 3 |
| | | Ability to manage capital efficiently and maintain balance between financial and operational resources | 3 |
| | | Ability to attract and sustain university revenue sources | 2 |
| | | Ability to monitor and comply with financial and tax regulations | 2 |
| | | Ability to manage the university's financial credibility, including relationships with banks and other financial institutions | 2 |
| | Research and Development Management | Ability to define tasks, set timelines, budget, and track project progress | 2 |
| | | Ability to manage university knowledge, including creating research databases, updating studies, and transferring knowledge across departments | 3 |
| | | Ability to manage research and development teams, including selecting, training, developing, and evaluating staff | 3 |
| | | Ability to manage relationships with other organizations, including participation in joint projects, collaborations with universities and research institutions, etc. | 3 |
| | Information Technology Management | Ability to develop and optimize university systems for high productivity and efficiency | 2 |



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|---|---|---|---|
| | | Ability to manage IT transformations within the university, including selecting and implementing new technologies and updating legacy systems | 2 |
| | | Ability to apply appropriate IT standards to ensure system quality and effective internal and external communication | 3 |
| | | Ability to manage IT security at the university, including handling security risks, enforcing security policies, and training staff | 3 |
| Communication Competencies | Active Listening | Ability to listen attentively to faculty, staff, and students at the University of Applied Science and Technology | 3 |
| | | Ability to focus and pay attention when conversing with faculty, staff, and students at the University of Applied Science and Technology | 2 |
| | | Ability to provide constructive feedback to faculty, staff, and students at the University of Applied Science and Technology | 2 |
| | | Ability to ask appropriate questions during discussions with faculty, staff, and students at the University of Applied Science and Technology | 2 |
| | | Ability to understand the needs of faculty, staff, and students at the University of Applied Science and Technology | 3 |
| | | Ability to comprehend academic concepts such as research articles, teaching methods, etc. | 2 |
| | Effective Speaking | Ability to communicate clearly and comprehensibly with faculty, staff, and students at the University of Applied Science and Technology | 2 |
| | | Logical, coherent, and unambiguous speech | 2 |
| | | Ability to communicate dynamically and engagingly with faculty, staff, and students at the University of Applied Science and Technology | 3 |
| | | Ability to deliver motivational and inspiring messages | 2 |
| | | Ability to use correct grammar and provide accurate information | 3 |
| | Interpersonal Communication | Ability to engage listeners effectively | 3 |
| | | Ability to participate in discussions and interact effectively with faculty, staff, and students at the University of Applied Science and Technology | 2 |
| | | Ability to use non-verbal communication such as body language, facial expressions, and appropriate word choice | 3 |
| | | Ability to understand and respect diverse social and cultural interactions | 2 |
| | Use of Various Communication Methods | Ability to write emails, messages, letters, and other written forms fluently and correctly | 2 |
| | | Ability to use verbal methods such as discussions, interviews, and Q&A sessions appropriately | 2 |
| | | Ability to select, design, and use visual methods such as charts, tables, and images | 2 |
| | | Ability to use virtual communication methods such as video calls, online discussions, and video conferences | 2 |
| | | Ability to engage with the media and use press communication methods such as newsletters | 3 |
| | Negotiation and Conflict Resolution | Ability to use negotiation techniques such as identifying strengths and weaknesses, making proposals, etc. | 2 |
| | | Ability to understand the rights and responsibilities of negotiating parties, including faculty, staff, and students at the University of Applied Science and Technology | 2 |
| | | Ability to listen to the views and suggestions of all parties and incorporate them into decision-making | 3 |
| | | Ability to critique, empathize, and understand different perspectives | 2 |
| Professional Competencies | Mastery of Knowledge and Technologies | Ability to master technical knowledge in various fields such as computer networks, information security, programming, databases, artificial intelligence, etc. | 2 |
| | | Ability to solve technical problems and find suitable solutions | 2 |
| | | Ability to teach new knowledge and technologies to faculty and staff at the University of Applied Science and Technology | 3 |
| | | Ability to comply with regulations related to security, privacy, intellectual property rights, etc. | 2 |
| | | Ability to evaluate and decide on the adoption of new technologies | 2 |
| | Planning and Managing Educational Programs | Ability to develop necessary curricula for educational programs | 2 |
| | | Ability to define educational objectives to ensure high-quality and effective instruction | 3 |
| | | Ability to assess the educational needs of faculty and staff at the University of Applied Science and Technology | 1 |
| | | Ability to design and develop educational content using various resources | 2 |



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|---|---|---|---|
| | Developing Industry Relations | Ability to identify and analyze industry needs | 2 |
| | | Ability to engage with industry and participate in exhibitions, conferences, and industrial meetings | 3 |
| | | Ability to build networking relationships with industry professionals and companies for information exchange and collaboration opportunities | 2 |
| | | Ability to execute contracts with industrial companies and ensure proper implementation | 3 |
| Individual Competencies | Leadership Skills | Ability to manage time effectively to achieve goals and plan university projects | 3 |
| | | Ability to guide faculty and staff by fostering a participatory environment | 2 |
| | | Ability to handle adverse situations and make decisions in urgent circumstances | 2 |
| | | Ability to engage in self-development and enhance personal skills and knowledge for career growth | 2 |
| | Educational Competencies | Ability to assess student performance and provide feedback | 2 |
| | | Ability to use various teaching methods at different levels | 2 |
| | | Ability to integrate various technologies to enhance the teaching process | 3 |
| | | Ability to analyze educational needs and plan to meet them | 2 |
| | | Ability to continuously update personal knowledge and skills in diverse educational fields | 3 |
| | | Ability to collaborate in academic groups and utilize collective expertise | 2 |

**Table 4**

*Outcomes of the Empowerment of Heads of Centers in Higher Education*

| Outcome | Component | Indicator | Frequency |
|---|---|---|---|
| Educational Quality Improvement | Development of Educational Programs | Increase in employee participation in training programs to enhance organizational performance | 4 |
| | | Evaluation of post-training performance to determine future training needs | 2 |
| | | Impact on organizational performance, productivity, and reduction of errors and costs | 2 |
| | | Reduction of training costs by assessing expenditures in comparison with outcomes | 2 |
| | Student Support and Services | Evaluation of the quality of services and support based on student satisfaction levels | 3 |
| | | Determination of responsiveness to student needs to improve service and support quality | 2 |
| | | Social interactions and positive relationships with students to strengthen engagement and increase student satisfaction | 1 |
| | | Assessment of student access to support services to ensure appropriate facilities and amenities | 3 |
| | Faculty Empowerment | Increased faculty satisfaction and its impact on improving teaching and research quality | 3 |
| | | Updating faculty knowledge and experience through participation in training courses and workshops | 2 |
| | | Enhanced interaction and collaboration between faculty and students, leading to improved educational experiences | 2 |
| | | Academic advancement of faculty through improved quality and quantity of research projects | 3 |
| | Integration of Technology in Education | Improvement of student learning quality by increasing access to modern educational technologies | 2 |
| | | Increased educational efficiency through investment in new educational technologies | 2 |
| | | Facilitating effective communication between faculty, students, and administrators through advanced technologies | 1 |
| | | Optimal time utilization and prevention of burnout among faculty, students, and administrators through technology use | 3 |
| Organizational Learning | Commitment to Learning | Increased faculty and staff participation in training sessions and meetings for enhanced learning | 2 |
| | | Improved understanding of the importance of learning for enhancing faculty and staff performance | 3 |
| | | Valuing learning to improve faculty and staff efficiency and effectiveness | 3 |
| | | Encouragement and support of faculty, staff, and students for better learning outcomes | 3 |


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| | | | |
|---|---|---|---|
| | Assessment of Learning Needs | Awareness of learning needs to help faculty and staff identify their knowledge and skill gaps | 2 |
| | | Prioritization of knowledge and skill development needs for faculty and staff | 2 |
| | | Specialized assessment of faculty and staff expertise in specific fields | 2 |
| | Design and Development of Educational Programs | Setting educational objectives aligned with student needs and institutional policies | 2 |
| | | Evaluating and measuring student progress based on curriculum goals and content | 2 |
| | | Aligning educational programs with the broader academic goals of the university | 3 |
| | Implementation of Educational Programs | Classroom and instructional management, including time management, student behavior management, and effective student communication | 3 |
| | | Use of active and participatory teaching methods such as group exercises and discussions | 3 |
| | | Creating a conducive learning environment with appropriate facilities and resources aligned with student needs and curriculum requirements | 1 |
| Organizational Effectiveness | Development of Organizational Communication | Internal communication to assess faculty and staff trust in each other and in university leadership | 3 |
| | | Effective communication between managers, staff, and faculty to reduce risks and maintain university stability during crises | 2 |
| | | Strong communication with governmental entities to mitigate legal risks and improve governmental relations | 3 |
| | Development of Information Technology | Utilization of IT to improve efficiency and productivity in the university | 2 |
| | | Updating technology to keep pace with emerging changes | 3 |
| | | Enhancing IT security to protect university data from cyber threats | 2 |
| | | Leveraging IT to optimize organizational workflows, reduce processing time, improve accuracy, and minimize human errors | 2 |
| | Assessment and Feedback on Educational Quality | Improvement of faculty and staff performance based on indicators such as the number of positive and negative feedback instances and participation in training programs | 3 |
| | | Enhancement of internal and external university relations through indicators such as student complaints and media relations | 1 |
| | | Strengthened teamwork through feedback mechanisms between management, faculty, and staff | 3 |
| Job Satisfaction | Improvement of Working Conditions | Providing appropriate physical work environments, including proper lighting, ventilation, and overall comfort for faculty and staff | 3 |
| | | Ensuring adequate working tools and facilities for faculty and staff to perform efficiently | 2 |
| | | Providing career growth and advancement opportunities, fostering knowledge acquisition, and skill development | 3 |
| | | Implementing fair and effective managerial policies, including compensation, promotion, and quality management strategies | 3 |
| | Creating Career Advancement Opportunities | Offering training opportunities for faculty and staff to learn new skills and expand their knowledge base | 2 |
| | | Providing career progression opportunities for faculty and staff through promotions and professional development | 3 |
| | | Facilitating cognitive development for faculty and staff to enhance understanding of university management, students, and institutional culture | 2 |
| | | Encouraging personal development opportunities for faculty and staff to engage with emerging technologies, innovative work methods, and new teaching strategies | 3 |
| | Increased Satisfaction with Colleagues and Managers | Improving university management behavior to foster trust, support, and encouragement among faculty and staff | 2 |
| | | Enhancing positive interactions among managers, faculty, and staff through fair performance evaluations, open communication, and participatory decision-making | 3 |
| | | Strengthening management support for faculty and staff in job-related and financial matters | 3 |
| | | Ensuring fair and equitable treatment of faculty and staff by management to increase self-confidence and promote justice in the academic environment | 3 |

The extracted codes are displayed in a hierarchical and tree structure, illustrating their frequency across four or five levels. The following figure presents the thematic framework for identifying indicators, components, and dimensions of the empowerment of heads of centers at the University of Applied Science and Technology.



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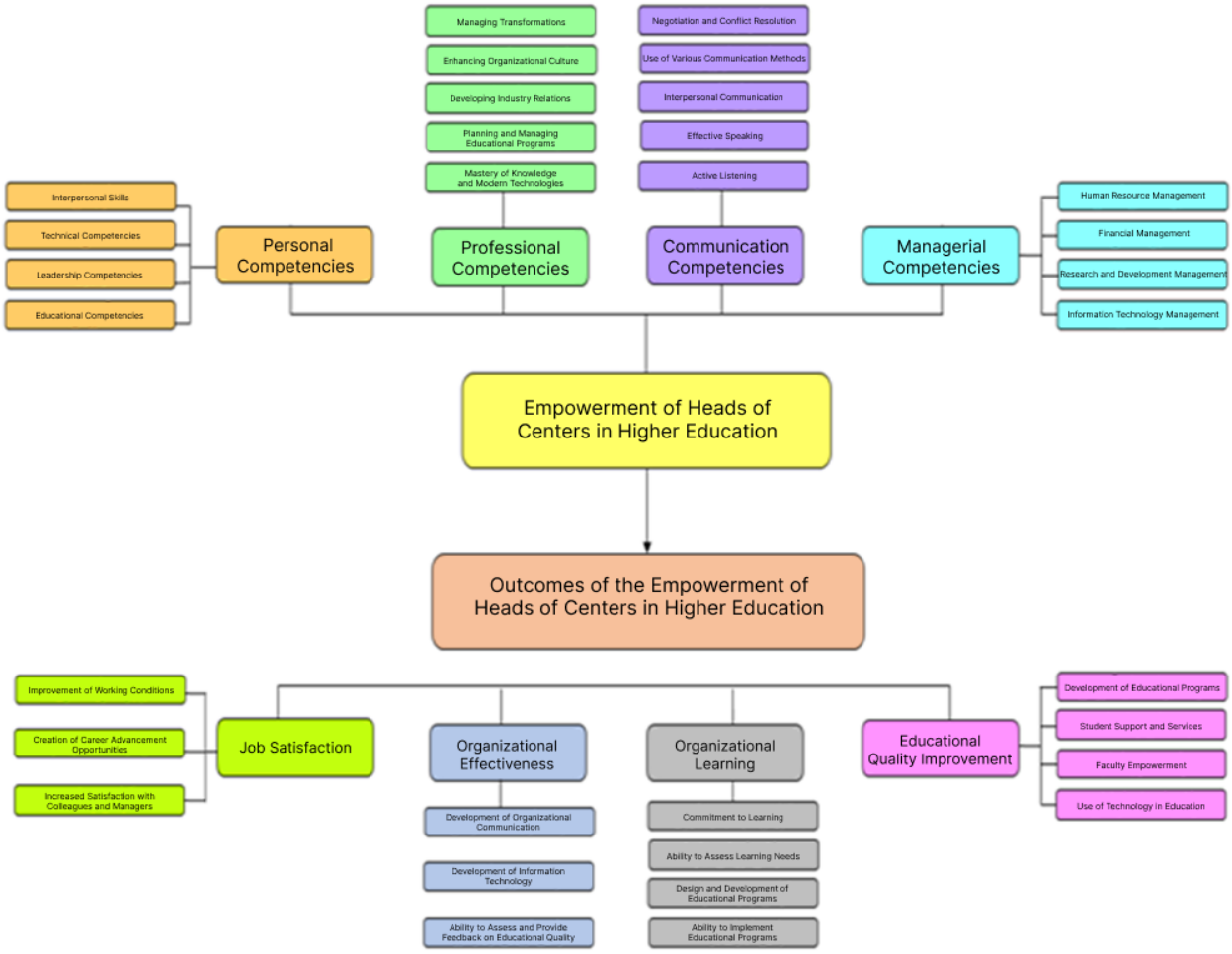
**Figure 1**

*Conceptual Model of the Study*




The validation of the above model is addressed in two aspects: internal and external validity. The validity of a model, as a key component of research, not only reflects the accuracy and reliability of the designed model's results but also indicates its applicability in real-world environments. Therefore, in the process of designing the empowerment capital model for heads of centers at the University of Applied Science and Technology, its validity was assessed. For this purpose, a 34-item questionnaire using a five-point Likert scale ranging from "very low" to "very high" was distributed among 30 experts in the field of empowerment related to the study's subject.

This questionnaire assessed the external validity of the designed model based on the components of objective, research method design, control of confounding variables, and model alignment. It also evaluated the internal validity of the designed model based on logical review, expert feedback, and sensitivity analysis. In this study, a one-sample t-test was used to assess the validity of each component. The results of this test generally indicated a high level of validity across the different components of the empowerment model for heads of centers at the University of Applied Science and Technology in terms of both internal and external validity. The table below presents the detailed statistical results of the one-sample t-test conducted to assess model validity.


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**Table 5**

*Findings from the One-Sample t-Test for Validity Assessment of the Empowerment Model for Heads of Centers*

| Component | Mean | Standard Deviation | Computed t | Significance Level | Mean Difference | Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| External Validity | 4.20 | 0.65 | 9.00 | 0.000 | 1.20 | 3.90 | 4.50 |
| Objective | 4.20 | 0.70 | 8.90 | 0.000 | 1.20 | 3.90 | 4.50 |
| Research Method Design | 4.25 | 0.70 | 9.10 | 0.000 | 1.25 | 3.90 | 4.60 |
| Control of Confounding Variables | 4.10 | 0.75 | 8.30 | 0.000 | 1.10 | 3.80 | 4.40 |
| Alignment | 4.05 | 0.80 | 7.50 | 0.000 | 1.05 | 3.70 | 4.40 |
| Internal Validity | 4.35 | 0.60 | 9.20 | 0.000 | 1.35 | 4.00 | 4.70 |
| Logical Review | 4.15 | 0.75 | 8.00 | 0.000 | 1.15 | 3.80 | 4.50 |
| Expert Feedback | 4.30 | 0.60 | 9.50 | 0.000 | 1.30 | 4.00 | 4.60 |
| Sensitivity Analysis | 4.40 | 0.55 | 9.80 | 0.000 | 1.40 | 4.10 | 4.70 |

According to Table 5, the significance level for both internal and external validity of the model and all components within these categories is less than 0.001, and the computed means range between 4.05 and 4.40. This clearly demonstrates the statistical significance of the findings with a 99% confidence level. This means that the obtained results were not generated randomly and confirm the high validity of the model. Therefore, it can be inferred that the designed model has considerable validity and can be used as a useful framework for enhancing the empowerment of heads of centers in higher education institutions.

Additionally, based on expert opinions, the internal validity of the designed model, with a mean of 4.35 and a computed t-value of 9.20, is higher than its external validity. Among the components of external validity, the research method design component had the highest validity, with a mean of 4.25 and a computed t-value of 9.10. On the other hand, within the components of internal validity, the sensitivity analysis component had the highest validity, with a mean of 4.40 and a computed t-value of 9.80.

Next, the internal validity of the model was assessed using confirmatory factor analysis (CFA) and the coefficient of determination ($R^2$), while the external validity of the model was measured through model fit indices and the $Q^2$ predictive relevance index.

Confirmatory Factor Analysis (Measurement Model) for Each of the Three Dimensions: In this stage, confirmatory factor analysis based on partial least squares (PLS) was used to confirm the model fit. According to the findings, the significance levels for all components and indicators exceeded 1.96, indicating that the model is statistically significant and possesses the necessary validity.

Coefficient of Determination ($R^2$) for Assessing Internal Validity: The $R^2$ coefficient for dependent latent variables was used to measure the internal validity of the empowerment model for heads of centers at the University of Applied Science and Technology. The $R^2$ coefficient represents the effect of an independent variable on a dependent variable, where values of 0.19, 0.33, and 0.67 are considered weak, moderate, and strong, respectively. The $R^2$ values obtained for all three dimensions exceeded 0.67.

Predictive Relevance Index ($Q^2$) for Assessing External Validity: The $Q^2$ index evaluates the predictive power of the model for dependent variables. Interpretation criteria for $Q^2$ are 0.02 (low predictive power), 0.15 (moderate predictive power), and 0.35 (high predictive power). A positive $Q^2$ value indicates a desirable predictive model. The $Q^2$ values for the main structural dimensions were 0.312, 0.238, and 0.295, which are positive and fall within an acceptable range. This confirms that the model has an appropriate predictive capacity across all three dimensions.

Model Fit Index (GOF): The GOF index, introduced by Tenenhaus et al. (2005), serves as a general model fit criterion and is calculated as the geometric mean of the communalities and $R^2$ values using the following formula:

$GOF = \sqrt{(\text{mean communality} \times \text{mean } R^2)} = \sqrt{(0.561 \times 0.76)} = 0.652$

Structural equation modeling (SEM) experts using PLS methodology consider a GOF index below 0.1 as weak, between 0.1 and 0.25 as moderate, and above 0.36 as strong. According to these criteria, the GOF index obtained for the examined model was 0.652, which falls within the strong category. Based on these findings, it can be concluded that the tested model exhibits an appropriate fit for the examined sample. Furthermore, since the factor loadings for all observed variables in the model exceeded 0.5, with significance levels greater than 2.58, the construct validity of the model is considered satisfactory.



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## 4. Discussion and Conclusion

In this study, based on the meta-synthesis method, expert interviews, and the Delphi technique, the final research model was developed, comprising the dimensions of managerial competencies, communication competencies, professional competencies, and personal competencies. The dimensions and components of the empowerment of heads of centers in higher education include managerial competencies (managerial competencies, communication competencies, professional competencies, and personal competencies), communication competencies (active listening, effective speaking, interpersonal communication, the use of various communication methods, and negotiation and conflict resolution), professional competencies (mastery of knowledge and modern technologies, planning and managing educational programs, developing industry relations, enhancing organizational culture, and managing transformations), and personal competencies (interpersonal skills, technical competencies, leadership competencies, and educational competencies). Additionally, the outcomes of the empowerment of heads of centers at the University of Applied Science and Technology include four dimensions: educational quality improvement (development of educational programs, student support and services, faculty empowerment, and the ability to use technology in education), organizational learning (increased commitment to learning, the ability to assess learning needs, the design and development of educational programs, and the ability to implement educational programs), organizational effectiveness (development of organizational communication, IT development, and the ability to assess and provide feedback on educational quality), and job satisfaction (improvement of working conditions, creation of career advancement opportunities, and increased satisfaction with colleagues and managers).

The managerial competencies dimension includes the ability to manage human resources, financial management, research and development management, and information technology management. Overall, the findings of this study align with the results of studies by Bigdeli et al. (2022), Beikzad et al. (2017), Maiorani and Freeman (2021), and Lin et al. (2022). Human resource management is one of the key competencies of managers; heads of centers must be skilled in hiring, training, motivating, and evaluating employee performance. Creating an environment where employees feel committed, creative, and innovative is part of their responsibilities. They must also be proficient in conflict resolution among employees and fostering reconciliation. Another essential competency is financial management, where heads of centers must effectively plan and allocate financial resources. They must monitor and control expenditures efficiently and possess the ability to attract financial resources from both private and public sectors. Additionally, heads of centers must have the ability to manage research and development by supporting research and innovation activities within their centers, establishing strong relationships with industry and other stakeholders, and commercializing research outcomes and innovations. Lastly, IT management is another crucial competency; heads of centers must be proficient in utilizing information technology to enhance educational and administrative processes, ensuring cybersecurity, protecting institutional data, and staying ahead in adopting the latest educational and administrative technologies.

The communication competencies dimension includes active listening, effective speaking, interpersonal communication, the use of various communication methods, and negotiation and conflict resolution. The findings of this study align with prior findings (Akter et al., 2023; Ariana & Daneshfard, 2020; Bigdeli et al., 2022; Ebrahimi Shad, 2021). Active listening is one of the critical components of this dimension; it involves fully concentrating on the speaker and deeply understanding their message. This competency enables university heads to comprehend the needs, concerns, and suggestions of stakeholders and provide appropriate responses. Another necessary competency is effective speaking, as clear and persuasive communication is essential for conveying university policies, decisions, and perspectives. Effective articulation allows others to understand and trust managerial messages. Heads of centers must also have strong interpersonal communication skills to establish productive relationships and foster internal and inter-organizational collaboration. Additionally, the ability to use various communication methods is a crucial skill, given the diversity of communication technologies. This competency includes proficiency in email, social media, online platforms, and virtual meetings. Finally, negotiation and conflict resolution are essential skills, as disputes inevitably arise in organizations, and the ability to manage these conflicts and achieve mutually beneficial agreements through negotiation is vital. These communication competencies enable university heads to foster a culture of transparency and trust within the academic environment, enhance collaboration, and improve organizational performance. As a result, these competencies form the


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foundation for effective managerial empowerment in higher education institutions.

The professional competencies dimension includes mastery of knowledge and modern technologies, planning and managing educational programs, developing industry relations, enhancing organizational culture, and managing transformations. The findings of this study align with prior findings (Bigdeli et al., 2022; Mohebi & Eslami, 2020; Torkzadeh et al., 2017). These competencies, selected based on managerial and specialized needs in educational and research environments, play a significant role in the empowerment and success of heads of centers at the University of Applied Science and Technology. One of these competencies is the mastery of knowledge and modern technologies, as the ability to leverage up-to-date knowledge and technological advancements is fundamental for promoting education and research. This includes familiarity with the latest developments across various scientific and technological fields. Another necessary competency is the ability to plan and manage educational programs, a core responsibility of university heads to provide effective and diverse learning opportunities for students and researchers. Additionally, developing industry relations is essential, as fostering collaborations with industries and various sectors can enhance research activities, facilitate technology transfer, and create job opportunities for students and graduates. Heads of centers must also enhance organizational culture, as a strong organizational culture promotes cooperation, innovation, and efficiency. Lastly, managing transformations is critical in dynamic educational environments, where adaptation to technological changes, labor market demands, and educational policies is imperative. These professional competencies are essential for successful leadership in applied science and technology institutions.

The personal competencies dimension includes interpersonal skills, technical competencies, leadership skills, and educational competencies. The findings of this study align with previous findings (Jalali Far, 2015; Mohammadi & Zahed Babolan, 2022). These competencies vary at different job levels and for various responsibilities. For heads of centers at the University of Applied Science and Technology, four types of competencies are particularly important. First, interpersonal skills are essential, as heads must communicate clearly and concisely with employees, students, and higher authorities. They must also be proficient in written communication for preparing reports, instructions, and other documents effectively. Active listening is another crucial aspect of interpersonal skills. Second, technical competencies are necessary, as heads of centers must have in-depth knowledge of their field and the institution's focus areas. They must be able to solve complex problems and make timely decisions. Strong computer literacy is also required to utilize information technology effectively. Third, leadership skills are essential, as heads of centers must motivate employees and students to achieve common goals, build strong and efficient teams, and facilitate coordination among team members. They must also make firm and sound decisions while taking responsibility for their actions. Lastly, educational competencies are crucial, as heads of centers must design and deliver training programs, assess their effectiveness, and continuously update their teaching skills. These four types of competencies are closely interconnected. For instance, an effective leader must also possess strong communication skills to interact efficiently with their team. Similarly, an educator must have extensive knowledge of their subject matter.

Based on the findings of this study, it can be concluded that the empowerment model for heads of centers in higher education (University of Applied Science and Technology) is a comprehensive and integrated framework that can enhance their empowerment. This model emphasizes four main dimensions: managerial competencies, communication competencies, professional competencies, and personal competencies. Managerial competencies encompass the skills and knowledge required to effectively manage an organization or a part of it, including strategic planning, resource organization, team and individual leadership, decision-making, problem-solving, and performance evaluation. Communication competencies enable the efficient exchange of information and ideas, covering verbal and non-verbal communication, listening, writing, presentation, negotiation, and mediation skills. Professional competencies involve specialized knowledge and skills related to a particular field, acquired through formal education and practical experience. Personal competencies refer to attributes that contribute to individual success in the workplace, such as self-awareness, intrinsic motivation, confidence, resilience, creativity, innovation, and time and stress management skills.

Additionally, the findings showed that the external validity of the designed model, based on components such as objective, research method design, control of confounding variables, and model alignment, and the internal validity based on logical review, expert feedback, and sensitivity analysis, was high. Experts' opinions further confirmed that


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the internal validity of the designed model was greater than its external validity. Among the external validity components, research method design had the highest validity, while among internal validity components, sensitivity analysis had the highest validity. Therefore, it can be concluded that this model, with its strong and precise structure, can help analysts and researchers gain a better understanding of the empowerment of university heads and contribute to its improvement, leading to better decision-making and more effective empowerment strategies. This underscores the importance of internal validity, ensuring the accuracy and reliability of research findings, alongside external validity for broader applicability.

One of the main limitations of this study is that its statistical population is limited to the heads of centers in higher education, which restricts the generalizability of the findings to managers and administrators of other organizations and institutions. Additionally, this study is cross-sectional, meaning that its results are based on data collected at a specific point in time; therefore, given the continuous changes in educational, cultural, and technological domains, caution should be exercised in interpreting and applying the findings in future contexts. Furthermore, some heads of centers at the University of Applied Science and Technology were unwilling to cooperate, which may have affected the results. External factors, such as religious, cultural, economic, political, and social variables, could also act as confounding variables, influencing the research outcomes beyond the control of the researcher.

Future research should explore this topic using a similar methodology in different organizational settings, including other universities, government agencies, and private institutions, to compare the results and examine the broader applicability of the proposed model. Conducting longitudinal studies in the future is also recommended to address any gaps in the designed framework by adapting it to evolving conditions. Additionally, future studies should ensure participant cooperation before data collection to obtain more accurate and generalizable findings. It is also suggested that future research investigate the impact of religious, cultural, economic, political, and social factors on the study's results to provide a more comprehensive understanding of the variables influencing the empowerment of university heads.

## Authors' Contributions

This article is derived from the first author's doctoral dissertation. All authors significantly contributed to this study.

## Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

## Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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## Declaration of Interest

The authors report no conflict of interest.

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## Ethical Considerations

In this study, to observe ethical considerations, participants were informed about the goals and importance of the research before the start of the interview and participated in the research with informed consent.

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