Design and Validation of a Professional Development Model for Senior Managers at the University of Applied Science and Technology for Sustainable Development

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Abstract

The present study aimed to design and validate a professional development model for senior managers at the University of Applied Science and Technology to promote sustainable development. The research employed a qualitative method, specifically meta-synthesis and the Delphi technique. The statistical population included scientific documents and organizational and academic experts. For the systematic literature review, a non-random purposive sampling method was used to select theoretical foundations and prior research (27-item checklist based on the PRISMA model). Similarly, non-random purposive sampling was employed for selecting experts. Data collection for the systematic review involved studying books, journals, online resources, and databases. After selecting the sources, data extraction and translation of relevant texts were conducted. Additionally, semi-structured interviews were used in the expert interview section. In the systematic review section, data collection tools were documentary studies aligned with the research approach of systematically reviewing the literature. Semi-structured interviews were also employed in this part of the study. To assess validity, the term "credibility" was applied. Furthermore, the validity of the questionnaire was established using face validity, content validity, and construct validity. Reliability was calculated and confirmed using Cronbach's alpha and composite reliability coefficients. Data analysis was performed using theoretical coding based on thematic analysis with MAXQDA software. The results indicated that the dimensions of professional development for senior managers at the University of Applied Science and Technology include cognitive development (self-awareness, knowledge acquisition, research competence, and understanding organizational learning processes), behavioral-judgmental development (value development, attitude development, and interest development), managerial-leadership development (organizational management skills, environmental adaptability, functional development, and guidance capabilities), and spiritual-ethical development (leadership ethics, ethical behavior development, and normative development).

Keywords: *Professional development, Managers, University of Applied Science and Technology, Sustainable development.*

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1. Introduction

Universities and academic centers, as key influential entities shaping the future through human resource development, are recognized globally as the most significant strategic assets of organizations, providing numerous advantages [1]. The professionalism of university managers has consistently been one of the most critical factors affecting educational quality. Professional managers are capable of creating conditions for effective teaching despite financial and environmental constraints [2]. Emphasizing the role of educational and developmental institutions in transitioning to a sustainable development-based society is an undeniable necessity [3]. Sustainable human resource development is pivotal for achieving sustainable development goals at local, regional, and international levels [4-6]. Sustainable development models for human growth necessitate the utilization of educational systems [7, 8], which are articulated through professional development. Professional development enhances individuals' capabilities and improves workforce productivity, subsequently improving the quality of the workforce in sectors such as education, healthcare, economy, environment, and human rights [9]. Another benefit of professional development is its role in students' academic success and development [10]. Professional development involves intellectual and personal efforts that lead to interaction, collaboration, and the generation of new ideas [11]. It refers to continuous and positive changes in individuals' professional capacities, serving as an empowering activity that enhances knowledge, attitudes, and skills to improve current and future performance [12].

Sustainable development and professional development are interdependent factors, meaning they positively correlate and move in the same direction [13]. The most common approach to enhancing the effectiveness and health of educational systems is professional development [14]. Professional development encompasses any activity designed to enhance managers' professional competencies by improving their knowledge, skills, or inclinations. It is a comprehensive, continuous, and focused approach aimed at improving managers to increase the effectiveness of employees, faculty, and ultimately students [2]. A lack of professional development jeopardizes achieving the sustainable development goals outlined in the 2030 Agenda [9].

The components of competency and professionalism in human resources include personality foundations (work discipline, mental health, patience), professional skills, intellectual foundations, and communication skills [15]. Research findings indicate numerous factors influencing professional development, including external support and collective collaboration [16], creativity and team learning [17], organizational factors [18], new managerial styles and approaches, self-development [19], material security policies, professional competence, and psychological motivation [20], financial and economic support (Won Sochudaltz et al., 2018), use of social media [21], time management skills, confidence to achieve goals [22], communication skills [23], creative skills, computer literacy and technology, media communication and awareness [24], learning from academics [25], and collaboration with other managers and internal organizational communications [26].

Since educational systems are the cornerstone of societal transformations and are recognized as fundamental for enhancing human capital [10, 27, 28], providing strategies for promoting sustainable development in universities is crucial. Furthermore, professional development is vital for achieving quality and sustainable development goals [29]. The University of Applied Science and Technology, as one of the pillars of higher education in the country, emphasizes self-sufficiency in high-quality human resources aligned with professional mission orientation and diversifying development mechanisms. Therefore, this university requires a model for professional development and, consequently, sustainable development. Given that university managers, as implementers and overseers of executive processes, play a crucial role in standard mechanisms for university development and significantly impact the quality of the educational units they lead, this study seeks to answer the question: What model can be designed for the professional development of senior managers at the University of Applied Science and Technology to achieve sustainable development?

2. Methodology

The research method, in terms of purpose, is applied, and in terms of data type, it is qualitative, employing meta-synthesis and the Delphi technique. The statistical population of this study consists of two main sections. The first section involves the analysis of scientific documents and resources, including specialized books, completed research projects, theses, and articles retrieved from domestic databases from 2017 to 2023 and international databases from 2018 to 2023. These resources specifically

address the professional development of senior managers at the University of Applied Science and Technology for sustainable development. The second section involves experts, comprising university professors from the academic years 2021–2022 who meet specific inclusion criteria, including a minimum of three years of teaching and research experience related to the topic, possession of a Ph.D. degree with faculty membership in fields such as human resource management and higher education management, and sufficient expertise and experience in professional development activities such as publishing articles, books, and research projects. Additionally, experienced administrators of the University of Applied Science and Technology were included based on criteria such as more than three years of executive management experience, relevant expertise in professional development through activities like authoring publications and conducting research projects, and holding at least a master's degree.

In the systematic literature review section, non-random purposive sampling was employed to select theoretical foundations and previous research based on inclusion criteria, using a 27-item checklist aligned with the PRISMA model. The sample size was determined based on the theoretical foundations and prior research selected by the researcher, in accordance with the study objectives and the nature of the research, structured using the PRISMA model flow diagram. Similarly, non-random purposive sampling was applied to select interviewees according to the inclusion criteria. A total of 24 participants were interviewed, with data collection ceasing at interviewees 25 and 26, as no new codes emerged, indicating data saturation.

The data collection tools included documentary studies for the systematic literature review, reflecting the research approach of systematically reviewing the existing literature. Meta-synthesis, or research synthesis, was conducted as an exhaustive review of scientific works on the topic, encompassing the search, identification, selection, and synthesis of relevant literature and prior studies. Semi-structured interviews were used in the qualitative section of the study. During individual interviews, two initial questions were posed to participants, derived from the research topic, model, and objectives, to gather in-depth qualitative insights.

The data analysis method involved theoretical coding, based on thematic analysis, which was conducted using MAXQDA software to systematically organize and interpret the qualitative data.

3. Findings and Results

In this qualitative section, interviews were conducted with 24 experts, specialists, and informed individuals. Among the participants, 10 held master's degrees, and 14 held doctoral degrees. Six experts had less than 10 years of work experience, 10 had between 11 and 20 years, and 8 had more than 20 years of experience. In terms of age distribution, 4 participants were under 45 years, 5 were between 45 and 50 years, 9 were between 51 and 55 years, and 6 were over 55 years old. Table 1 presents the integration of codes extracted from the systematic literature review and interviews with experts, displaying both common and distinct codes.

Table 1. Integration of Concepts Extracted from the Systematic Literature Review and Expert Interviews

Selective Coding	Axial Coding	Open Coding (Indicators)/Basic Units
Personal Development	Sustainable Thinking	The manager has the ability to focus on goals.
		The manager can identify university priorities.
		The manager possesses personal stability.
		The manager has tireless motivation.
		The manager considers various strategies in human resource management.
	Sustainable Attitude	Alignment between organizational thinking and individual management attitudes is evident.
		The manager values group thinking over individual thinking.
		The manager demonstrates decisiveness in decision-making.
		The manager exhibits optimism.
		The manager has a positive attitude toward admitting mistakes.
	Sustainable Moral Education	The manager is known for good character.
		The manager prioritizes honesty and integrity.

		The manager adheres to ethical values.
		Traits such as materialism, authoritarianism, and neglecting the virtue of service are absent.
		Receptiveness to criticism, safeguarding public funds, and avoiding greed are key features.
Economic Development	Consumption Pattern	Proper management of available resources.
		Allocation of credits and financial resources based on goals and plans.
		Time management for implementing managerial plans and organizing resources.
		Budget prioritization and avoidance of unnecessary expenditures.
	Resource Mobilization	The manager utilizes university production capacities, such as managing classes and cafeterias.
		The manager enhances interactions to secure timely funding from higher authorities.
		The manager generates income through selling deteriorating equipment.
	Economic Capacity Building	Development of permanent faculty capacities.
		Optimization of payments and educational incentives to enhance knowledge and research capacity.
		Skill-based programs to enhance university faculty capabilities.
Social Development	Opportunity Creation	Strategic planning enhances individual knowledge in society.
		Strategic planning enhances social knowledge in society.
		Skill-based planning supports employment generation.
		Planning ensures educational equity.
	Participation	University-industry linkages are fostered through proper planning.
		Knowledge development aligned with societal needs is achieved.
		Planning addresses production obstacles.
	Technology Transfer	International collaborations facilitate technology transfer based on science.
		The manager uses academic capacities and research development to achieve modern technologies.
		Growth and development of innovation centers and knowledge-based companies support technology transfer.
		Academic and research advancements enhance societal practical capabilities.

Based on the identified issues, the study's conceptual model is presented as follows.

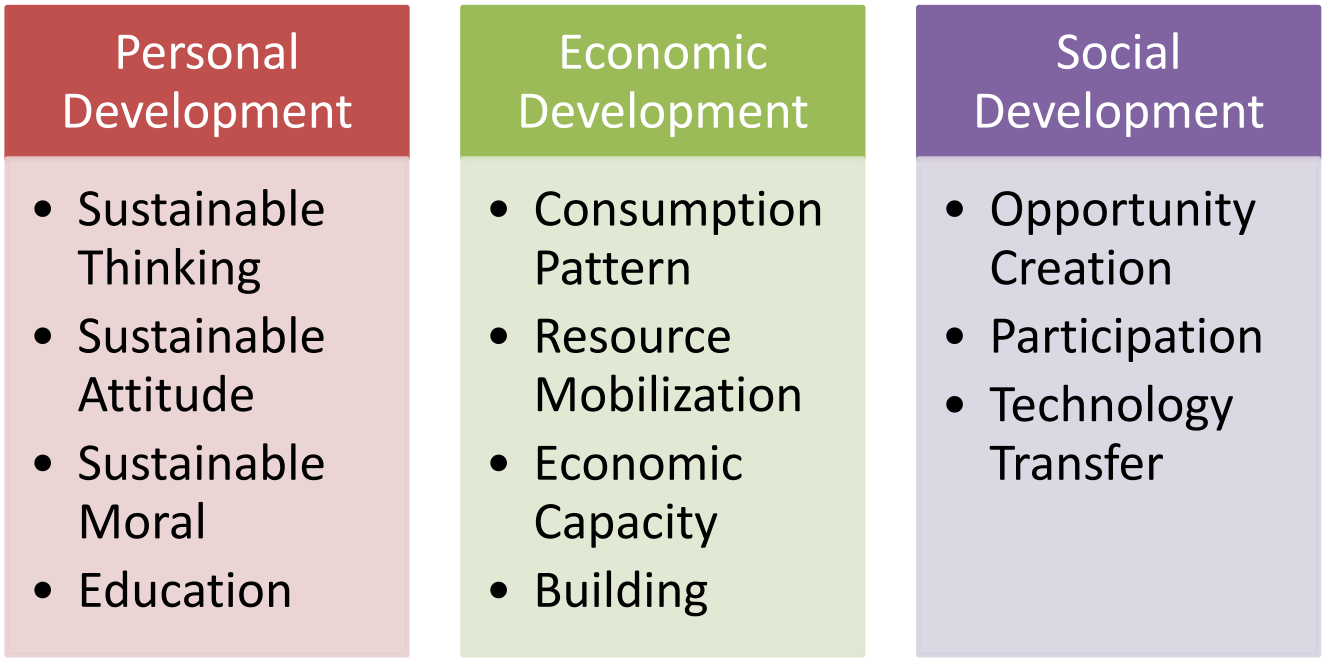

Figure 1. Conceptual Model

To assess the fit of the final model, a five-point Likert scale questionnaire was designed to evaluate the degree of model suitability. The questionnaire was distributed to 24 experts in this field. The collected data were analyzed using a one-sample t-test, with the results presented in Table 2.

Table 2. Results of One-Sample T-Test to Determine the Degree of Suitability of the Proposed Model for Final Model Presentation (Expected Mean = 3)

Row	Item	Question	Mean	Standard Deviation	T-Statistic	Degrees of Freedom	Significance Level
1	Alignment	Are the concepts derived from theoretical foundations and expert interviews?	3.41	1.27	9.42	23	0.00
2	Comprehensibility	Are the identified factors sufficiently clear and systematically interconnected?	3.78	1.25	11.74	23	0.00
		Are the identified factors well-categorized and labeled?	3.65	1.36	8.67	23	0.00
3	Generalizability	Is the model explained in a way that accounts for varying conditions and is generalizable?	3.81	1.21	10.55	23	0.00
		Have broader conditions (confounding variables) that might affect the studied phenomenon been explained?	3.76	1.15	10.19	23	0.00
4	Control	Do the findings on which the model is based appear significant?	3.75	0.84	12.86	23	0.00

1. **Alignment:** The calculated t-statistic (9.42) is significant at the 0.01 level. Comparing the mean of this component (3.41) with the expected mean indicates that the alignment of the model is valid and confirmed with 99% confidence by the experts.
2. **Comprehensibility:** The calculated t-statistic (11.74) is significant at the 0.01 level. Comparing the mean of this component (3.78) with the expected mean shows that the comprehensibility of the model is valid and confirmed with 99% confidence by the experts. For the questions under this item, the t-statistic calculated for both questions is significant at the 0.01 level, and the observed mean for each question exceeds the expected mean (3). Thus, comprehensibility is considered a valid component of the model.

3. **Generalizability:** The calculated t-statistic (10.55) is significant at the 0.01 level. Comparing the mean of this component (3.81) with the expected mean demonstrates that the generalizability of the model is valid and confirmed with 99% confidence by the experts. For the questions under this item, the t-statistic calculated for both questions is significant at the 0.01 level, and the observed mean for each question exceeds the expected mean (3). Thus, generalizability is considered a valid component of the model.
4. **Control:** The calculated t-statistic (12.86) is significant at the 0.01 level. Comparing the mean of this component (3.75) with the expected mean indicates that the controllability of the model is valid and confirmed with 99% confidence by the experts. For the questions under this item, the t-statistic calculated for both questions is significant at the 0.01 level, and the observed mean for each question exceeds the expected mean (3). Thus, controllability is considered a valid component of the model.

It is worth noting that in addition to the expert survey on six questions and four items for model validation, confirmatory factor analysis was conducted. The measurement model for validating the model was developed using LISREL v8.8 software and is presented in Figures 4-9 through 4-18 for each dimension separately. As evident from the measurement models, the t-values for all indicators and components exceed 2.58, confirming each indicator and component for every dimension with 99% confidence. No indicators or components require removal.

4. Discussion and Conclusion

This study aimed to design and validate a professional development model for senior managers at the University of Applied Science and Technology to promote sustainable development. The findings revealed that the dimensions of professional development for senior managers include cognitive development (self-awareness, knowledge creation, research, and understanding organizational learning processes), behavioral-judgmental development (value development, attitudinal development, and interest development), managerial-leadership development (organizational management, environmental adaptation, performance improvement, and guidance), and spiritual-ethical development (leadership ethics, moral behavior, and normative development).

Cognitive development plays a crucial role in enhancing educational quality and advancing these universities. Managers with advanced cognitive thinking can effectively outline long-term visions and goals for the university and develop strategies to achieve them. They can analyze complex challenges, propose creative solutions, and engage effectively with stakeholders to mobilize them toward shared objectives. Additionally, cognitively developed managers embrace new ideas, utilize them to improve university processes and services, and adopt new technologies to foster a dynamic and innovative learning environment. They can identify and address complex problems, analyze information efficiently, and make evidence-based decisions while considering diverse perspectives. Strong problem-solving skills allow these managers to enhance institutional resilience and adaptability in the face of challenges.

Behavioral-judgmental development is another critical dimension that enhances educational quality and institutional progress. Inspirational and motivational leadership contributes to this development. Managers with positive attitudes and behaviors serve as role models for staff and students, fostering motivation and creating an environment where individuals feel valued, supported, and encouraged. By sharing their enthusiasm for education and learning, these managers build trust and collaboration. Strong interpersonal skills further enable managers to establish positive relationships with staff, students, stakeholders, and the broader community, facilitating effective communication and stakeholder engagement.

Managerial-leadership development is an essential aspect of professional growth for senior managers at these universities, contributing significantly to institutional advancement. Managers with strong managerial skills can design and implement effective programs and strategies, allocate resources efficiently, and create functional and efficient processes and systems. Human resource management skills allow them to attract, recruit, and retain talented staff while fostering a positive work environment where employees feel valued and encouraged.

Spiritual-ethical development emphasizes the importance of moral judgment and commitment to ethical values. Managers with strong ethical values act as role models, promoting a culture of integrity, accountability, respect, and fairness. They incorporate ethical considerations into decision-making processes and create an inclusive

educational environment where all students feel respected and supported. These managers encourage open dialogue and the exchange of ideas, helping students discover their purpose and achieve their potential. With a strong sense of social responsibility, they position the university as a positive force in the community, facilitating social engagement opportunities for students and staff and collaborating with organizations to address societal challenges. Additionally, managers with an understanding of mental health can support the well-being of students and staff by implementing programs that promote resilience and stress management and providing resources for those facing mental health challenges.

The findings align with those of Karaminejad et al. (2022), who identified leadership skills, personal development, entrepreneurial skills, professional ethics, and communication skills as core themes [30]. Hosseini-Halim et al. (2022) identified 12 strategies for professional development, emphasizing educational and research skill enhancement [31]. Karami et al. (2022) highlighted barriers to professional development, including inadequate managerial attention to strategic goals and inefficient educational systems, underscoring the need for systemic reforms [32]. Taherpour Kalantari et al. (2022) proposed a conceptual model of professional development grounded in religious, cultural, social, political, and economic principles, offering inner (individual, skill-based, and content) and outer (technological, organizational, and communication) dimensions [15]. Akrami et al. (2022) observed that recent synthesis studies indicate professional development models can be segmented into knowledge, character, and action dimensions [33]. Barati (2022) identified individual, organizational, and environmental dimensions, with organizational factors playing the most significant role [2]. Yazdani et al. (2022) categorized professional development methods into formal and informal approaches, emphasizing the importance of continuing education and practical application [34]. Adli (2021) highlighted the challenges of aligning current professional development programs with technological and scientific advancements, proposing key knowledge management components to address these gaps [35]. Zulkifli and Usman (2023) emphasized similar themes in their study [36].

The interdependence of sustainable and professional development is evident, as they positively reinforce each other and progress in tandem [13]. Professional development is a proven approach to enhancing the effectiveness and health of educational systems (Brown & Militello, 2016). It encompasses activities designed to improve managerial competencies through knowledge, skills, and attitudes [2]. Its absence jeopardizes sustainable development goals as outlined in the 2030 Agenda [9].

Given its critical role, the University of Applied Science and Technology requires a professional development model aligned with its mission-driven goals and commitment to self-sufficiency in high-quality human resources. As implementers and overseers of university processes, senior managers play a strategic role in advancing institutional quality and standards. The model validated in this study demonstrates high reliability in alignment, comprehensibility, generalizability, and control dimensions, offering a valuable framework for professional development toward sustainable growth.

To enhance the cognitive development of senior managers at the University of Applied Science and Technology, it is essential to implement specialized training programs focused on key areas such as strategic management, creative thinking, emotional intelligence, and effective communication. These programs should be designed to equip managers with the skills needed to analyze complex challenges, make evidence-based decisions, and align long-term institutional goals with practical strategies. Workshops aimed at improving cognitive skills, such as critical thinking, focus, and problem-solving, can further strengthen their ability to navigate the complexities of higher education management. Providing opportunities for mentorship and coaching can enable managers to benefit from the expertise of experienced professionals, while supporting advanced studies will help them enhance their academic and professional qualifications. These efforts collectively contribute to fostering a mindset of innovation and adaptability, essential for keeping the university aligned with evolving trends in higher education.

Behavioral and judgmental development can be promoted by offering comprehensive workshops on leadership, interpersonal communication, conflict resolution, and time management. These initiatives can help managers build positive relationships with faculty, staff, students, and stakeholders, creating an environment of trust and collaboration. By fostering inspirational leadership, managers can serve as role models, motivating their teams to achieve shared goals while cultivating a culture of inclusivity and support. Mentorship programs tailored to ethical decision-making and organizational behavior can help managers integrate values of integrity, accountability, and respect into their leadership style. Additionally, creating

spaces for open dialogue and professional exchange can enhance their ability to address organizational challenges while fostering a shared commitment to excellence in education.

Managerial, leadership, and ethical-spiritual development can be achieved by providing managers with training programs that focus on organizational planning, resource allocation, and decision-making under complex conditions. These programs should emphasize practical skills in managing institutional resources efficiently, fostering operational excellence, and promoting talent acquisition and retention strategies. Moreover, ethical-spiritual development requires targeted initiatives, such as workshops on applied ethics, that equip managers with the tools to navigate moral dilemmas in the workplace. Facilitating opportunities for managers to engage in community service and social responsibility initiatives can further instill a sense of purpose and enhance their ability to lead with empathy and integrity. Mental health awareness programs that address resilience, stress management, and well-being are also vital for creating a supportive environment for students and staff, ensuring that the university becomes a space where individuals can thrive both professionally and personally. These integrated recommendations can collectively drive the professional growth of senior managers, empowering them to contribute effectively to the sustainable development of the university.

Authors' Contributions

Authors equally contributed to this article.

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Declaration of Interest

The authors report no conflict of interest.

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Ethical Considerations

All procedures performed in this study were under the ethical standards.

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