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Structural Modeling of School Managers' Competencies as a Driver for Sustainable Development

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ABSTRACT

Purpose: This study focused on the structural modeling of competencies of high school managers in Tehran as a driver for sustainable development.

Methodology: From the perspective of its objective, this research is developmental-applied, and in terms of data collection, given the nature of the study, it is descriptive-survey. The statistical population in the quantitative section includes high school managers from districts 2, 5, 6, and 8 in Tehran, who have experience in managing high schools and are active in executive and research activities in the field of education. Therefore, the sample size for the forthcoming research is 384 individuals, for which 384 questionnaires were used for data analysis. To measure the research variables, questionnaires by Shamsudin & Chutipattana (2012) and Wayla & Tolud (2021) were utilized. The reliability of the questionnaire was calculated based on Cronbach's alpha, and the validity of the questionnaire was based on confirmatory factor analysis. In the present research, the structural equation modeling method was used for data analysis. The software used for data analysis were SPSS-22 and SMARTPLS-4.

Findings: According to the research findings, the professional competency model of school managers includes competency enablers, management competencies, ethics and professional behavior competencies, manager development, social indicators of managers, the establishment of work groups to enhance performance and green competency, attitudinal competencies, knowledge competencies, educational competencies, commercialization of knowledge-skills and technology competencies, hardworking spirit, consumption pattern modification, and participation in development towards national authority, which lead to the realization of results such as a hardworking spirit, consumption pattern modification, and participation in development.

Conclusion: The professional competency model of school managers in high schools, with the expansion of professional competency, can assist managers and planners of educational systems in improving educational and training conditions.

Keywords: Competency, Sustainable Development, School Managers.

1. Introduction

Retrospective Look at the Global Environmental Situation: Evidently, in recent decades, Earth has endured irreversible damages due to human activities. According to the 2022 United Nations Environment Programme report, the 21st century has seen escalating environmental problems (Biermann et al., 2022). Increases include a one-degree rise in temperature, a 1.5 times increase in carbon dioxide emissions, a 10-fold increase in human contributions to the destruction of the ozone layer from 5% to 50%, a 10-fold increase in ozone layer depletion, and a yearly loss of approximately 13 million hectares of forests over the last decade. Furthermore, 5 million deaths annually due to exposure to chemical wastes are among the alarming statistics reported by the United Nations. Environmental degradation, due to its adverse effects on humanity, has become one of the biggest challenges in the contemporary world. The crises of the modern environment are born from materialistic, expansionist, and dominating ideologies and the disarray in human-environment interactions. It is an undeniable reality that environmental issues are one of the most significant concerns of the third millennium, primarily caused by improper human behaviors (Biermann et al., 2022).

Due to emerging problems such as natural resource degradation, environmental pollution, poverty, and inequality, the concept of sustainable development was introduced. The traditional paradigm of development aims to achieve economic growth at any cost, whereas the new paradigm considers qualitative growth with an emphasis on environmental protection and social justice. Higher education, due to its high impact factor in raising awareness and enhancing the necessary capabilities of individuals in society, possesses the requisite capacity to initiate the sustainable development movement. Since the Stockholm Conference in 1972, which highlighted the role of education in international environmental conservation, higher education institutions have increasingly explored their role in achieving sustainable development (Findler et al., 2019).

The university is among the most important institutions closely connected to various societal dimensions and is expected to create the necessary platforms for generating knowledge and its distribution and dissemination, paving the way for comprehensive national development. Although higher education institutions in the third millennium have faced challenges, changes, and unpredictability, they must make considerable efforts to adapt to new conditions by

altering their structures, processes, and systems (Lucas et al., 2021). The university will be the starting point of the development path, and no social institution has been more influential in this matter. Whether in European countries, leading societal expectations in the social dimension and contributing to practical and scientific advancements through the inventions of scholars, or in less developed countries preparing society for development and arranging the necessary mechanisms (Mikla, 2025).

Sustainable performance is a relatively new concept defined as the process focusing on all five dimensions of sustainability performance (economic, governance, social, ethical, and environmental). Research indicates that an organization may achieve short-term effectiveness through its activities; however, factors such as social behavior, ethical responsiveness, and considering the interests of other stakeholders ensure that the company endures and continues its activities in the long term (Karsikas et al., 2022). The term sustainability encompasses all activities related to organizational growth, provided that the natural and environmental resources upon which present and future communities depend are preserved (Busulwa et al., 2022).

The concept of competency was first introduced by David McClelland (1973) under the term "professional competency" in criticism of solely assessing individuals based on mental intelligence tests. According to him, mental intelligence does not fully explain job success, and the factors that genuinely contribute to employees' job success are professional competencies, which include attitudinal, cognitive, and personal characteristics. Today, human resource experts believe that the concept of professional competency can provide a common language for analyzing individual successes and devising better and more efficient key performance evaluation criteria (Villa & Tulod, 2021).

Numerous studies have been conducted concerning the competencies of managers in various types of organizations. Many of these studies have focused on developing competency models. However, research examining the professional competencies of managers in schools is significantly more limited. This scarcity is more noticeable in the education sector. Regarding managers' competencies and their relationship with performance, researchers (Heydari et al., 2023; Koenigsfeld et al., 2012; Purohit & Shah, 2018; Villa & Tulod, 2021) have developed competency models and noted that there is a relationship between managers' competencies and their performance, and all competency indicators affect the performance level.

Managers with higher management competencies exhibit superior performance.

The importance of this research lies in its intention to review the existing literature on professional competency to thereby provide a comprehensive definition of professional competency of school managers as an effective and key driver of sustainable development and determine the dimensions and impacts it may have at the individual, organizational, and societal levels. Additionally, identifying the factors that play a role in the formation of professional competency and the policies and tools necessary to prevent or support these types of behaviors further underscores the significance of this research (Lans et al., 2023). Literature reviews related to professional competency of managers, sustainable development, and pro-environmental behavior show the significant role of individual, personality, and social factors in their emergence, but no targeted and comprehensive research has been conducted in Iran to identify the factors that form professional competency and its consequences, and ultimately the professional competency model of school managers as an effective and key driver of sustainable development. It is necessary to examine this professional competency based on research conducted in other countries, which has resulted in significant individual, organizational, and societal consequences, to determine the extent to which organizations and individuals are involved with the topic of professional competency of school managers as an effective and key driver of sustainable development. The research question of this study is: What is the professional competency model of school managers in Tehran's middle schools?

2. Methods and Materials

2.1. Study Design and Participants

This study is developmental-applicative in terms of purpose and descriptive-survey in terms of data collection, given the nature of the research. Additionally, since the data collection tool distributes and provides a detailed description of the current state among the population and subjects (to use this data to correct or modify the current conditions and present well-reasoned plans for improvement), it is a survey-type research. For the validation of the research model, the quantitative population includes secondary school administrators in districts 2, 5, 6, and 8 of Tehran, who have

experience in managing secondary schools and have executive and research activities in the field of education. In this study, the sample size was 384.

2.2. Data Collection

Shamsudin and Chuttipattana's (2012) and Vayla and Tulod's (2021) questionnaires were used to measure the research variables.

2.3. Data Analysis

Modeling determines whether the data collected from the sample support the theoretical model or not and which component of the model is confirmed by the data and which needs modification. Indeed, since there are multiple independent variables in the current research that need to be examined for their effect on the dependent variable, the use of structural equation modeling is necessary. The software used in this section were SPSS-22 and SMARTPLS-4.

3. Findings and Results

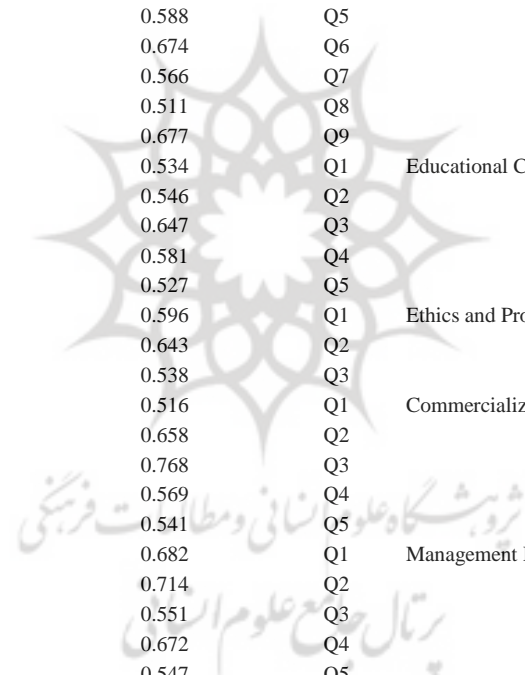
Descriptive findings show that 75.26% of the participants are male and 24.74% are female. Also, the highest percentage of the research samples in terms of age are in the 30 to 40-year range (46.87%). Most participants in the study hold a master's degree. Before proceeding to hypothesis testing, it is necessary to know the normality of the data, so depending on whether the data are normal or not, appropriate tests will be used. Since the significance level for the research variables is less than 0.05, it is concluded that the data collected for the research variables are not normal. Given that the data of the current research are not normal, the partial least squares (PLS) method has been used to examine the research model. For composite reliability, a value equal to or greater than 0.7 is considered appropriate. This criterion is also displayed in Table 1.

The findings indicate that the composite reliability indicators, average variance extracted, and Cronbach's Alpha are at acceptable levels. Moreover, the results demonstrate that each of the research constructs has acceptable fit indices. All factor loadings are significant at the (0.01) level. Also, as observed, the results demonstrate the appropriateness of the convergent validity criterion (AVE).

Table 1

Confirmatory Factor Analysis Findings

Cronbach's Alpha	AVE	Composite Reliability	Factor Loadings	Items	Variables
0.80	0.52	0.86	0.534	Q1	Attitudinal Competencies
			0.578	Q2	
			0.634	Q3	
			0.517	Q4	
			0.649	Q5	
			0.572	Q6	
0.87	0.57	0.89	0.674	Q1	Knowledge Competencies
			0.569	Q2	
			0.506	Q3	
			0.611	Q4	
0.88	0.51	0.84	0.544	Q1	Skill Competencies
			0.569	Q2	
			0.634	Q3	
			0.508	Q4	
0.75	0.57	0.87	0.674	Q1	Managerial Competencies
			0.758	Q2	
			0.639	Q3	
			0.537	Q4	
			0.588	Q5	
			0.674	Q6	
			0.566	Q7	
			0.511	Q8	
			0.677	Q9	
0.79	0.55	0.86	0.534	Q1	Educational Competencies
			0.546	Q2	
			0.647	Q3	
			0.581	Q4	
			0.527	Q5	
0.77	0.58	0.86	0.596	Q1	Ethics and Professional Behavior
			0.643	Q2	
			0.538	Q3	
0.78	0.60	0.86	0.516	Q1	Commercialization Competencies
			0.658	Q2	
			0.768	Q3	
			0.569	Q4	
0.80	0.52	0.88	0.541	Q5	Management Development
			0.682	Q1	
			0.714	Q2	
			0.551	Q3	
			0.672	Q4	
0.76	0.57	0.84	0.547	Q5	Social Indicators of Managers
			0.633	Q1	
			0.523	Q2	
			0.670	Q3	
			0.573	Q4	
0.86	0.52	0.89	0.608	Q1	Establishing Work Groups for Performance Enhancement
			0.588	Q2	
			0.538	Q3	
			0.793	Q4	
			0.634	Q5	
0.84	0.50	0.82	0.680	Q1	Green Competencies
			0.539	Q2	
			0.547	Q3	
0.81	0.53	0.79	0.608	Q1	Intervening Factors
			0.583	Q2	
			0.617	Q3	



0.84	0.50	0.82	0.593	Q4	Outcomes
			0.580	Q1	
			0.567	Q2	
			0.673	Q3	
			0.746	Q4	
			0.629	Q5	
			0.561	Q6	

For validating the professional competency of school managers as an effective and key driver for sustainable development, the proposed conceptual model was examined using structural equation modeling and partial least squares method for estimating the model.

Considering the coefficients and factor loadings, t-values above ± 1.96 are significant at the 0.05 level, and t-values above ± 2.58 are significant at the 0.01 level. Path coefficients are positive and significant at the 0.01 level.

Table 2

Summary of Structural Model Results

Path	Path Coefficient	Significance Level
Skill Competencies → Professional Competency of School Managers	0.161	0.01
Management Competencies → Professional Competency of School Managers	0.319	0.01
Ethical and Professional Behavior Competencies → Professional Competency of School Managers	0.298	0.01
Professional Competency of School Managers → Manager Development	0.514	0.01
Professional Competency of School Managers → Social Indicators	0.356	0.01
Professional Competency of School Managers → Establishment of Work Groups	0.294	0.01
Professional Competency of School Managers → Green Competency	0.223	0.01
Mediating Factors → Manager Development	0.226	0.01
Mediating Factors → Social Indicators	0.127	0.01
Mediating Factors → Establishment of Work Groups	0.185	0.01
Mediating Factors → National Green Competency	0.241	0.01
Infrastructure and Phenomena → Manager Development	0.232	0.01
Infrastructure and Phenomena → Social Indicators	0.182	0.01
Infrastructure and Phenomena → Establishment of Work Groups	0.223	0.01
Infrastructure and Phenomena → Hardworking Spirit	0.310	0.01
Manager Development → Management of Diversity and Plurality	0.257	0.01
Manager Development → Hardworking Spirit	0.347	0.01
Manager Development → Consumption Pattern Reform	0.314	0.01
Manager Development → Movement Towards National Authority	0.211	0.01
Manager Development → Participation in Development	0.191	0.01
Manager Development → Strengthening Human-Nature Relations	0.168	0.01
Social Indicators → Management of Diversity and Plurality	0.287	0.01
Social Indicators → Hardworking Spirit	0.111	0.01
Social Indicators → Consumption Pattern Reform	0.211	0.01
Social Indicators → Movement Towards National Authority	0.191	0.01
Social Indicators → Participation in Development	0.257	0.01
Social Indicators → Strengthening Human-Nature Relations	0.168	0.01
Work Group Establishment → Management of Diversity and Plurality	0.257	0.01
Work Group Establishment → Hardworking Spirit	0.364	0.01
Work Group Establishment → Consumption Pattern Reform	0.274	0.01
Work Group Establishment → Movement Towards National Authority	0.245	0.01
Work Group Establishment → Participation in Development	0.357	0.01
Work Group Establishment → Strengthening Human-Nature Relations	0.255	0.01
Green Competency → Management of Diversity and Plurality	0.529	0.01
Green Competency → Hardworking Spirit	0.401	0.01
Green Competency → Consumption Pattern Reform	0.367	0.01
Green Competency → Movement Towards National Authority	0.314	0.01
Green Competency → Participation in Development	0.264	0.01
Green Competency → Strengthening Human-Nature Relations	0.336	0.01

According to Table 2, based on the research findings, the research variables have a significant impact on each other at the 0.01 level.

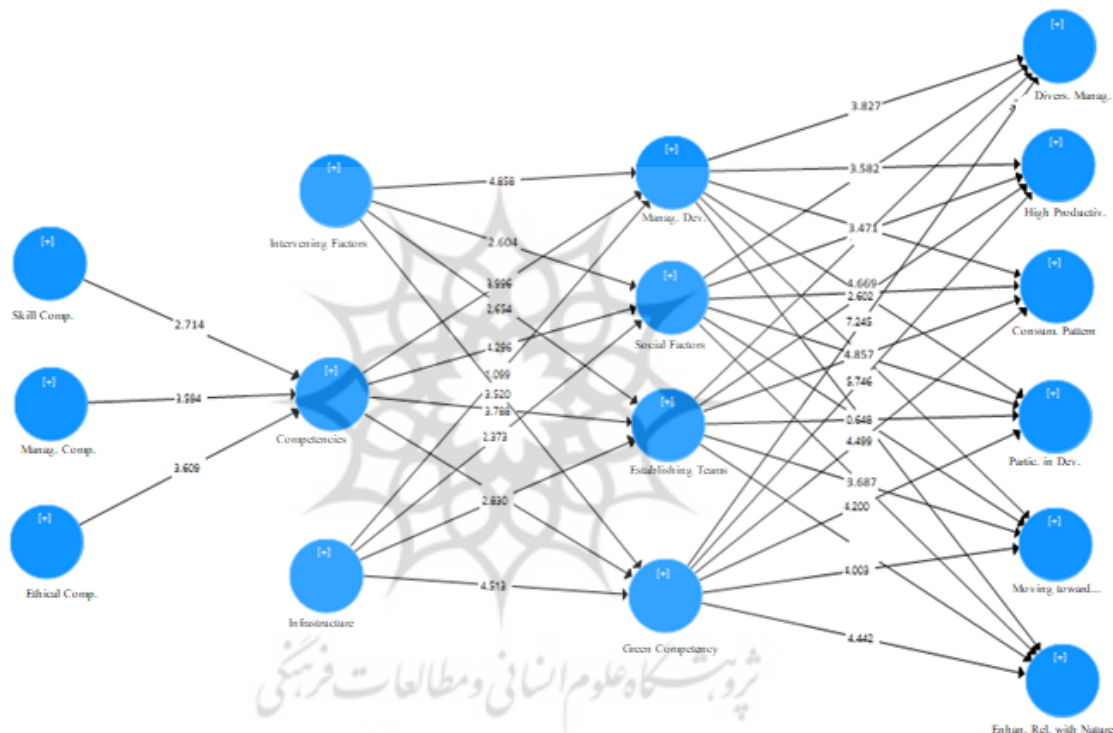
Finally, to demonstrate the validity of the model findings, the fit indices of structural equation models using the partial least squares method were used. In addition to the aforementioned indices, the overall model fit in PLS is the GOF index, which can be used to assess the validity or quality of the PLS model in general. This index functions similarly to the fit indices of the model and ranges between

zero and one, with values close to one indicating an appropriate model quality. This index also examines the overall predictive capability of the model and whether the tested model has been successful in predicting the latent variables. In the current research, the absolute fit index GOF obtained was 0.51, indicating an appropriate fit for the tested model.

Figure 1 shows the t-values of relationship between the variables of the research.

Figure 1

Model with T-Values



4. Discussion and Conclusion

The purpose of this study was to model the structural competency of school managers as a driver for sustainable development. Based on the presentation of a model for the professional competency of school managers as an effective and key driver for sustainable development, it included enablers of skill competencies, management competencies, and ethical and professional behavior competencies, manager development, social indicators of managers, the establishment of work groups for performance enhancement, and green competencies, along with attitudinal, knowledge, educational, and commercialization of knowledge-skill and

technology competencies. This model leads to outcomes such as a hardworking spirit, consumption pattern modification, and participation in development.

Explaining the research findings, it can be stated that due to emerging problems such as the destruction of natural resources, environmental pollution, poverty, and inequality, the approach of sustainable development was introduced. The traditional development paradigm seeks economic growth at any cost, while the new paradigm considers qualitative growth with respect to the environment and social justice. In this context, higher education, due to its high impact factor in raising awareness and enhancing the necessary capabilities of individuals in society, has the

necessary capacity to initiate the sustainable development movement. Education is among the most important institutions with a close connection to other societal dimensions, and it is expected to create the necessary platforms for generating knowledge and its distribution and dissemination, paving the way for comprehensive national development. Although organizations and educational systems in the third millennium have faced challenges, changes, and unpredictabilities, they must make significant efforts to adapt to new conditions by changing their structures, processes, and systems. The university will be the starting point of the development path, and no social institution has been more influential in this regard. Whether in European countries, leading societal expectations socially and contributing to practical and scientific advancements through the inventions of scholars, or in less developed countries preparing society for development and arranging the necessary mechanisms, sustainable development will not be possible without investment in the workforce and human capital in various communities. In sustainable development, the focus is on human development. The findings of this research are consistent with the results of prior studies (Chong, 2013; Heydari et al., 2023; Koenigsfeld et al., 2012; Purohit & Shah, 2018; Shyr, 2017; Villa & Tulod, 2021).

Heydari (2022) conducted a study on environmental responsibility: Good performance enhances organizational effectiveness, ultimately leading to national economic growth. It is notable that the results of teachers' job performance impact the school and the entire community (Heydari et al., 2023). According to Shyr (2017), competencies are described as the background characteristics and mental and physical abilities of an individual that are causally related to effective job performance (Shyr, 2017). Based on the research findings, the following recommendations are made:

It is suggested that more attention be paid to the professional competencies of managers in strategic planning and organizational missions, and more carefully create an appropriate position in organizational planning and prepare the necessary factors for it.

To prepare and empower organization members, design and implement training and experiential programs at all organizational levels.

Based on the research findings, it is suggested that educational organizations and schools develop short-term, medium-term, and long-term strategic goals, and continuously update the training program for professional competencies based on the needs of human resources;

It is recommended that components of professional competencies be enhanced through educational workshops and scientific seminars, and that the strategies presented in the proposed model be considered in school policies and goal setting.

This study, while providing insightful contributions to the field of educational management and sustainable development, has several limitations. Firstly, the research is confined to school managers within Tehran, which may not reflect the diverse management experiences or environmental contexts found in other regions or countries, potentially limiting the generalizability of the findings. Secondly, the study primarily relies on self-reported data from questionnaires, which can introduce biases such as social desirability or inaccuracies in self-assessment. Additionally, the structural equation modeling approach, though robust, depends heavily on the theoretical framework established; any oversight in model specification could impact the results. Lastly, the cross-sectional design of the study limits the ability to draw conclusions about the causality between professional competencies and sustainable development outcomes, suggesting a need for longitudinal studies to better understand these dynamics over time.

Authors' Contributions

The first author was responsible for conducting the interview and collecting data, and the other authors were responsible for analyzing the data and writing the article.

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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Ethics 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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