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Structural Modeling of the Enhancement of the Electronic Professional Learning Environment for Managers (Case Study: Bandar Abbas Oil Refinery)

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A B S T R A C T

Objective: The present study aimed to model the structural enhancement of the electronic professional learning environment for managers at the Bandar Abbas Oil Refinery.

Method: This descriptive correlational study was conducted on 166 managers, deputies, and employees of the Bandar Abbas Oil Refinery who were selected using stratified random sampling. In this research, a researcher-made questionnaire was used, based on the model by Nami et al. (2022), which was validated in terms of reliability by Cronbach's alpha (above 0.70 for all indicators) and in terms of validity by experts. Data analysis was performed using LISREL software, employing Kolmogorov-Smirnov tests and structural equation modeling with confirmatory factor analysis.

Findings: The results indicate that with significant numbers, it can be said: The dimensions of education, organization, environment, management, economics, communication, individual, technology, and standardization of education have a significant and positive relationship with the enhancement of the electronic professional learning environment for managers in the Bandar Abbas Oil Refinery ($P < 0.001$).

Conclusion: Consequently, electronic professional learning environments have unique capacities for designing and implementing learning for managers, which enriches the learning experiences of managers.

Keywords: *Electronic learning, Electronic learning environment, Professional electronic learning, Bandar Abbas Oil Refinery.*

1 Introduction

In the 21st century, improving the teaching-learning activities of employees necessitates the use of technology for constructive and beneficial communications (Parsakia, 2023). Nowadays, organizations strive to develop models and implement them in electronic learning environments. This facilitates continuous activation of team work movements and acquisition of diverse interactive

learning experiences by fostering a sense of belonging in their members. Such activities lead to the creation of efficient collaborative learning processes, tailored to employees based on their job functions, and facilitate the transfer of knowledge into organizational work (Eid & Quinn, 2017).

Access to learning is a significant goal of education and has various aspects. One aspect is geographical: E-learning has shown to be a massive advantage. Today, the internet is almost universally accessible, though politics more than economics, presents a challenge to equitable access. A key goal or indicator of success in e-learning is that all capable and motivated learners should be able to obtain a course or a degree program in their chosen field online (Niemi, 2021).

The environment of professional electronic learning is shaped for future-oriented organizational education of employees, aiming at growth, dynamism, and mutual relationships in generating organizational knowledge. Transformational leadership is a primary factor in enhancing the empowerment of professional electronic learning environments in organizations. They pursue the electronic learning environment professionally for creativity and professional growth of employees (Salari Jaeini et al., 2021). In the 21st century, improving the teaching-learning activities of employees requires the use of technology for constructive and beneficial communications. With recent advancements in technology and the expansive electronic and internet space, educational trainers and organizations can empower employees by networking and aiming for quality in professional knowledge delivery (Hewitt et al., 2003). To understand the nature of professional learning environments, they should be generally considered as communities of common interest that discover, refine, and establish ways for an organization's advancement. Importantly, the end goal of creating a professional learning community in an organization is to focus on improving the learning outcomes of learners. Professional learning environments in the form of electronic learning are used for faster acquisition of new technical knowledge and skills in the organization, but this requires a proper understanding of how to maintain supportive structural communication for the sustainability of this environment (Liu et al., 2016).

High-performing professional learning communities "have capacities for learning, research, change, and innovation" (Krutka & Carpenter, 2016). Every organization has fundamental infrastructures, one of the main components of which are experienced professionals responsible for transferring knowledge, creating insight, and enhancing learners' skills within the framework of the organizational education system. Professional managers seek to implement changes in activating electronic professional advancement in learning. Technology advocates moving from professional advancement to changing the structure of the electronic learning environment (Al-Fraihat et al., 2020; Kumar Basak et al., 2018). In professional learning environments, electronic learning is not only formed for skill-based training of employees but also, through conscious organizational decision-making, they select the best way of learning for employees through the electronic space, aiding them in sustainable team learning with joint guidance from managers. Professional electronic learning for managers occurs when knowledge based on electronic methods is processed with the latest electronic communication tools for a common ideal of professional excellence and a spectrum of behaviors in learning changes (Cheerapakorn & Chatwattana, 2023). In electronic learning environments, employees should be placed in the world of technology. Indeed, developed countries are encouraging managers to build professional electronic learning communities by participating in technology-driven projects in the organizational environment (Cheng & Chen, 2015). Professional learning communities can create networks and professional collaborations where managers share visions, team learning, supportive conditions in relationships, and structures with the goal of developing their leadership abilities. If we consider education and research in the organization as a kind of information dissemination in light of the beneficial achievements of communication science, then the approach of professional electronic learning will have stronger technical, cognitive, and communicative skills (Harris & Jones, 2017).

In addition to the need to utilize the digital world to focus on structures and processes in professional organizational learning environments, there is a need to pay attention to managerial relational support in establishing coherence in professional learning in the organizational education environment (Cheng & Chen, 2015). The primary responsibilities of managers in the organization are interaction, assessment, and electronic evaluation in the professional electronic learning environment, jointly guiding employees towards obtaining job information resources and organizational support (Zheng et al., 2023). A professional educational approach in the path of electronic teaching and learning in the organization is where groups of learners exchange technical information through the electronic path in organizational and professional

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communications. The successes of the learning environment in repetitively employing acquired technical skills can be significantly influenced by managers in terms of quality professional growth (Cheerapakorn & Chatwattana, 2023; Moiri et al., 2022; Putro, 2023). In the professional electronic learning environment, conscious synergy in the path of organizational learning and teaching with interactive and collaborative approaches exists (Al-Fraihat et al., 2020).

The Bandar Abbas Oil Refinery is among the organizations with advanced technology in the work environment. Given the geographical spread of companies active in this industry and their location in a less developed region (Bandar Abbas), to benefit from advanced and up-to-date training, there is a need to access and develop structures of professional electronic learning. Specifically, the necessity of focusing on the professional electronic learning environment can be seen in cases such as; the location of the Bandar Abbas Oil Refinery in a remote area from academic centers and less developed regions, the knowledge-based nature of most companies in this industry; advanced technology and mostly foreign complex processes in the industry; high costs of missions and presence of refinery experts in concentrated and resident educational centers and universities in the capital and high educational levels and opportunities to benefit from electronic training and professional electronic learning environments instead of traditional face-to-face training and environments. Considering the above points and the opportunities and threats of the professional electronic learning environment in the Bandar Abbas Oil Refinery, it is essential to identify and analyze the readiness of the professional electronic learning environment and the influencing factors on the efficiency of this important aspect in the Bandar Abbas Oil Refinery before proceeding to establish the necessary infrastructure. Therefore, the aim of this research is to investigate the structural modeling of enhancing the professional electronic learning environment of managers in the Bandar Abbas Oil Refinery.

2 Methods and Materials

2.1 Study Design and Participants

The present research is applied in purpose and descriptive-correlational in terms of data collection methodology, utilizing structural equation modeling. The statistical population in this study consisted of all managers, deputies, heads of operational units, maintenance heads, safety department heads, and shift heads of the Bandar Abbas Oil Refinery, totaling 231 individuals. In this study, for the quantitative section, the sample size was determined to be 145 based on the population size using Morgan and Jersey's table. However, as the response rate to the surveys was lower than the sample size, an additional 25% was added to the distributed questionnaires (total distributed = 181), ultimately yielding 166 accurately returned questionnaires, which were then designated as the final sample size. For data collection in the theoretical foundations and literature of the study, library sources were used as the most effective method, and questionnaires were used for data collection, as the research is descriptive in nature.

2.2 Data Collection

The data collection tool in this research was a questionnaire used in the study by Nami et al. (2022) (Niemi, 2021). The questionnaire consisted of 21 questions and 9 factors: the first factor being educational (questions 1 to 3), the second organizational (questions 4 to 6), the third environmental (questions 7 to 9), the fourth managerial (questions 10 to 11), the fifth economic (questions 12 to 13), the sixth communicational (questions 14 to 15), the seventh individual (questions 16 to 17), the eighth technological (questions 18 to 19), and the ninth standardization of learning (questions 20 to 21). All constructs were measured using a five-point scale ranging from "very low" (1) to "very high" (5). The validity of the questionnaire was examined using face and content validity, and Cronbach's alpha was used to assess the reliability of the study.

2.3 Data Analysis

Using the collected data and SPSS software version 22, the reliability coefficient was calculated using Cronbach's alpha. For data analysis and model validation, structural equation modeling was utilized using LISREL software.

3 Findings and Results

To better understand the nature of the research variables and to identify patterns governing the data, we first examine the results of the descriptive analysis. 166 individuals, consisting of managers, deputies, heads of operational units, maintenance heads, safety department heads, and shift heads of the Bandar Abbas Oil Refinery, were considered as the sample. The results of the age characteristics showed that the majority of respondents were between 31 and 40 years old

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(47.6%), with the least being over 50 years old (9.6%). In terms of gender, the majority were men (58.4%) and the minority women (41.6%). Regarding the educational level of the respondents, the highest was a bachelor's degree (58.4%) and the lowest a doctoral degree (3%). In terms of job experience, the majority had 11 to 15 years (52.4%) and the least had more than 21 years (1.2%).

To measure the reliability of the designed model, the Kappa index was used. This was done by another individual (from the experts in this field) classifying the codes into concepts without knowledge of the way the researcher had integrated the codes and concepts. The concepts presented by the researcher were then compared with those presented by this individual. The researcher had identified 21 concepts, and the other individual 23, of which 18 were common. The Kappa index was found to be 0.781, which is considered a valid level of agreement.

Figure 1

Model with Standard Estimation Values

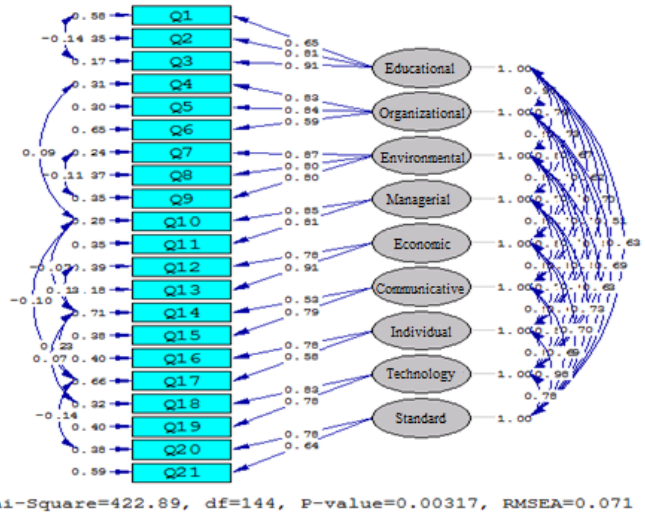

Figure 2

Model with T-values

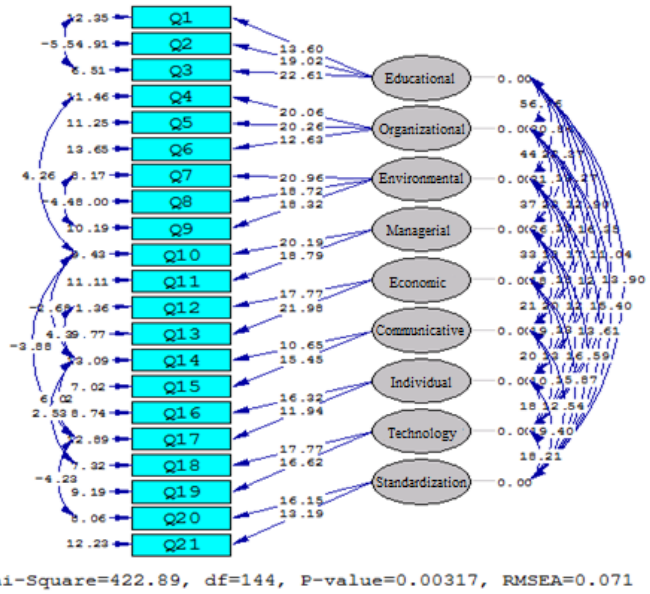

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Table 1

Factor loadings, t-values and reliability tests

Category	Comp.	Factor Loading	Error	T-value	Composite Reliability	Cronbach's Alpha
Educational	C1	0.65	0.58	13.60	0.81	0.61
	C2	0.81	0.35	19.02	0.81	0.61
	C3	0.91	0.17	22.61	0.81	0.61
Organizational	C4	0.83	0.31	20.06	0.78	0.62
	C5	0.84	0.30	20.26	0.78	0.62
	C6	0.59	0.65	12.63	0.78	0.62
Environmental	C7	0.87	0.24	20.96	0.76	0.55
	C8	0.80	0.37	18.72	0.76	0.55
	C9	0.80	0.35	18.32	0.76	0.55
Managerial	C10	0.85	0.28	20.19	0.84	0.72
	C11	0.81	0.35	18.79	0.84	0.72
Economic	C12	0.78	0.39	17.77	0.83	0.72
	C13	0.91	0.18	21.98	0.83	0.72
Communicative	C14	0.53	0.71	10.65	0.72	0.52
	C15	0.79	0.38	15.45	0.72	0.52
Individual	C16	0.78	0.40	16.32	0.71	0.51
	C17	0.58	0.66	11.94	0.71	0.51
Technology	C18	0.83	0.32	17.77	0.77	0.55
	C19	0.78	0.40	16.62	0.77	0.55
Standardization	C20	0.78	0.38	16.15	0.74	0.52
	C21	0.64	0.59	13.19	0.74	0.52

As the results in the Table 1, the factor loadings of all items are greater than 0.4. Therefore, the measurement model is homogeneous, and the factor loading values are acceptable. The results of examining the significance of the t-statistic values in the table above showed that the t-statistic values for all items were reported to be more than 2.58. This means that the relationship between items and sales is accepted with 99% confidence. The results of examining Cronbach's alpha coefficients and composite reliability in the table above showed that the values of these indices for all latent variables are more than 0.7, thus confirming the reliability of the measurement tools using these two indices.

Table 2

Fornell-Lurker Test and AVE

	Educational	Organizational	Environmental	Managerial	Economic	Communicative	Individual	Technology	Standardization	AVE
Educational	0.739									0.547
Organizational	0.577	0.758								0.575
Environmental	0.680	0.820	0.754							0.568
Managerial	0.717	0.775	0.871	0.745						0.555
Economic	0.608	0.839	0.851	0.818	0.730					0.533
Communicative	0.594	0.702	0.718	0.633	0.719	0.734				0.538
Individual	0.565	0.196	0.280	0.303	0.171	0.395	0.769			0.592
Technology	0.624	0.867	0.866	0.840	0.624	0.674	0.191	0.755		0.570
Standardization	0.585	0.711	0.725	0.639	0.729	0.997	0.383	0.684	0.733	0.538

As observed in Table 2, the results of examining the extracted variance values of the latent variables of the research showed that all variables allocated values greater than 0.5. Based on this, it can be said: the convergent validity of the measurement tools using the average extracted variance index was confirmed. Also, the square root of the average extracted of each latent variable is greater than the maximum correlation of that latent variable with other latent variables. Based on this, the divergent validity of the measurement model using the Fornell-Larcker test was confirmed.

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Table 3

Fit Indices

Fit Index Categories	Fit Index	Acceptable Value	Model Value	Fit Result
Absolute Fit Indices	GFI	> 0.90	0.90	Suitable
	RMR	~0.00	0.018	Suitable
Comparative Fit Indices	NFI	> 0.90	0.99	Suitable
	CFI	> 0.90	0.99	Suitable
	RFI	> 0.90	0.98	Suitable
	IFI	> 0.90	0.96	Suitable
Parsimonious Fit Indices	PCFI	> 0.50	0.743	Suitable
	RMSEA	< 0.08	0.079	Suitable
	CMIN/DF	Less than 5	2.91	Suitable

The results of Table 3 indicate that the data of the research model fits well, and this is indicative of the alignment of the questions with the theoretical constructs.

4 Discussion and Conclusion

The results of this study showed that the research model consists of 9 dimensions, 23 components, and 177 indicators, with all dimensions, components, and their indicators having a factor loading greater than 0.4, which is considered acceptable. The t-statistic values obtained are also greater than 1.96 in all paths. Therefore, it can be said that there is a significant relationship between each dimension and component with their related indicators. As a result, the model is suitable for enhancing the electronic professional learning environment of managers as described below. The results are in line with some previous research (Abbasi Kasani et al., 2019; Alipour et al., 2021; Draghici et al., 2014; Harris & Jones, 2017; Hedberg, 2008; Hillman, 2003; Kumar Basak et al., 2018; Zheng et al., 2023).

In explaining this result, it can be said that in the information age, human knowledge and skills must continuously develop and upgrade to keep pace with the rapidly growing new technologies. E-learning empowers us to know more, learn faster, and achieve learning at a lower cost. E-learning presents educational content in various formats, increases learners' access to knowledge and lifelong learning, enhances the quality of educational services, and also accelerates educational programs. On the other hand, entry into an inline learning environment requires prerequisites (Cheng & Chen, 2015; Hillman, 2003; Khalvandi et al., 2023). Some of these prerequisites are dependent on previous experience, while others are related to the learner's mental readiness. Entry into an inline learning environment without awareness and skills only leads to wasted time, weakened morale, incomplete learning, and program failure. Moreover, learners who are not ready to enter the field of electronic learning in virtual education and electronic content production but are forced to enter have bitter experiences that can even negatively affect future opportunities (Cheng & Chen, 2015; Howaida & Manahill, 2023). Providers of electronic learning opportunities must also accept to give learners the opportunity to think, gain awareness and skills, and even provide facilities in this area if possible. The electronic professional learning environment of managers, which occurs in a network environment and employs a range of multimedia, transmedia, and remote communication technologies. In the electronic professional learning environment, a virtual outlook for guiding and learning all members of the organization is formed. In this electronic environment, employees are guided along the appropriate path of organizational training and based on regular activities in the transfer of experience and sharing of knowledge, and managers are directed based on structural support and constructive relationships. Also, the primary responsibilities of managers in the electronic professional learning environment take shape in the joint guidance of employees without dominating their organizational behavior (Al-Fraihat et al., 2020; Kumar Basak et al., 2018). In the electronic professional learning environment, a clear outlook for access to appropriate organizational planning and innovative strategies in the constructive occupational communications of managers and employees is based on a common ideal. Today, organizations strive to build models and implement them in electronic learning environments so that they can continuously activate team work movements, obtain various interactive learning experiences through enhancing a sense of belonging to the organization in their members (Harris & Jones, 2017; Liu et al., 2016). These activities lead to the creation of efficient collaborative learning processes tailored for employees according to job

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functions and facilitate the transfer of knowledge to organizational work. Given the results obtained from the research, it is suggested to managers and officials of the oil company and other companies and organizations: Educational indicators for the effectiveness of the electronic learning environment, electronic learning course and project, and support for the learner should be evaluated. Processes and the efficiency of the internal and external systems of electronic learning should be improved, and the continuation of maintaining, preserving, and ensuring the quality of electronic learning should be sustained. Also, the design of the electronic learning system should consider aspects such as organization and appropriate support, faster responsiveness, and the provision of guidance services in the electronic learning system.

5 Limitations and Suggestions

This research, like other studies, has limitations such as being limited to the Bandar Abbas Oil Refinery, difficulties in obtaining people's consent to fill out the questionnaire, and the use of closed-response questionnaires. Therefore, it is suggested for future researchers to select a broader statistical population and investigate the status of universities and institutes conducting electronic education and to use a mixed method for further examination of the subject. Finally, models of flexibility, interaction, optimization of electronic learning in managers and students, and strategies for achieving active learning through electronic learning environments should be researched.

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Declaration of Interest

The authors of this article declared no conflict of interest.

Authors Contributions

All authors have contributed significantly to the research process and the development of the manuscript.

Ethics principles

In this research, ethical standards including obtaining informed consent, ensuring privacy and confidentiality were observed.

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