



Testing the Electronic Entrepreneurship Model in Small and Medium Enterprises

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ABSTRACT

The purpose of this study is to test the electronic entrepreneurship model in small and medium enterprises (SMEs). This research is applied in terms of its objective and descriptive-survey in terms of data collection. Data were collected using a researcher-developed standardized questionnaire. The statistical population consisted of managers (senior, middle, and operational) active in the field of internet-based businesses, with a total of 158 individuals identified. The sample size was determined to be 113 individuals using the Cochran formula, and a stratified random sampling method based on organizational position was employed. To collect data related to the variables, a researcher-developed questionnaire derived from a doctoral dissertation and an article by Hosseini et al. (2024) was used. The composite reliability and the reliability of each research component were calculated, confirming the validity and reliability of the measurement tool. Structural equation modeling (SEM) using Smart PLS4 software was applied for data analysis. The results indicate that all indicators and factors of the electronic entrepreneurship model in SMEs have factor loadings greater than 0.4, thus confirming the effectiveness of the indicators and factors. Furthermore, the electronic entrepreneurship model for SMEs was developed, and the impact of causal, contextual, and environmental factors on strategies was found to be significant. Additionally, strategies had a positive and significant effect on outcomes and results. Finally, the proposed model demonstrated a good fit. Therefore, the electronic entrepreneurship model can be recommended as a comprehensive and practical framework for all managers of SMEs.

KEYWORDS: Electronic Entrepreneurship, Small and Medium Enterprises, Structural Equation Modeling

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1. Introduction

The rapid transformations in national economies and their interactions with the global economy, coupled with the emergence of phenomena such as economic globalization and information technology, increasingly highlight the acceleration of entrepreneurship development and growth. In recent decades, technological advancements have led to the digitalization of economies, and the COVID-19 pandemic has further expedited the development of the digital economy, underscoring its necessity. Information technology has come to the aid of entrepreneurship, giving rise to a new concept known as electronic entrepreneurship. Electronic entrepreneurship represents a modern business approach in the current era, providing a suitable platform for economic growth and development, particularly for developing countries (Epifanova et al., 2023).

Over the past two decades, the advent of the information society, characterized by the introduction of new technologies into various aspects of life, has positioned electronic entrepreneurship as a novel approach to launching businesses based on innovative ideas and thinking, gaining significant traction among service and production sector actors (Tavazoeifar et al., 2019). This emerging phenomenon, enabled by technological assets such as the internet and information technology, can create numerous opportunities for entrepreneurial activities through digitalization. Therefore, entrepreneurs must be aware of these opportunities to foster sustainable innovations. Digitalization is not limited to new advancements in entrepreneurship but has also brought about a profound transformation in business models (Turkan & Turkan, 2022).

Today, the emphasis on electronic entrepreneurship stems from the role of new electronic technologies in online businesses. In the context of a knowledge-based economy, organizations adopt digitalization processes to organize and compete globally (Ratten, 2018). Electronic entrepreneurship is essential not only for technology companies and IT sectors but for all industries (Tambas et al., 2018). In addition to new businesses created through digitalization, existing industries and businesses are transitioning from offline to online models, leading to technological advancements and diverse opportunities for entrepreneurs (Cross et al., 2018).

In the current Iranian context, many industry practitioners remain unclear about how to leverage electronic entrepreneurship to enhance service levels and address existing shortcomings. Thus, adopting these technologies in Iran, given its needs, deficiencies, and potential, is highly beneficial. Electronic entrepreneurship, in its fullest sense, acts as a driver of added value in business markets (Mirparsa, 2013). This form of entrepreneurship transcends mere technology, representing an interplay between technology, strategy, and business processes, leveraging information and communication technology (ICT) to create value for entrepreneurs (Bernardino et al., 2023).

An examination of the behavior and performance of successful knowledge-based companies over recent years reveals that their market presence and strategies possess unique characteristics, leading to distinct success patterns (Indira et al., 2024). In other words, entrepreneurial approaches in these companies differ from those of long-established businesses (Russo & Roman, 2020). While much of the entrepreneurship literature reports on the performance of well-established firms, there is relatively less data available on entrepreneurial knowledge-based companies, particularly small and medium enterprises (SMEs) (Purnomo et al., 2023).

In recent years, one of the concerns of business experts has been documenting and modeling the practices of entrepreneurs across various performance domains, including information and communication technology (Keshavarz et al., 2019). This has facilitated closer integration

between the fields of entrepreneurship and ICT, with studies in this area often categorized under the concept of "electronic entrepreneurship" (Rybakova et al., 2021). The primary goal of developing the concept of electronic entrepreneurship has been to achieve a proper understanding of the intersection between entrepreneurship and ICT and the impact of this technology on entrepreneurship (Fard et al., 2021).

A review of 70 articles from 2012 to 2019 indicates that electronic entrepreneurship is a concept with over two decades of history (Darajimba et al., 2024). However, it remains a young and dynamic research field that, despite extensive international studies, has not been sufficiently explored in Iran (Keshavarz et al., 2019). Furthermore, according to statistics from the Mazandaran Province General Directorate of Economic Affairs and Finance, the slow pace of electronic entrepreneurship development and existing markets in the province, despite the presence of experienced entrepreneurs, reputable universities, and the potential for creating SMEs and operational entrepreneurial thinking in provincial investments, does not align with modern economic needs and conditions (Mazandaran General Directorate of Economic Affairs and Finance Report, 2020). Consequently, this study focuses on examining electronic entrepreneurship in SMEs in Mazandaran Province, aiming to test the electronic entrepreneurship model in this context.

A review of past research suggests that, although electronic entrepreneurship and its contributing factors have gained attention in recent years through the enactment of laws, the establishment of entrepreneurship disciplines, and the growth of entrepreneurship centers in universities and science and technology parks, a theoretical gap in this field is still evident in Iran. In other words, the studies conducted exhibit a form of one-sidedness, making it difficult to clearly identify a model or pattern for electronic entrepreneurship. Based on the above, the main research problem of this study is to design and validate a model for electronic entrepreneurship in SMEs. Therefore, given the economic policies aimed at fostering entrepreneurship in SMEs and the cognitive gap in the literature, the researcher is faced with the following question: What are the dimensions and factors of a suitable and comprehensive electronic entrepreneurship model for SMEs?

2. Theoretical Foundations and Literature Review

Over the past two decades, the transition to an information society, characterized by the integration of new technologies into various aspects of life, has positioned electronic entrepreneurship as a novel approach to launching businesses based on innovative ideas and thinking. This approach has gained significant prominence among actors in the service and production sectors (Tavazoeifar et al., 2019). Electronic entrepreneurship involves examining the unique characteristics and detailed roles of electronic technologies in shaping entrepreneurial activities. In the context of a knowledge-based economy, companies adopt digitalization processes to compete globally (Ratten, 2018). Electronic entrepreneurship is not only relevant to the information technology sector but is also critical and applicable across all industries (Tambas et al., 2018). The increasing importance of small and medium enterprises (SMEs) and the growing significance of electronic businesses have underscored the need to facilitate the entry of knowledge-based companies into electronic business environments (Tavazoeifar et al., 2019). Consequently, electronic entrepreneurship must be contextualized within SMEs, enabling companies to leverage electronic technologies to reorganize and establish broader customer communications (Liore et al., 2018). Electronic entrepreneurship serves as a catalyst, driving

employment cycles, fostering economic dynamism, and giving rise to a new form of economy known as the knowledge-based economy (Diawati, 2024).

However, in the current Iranian context, many industry practitioners remain unclear about how to utilize electronic entrepreneurship to enhance service levels and address existing shortcomings. Therefore, adopting these technologies in Iran, given its needs, deficiencies, and potential, is highly beneficial (Mirparsa, 2013). In its fullest sense, electronic entrepreneurship is a driver of added value in business markets. This form of entrepreneurship transcends mere technology, representing an interplay between technology, strategy, and business processes, leveraging information and communication technology (ICT) to create value for entrepreneurs (Bernardino et al., 2023).

A review of 70 articles from 2012 to 2019 indicates that electronic entrepreneurship is a concept with over two decades of history (Darajimba et al., 2024). However, it remains a young and dynamic research field that, despite extensive international studies, has not been sufficiently explored in Iran (Keshavarz et al., 2019). Given the limited domestic and extensive foreign research on electronic entrepreneurship, and considering that the primary limitation of past studies is the lack of comprehensive examination of the components and outcomes of electronic entrepreneurship, there is a clear need to identify and present these components and outcomes in the Iranian context. Moreover, researchers have identified a significant gap in the conceptualization of entrepreneurship in the digital era. Thus, this study distinguishes itself by offering a more comprehensive and precise classification that encompasses various dimensions at different levels. Additionally, most models proposed in the field of electronic entrepreneurship have primarily focused on social networks (Zaw & Collier, 2016). Consequently, the absence of a comprehensive model for electronic entrepreneurship has been felt, and developing such a model to achieve the defined objectives is deemed essential. Therefore, the researchers of this study aim to identify the components and outcomes of electronic entrepreneurship. It should be noted that all factors used in designing the model were derived from theoretical foundations and interviews with experts, reorganized by the researcher into new factors and indicators. The following factors can thus be considered for this study:

Table 1: Factors and Indicators Derived from Theoretical Foundations and Interviews (Hosseini et al., 2023)

Factors	Indicators
Causal Factors	Personality traits Organizational policies Digital programs and policies of companies Organizational culture of electronic entrepreneurship Organizational structure Management expertise in electronic entrepreneurship Subjective norms Social norms
Contextual Factors	Past experiences Proper and timely use of ICT Research contracts Electronic entrepreneurship training in business Organizational competitive advantage Electronic entrepreneurship skills of managers and employees
Environmental Factors	SME business environment

Factors	Indicators
	Political environment Economic environment Cultural environment
Strategies in SMEs	Strategies for developing electronic entrepreneurship Dynamic capabilities of electronic entrepreneurship
Outcomes in SMEs	Electronic entrepreneurship attitude Growth of SME businesses Sustainable development of SMEs Market share expansion of SMEs

3. Research Methodology

This study is applied in terms of its objective and descriptive-survey in terms of data collection. The data collection method in this research is quantitative. Quantitative data were gathered using a researcher-developed standardized questionnaire. The statistical population of this study includes all managers and experts related to electronic entrepreneurship in small and medium enterprises (SMEs) in Mazandaran Province. Given the population size of 289 individuals, the sample size was determined to be 165 using the Cochran formula. A stratified random sampling method was employed, with stratification based on organizational position. To collect data related to the variables, a researcher-developed questionnaire derived from a doctoral dissertation and an article by Hosseini et al. (2024) was used. To determine the reliability coefficient, Cronbach's alpha method was utilized. The composite reliability and the reliability of each research component were calculated, indicating the reliability of the measurement tool. Additionally, the divergent and convergent validity of the questionnaire were assessed, confirming its satisfactory validity. Causal relationships between variables were analyzed using structural equation modeling (SEM) with the Smart PLS4 software. Unlike variance-based structural equation modeling, which evaluates the fit of the hypothesized model and is used for explaining, testing, and confirming theories, the PLS method is prediction-oriented and can be applied for theory development.

4. Findings

To gain a better understanding of the studied population, it is necessary to describe the data before conducting statistical analysis. According to Table 3, the descriptive findings indicate that based on the responses collected from a sample of 165 individuals, 132 were male and 33 were female. Regarding education, 124 individuals held a master's degree, and 41 held a doctoral degree. In terms of work experience, 42 individuals had less than 10 years, 86 had between 10 and 20 years, and 37 had more than 20 years of experience. Regarding age, 27 individuals were under 30 years old, 48 were between 30 and 40 years old, 63 were between 41 and 50 years old, and 27 were over 50 years old. In terms of organizational position, 32 were presidents, 31 were vice presidents, 24 were senior experts, and 78 were experts.

Table 3: Descriptive Findings

Demographic Variable	Sample Size in the Used Range
Gender	Male: 132
Age	20–30 years: 27
Education	Master's: 124
Work Experience	Less than 10 years: 42

5. Model Fit Assessment

To evaluate the model fit, the measurement model fit, structural model fit, and overall model fit were examined. To assess the reliability of the measurement model, factor loadings, Cronbach's alpha coefficients, and composite reliability (CR) were analyzed. The threshold for acceptable factor loadings is 0.4. As shown in Figure 2, all factor loading coefficients for the questions exceed 0.4, indicating the suitability of this criterion. According to the data analysis algorithm in SmartPLS4, after assessing the factor loadings of the questions, the next step involves calculating and reporting Cronbach's alpha and composite reliability coefficients. The second criterion for evaluating the measurement model fit is convergent validity, which examines the correlation between each construct and its respective questions (indicators). The results are presented in Table 4.

Table 4: Results of Cronbach's Alpha, Composite Reliability, and Average Variance Extracted (AVE) for Latent Variables

Latent Variables	Cronbach's Alpha (Alpha > 0.7)	Composite Reliability (CR > 0.7)	Average Variance Extracted (AVE > 0.5)
Market Share Expansion	0.747	0.741	0.525
Sustainable Development	0.786	0.859	0.605
Strategies	0.768	0.828	0.555
Electronic Entrepreneurship Development Strategies	0.766	0.760	0.591
Business Growth	0.843	0.927	0.864
Contextual Factors	0.797	0.856	0.501
Causal Factors	0.870	0.891	0.513
Intervening (Environmental) Factors	0.787	0.865	0.620
Dynamic Capabilities of Electronic Entrepreneurship	0.761	0.796	0.586
Electronic Entrepreneurship Attitude	0.881	0.920	0.744
Core Phenomenon (Electronic Entrepreneurship)	0.758	0.765	0.528
Outcomes	0.865	0.890	0.517

Given that the acceptable threshold for Cronbach's alpha and composite reliability is 0.7, and based on the findings in the above table, these criteria meet acceptable levels for the latent variables, confirming the reliability of the research. Additionally, since the acceptable threshold for AVE is 0.5, and the findings in the table indicate that this criterion is met for the latent

variables, the convergent validity of the research is also confirmed. The following table presents the standardized coefficients between exogenous (influencing) and endogenous (affected) latent variables.

Table 5: Results of Path Analysis

Path	t-Statistic	Significance Level	Path Coefficient	Result	R ²
Causal Factors → Core Phenomenon	57.731	0.000	0.805	Accepted	0.649
Contextual Factors → Strategies	8.911	0.000	0.433	Accepted	0.777
Intervening (Environmental) Factors → Strategies	6.609	0.000	0.359	Accepted	
Core Phenomenon → Strategies	2.393	0.017	0.183	Accepted	
Strategies → Outcomes	6.799	0.000	0.452	Accepted	0.205

Since the t-values for the relationships fall outside the range of (-1.96, 1.96) and their significance levels are less than 0.05, the impact of contextual, causal, and environmental factors on the core phenomenon and strategies is significant at a 95% confidence level. Additionally, strategies have a positive and significant impact on outcomes. Furthermore, based on the R² values for the core phenomenon, strategies, and outcomes, a strong predictive power is estimated.

Model Validity and Fit Assessment: Hair (2010, 2011) introduced three values—0.01, 0.15, and 0.35—as weak, moderate, and strong thresholds for the Goodness of Fit (GOF). Given the obtained GOF value of 0.55, the strong overall model fit is confirmed.

5. Discussion and Conclusion

The study results indicate that all indicators and factors of the electronic entrepreneurship model in small and medium enterprises (SMEs) have factor loadings greater than 0.4, thereby confirming the effectiveness of these indicators and factors. Additionally, the electronic entrepreneurship model for SMEs in Mazandaran Province was developed, and the impact of causal, contextual, and environmental factors on strategies was found to be significant. Furthermore, strategies had a positive and significant effect on outcomes and results. Ultimately, the proposed model demonstrated a good fit. Therefore, the electronic entrepreneurship model can be recommended as a comprehensive and practical framework for all SME managers.

The factors (causal, contextual, and intervening) influencing electronic entrepreneurship in SMEs can be categorized and analyzed into several groups. The first category is the intra-organizational dimension, which refers to the organizational environment, available facilities, and resources within organizations. The second category is the extra-organizational dimension, encompassing factors beyond the organization's control. In this study, the components affecting electronic entrepreneurship are explained through indicators such as subjective norm control, perceived behavioral control, and social norms. The third category is infrastructure, which refers to elements within the organization that enhance its performance. The components of this dimension include information technology infrastructure, which is explained through indicators such as website quality, hardware and software platforms, networks, and online advertising.

These findings align with the studies of Epifanova et al. (2023), Tavazoeifar et al. (2019), Turkan & Turkan (2022), Ratten (2018), Tambas et al. (2018), Cross et al. (2018), Mirparsa (2013), Indira et al. (2024), Russo & Roman (2020), Purnomo et al. (2023), and Fard et al. (2021), highlighting the significant importance of these indicators for electronic entrepreneurship. Subjective and social norms rank as the second and third most influential indicators for digital entrepreneurship in SMEs. Attention to norms is a critical condition for the survival and success of any business, not only in digital entrepreneurship. The social norm indicator significantly impacts digital entrepreneurship by facilitating better transmission of information related to individuals' resource allocation styles, generating economies of scale, and creating additional demand.

The results regarding the impact of strategies on outcomes suggest that to facilitate the implementation and learning of electronic entrepreneurship, evaluation, design, and execution, along with the application of knowledge and opportunity-seeking, should be conducted effectively. This is because one of the requirements for fostering electronic entrepreneurial competencies in learners is their pragmatism and proactiveness. Given that the primary goal of electronic entrepreneurship is to enhance entrepreneurial competencies and entrepreneurial intention, the main learning activities should include utilizing entrepreneurial mentors and experts, employing blended and creative teaching methods, and leveraging specialized entrepreneurship consultants. In line with these findings, it has been suggested that designing a business plan, adopting collaborative methods, fostering cooperation, and employing any approach that promotes experiential learning—i.e., learning through employee involvement in tasks—should be part of work activities (Stanzin et al., 2020). Another study suggests that to achieve better outcomes from electronic entrepreneurship, employees should be guided toward acquiring broader skills beyond theoretical knowledge, maximizing their creative potential, and actively engaging them in the electronic entrepreneurship process (Kraus et al., 2019).

Based on the results, it is recommended that SMEs enhance learning from experiences, foster business independence, and increase risk-taking capacity to transform their electronic entrepreneurship attitude, ultimately leading to entrepreneurial intention and decision-making. This can facilitate capital attraction and revenue growth, contributing to the growth of SMEs. The primary objective of designing the electronic entrepreneurship model is to strengthen electronic entrepreneurial intention and the decision to launch a business. To achieve this goal, it is suggested that planners develop content based on learners' occupational needs and societal demands, tailored to each academic discipline, experiences, and interests, and organized around managerial, electronic entrepreneurship, general, and professional skills. Such content should involve practical and experiential learning, active learner participation in the learning process, and real-world work experiences. Additionally, SME managers are recommended to improve green innovation and foster electronic entrepreneurship motivation, enabling employees to engage in electronic entrepreneurship processes to enhance workforce quality. This can lead to the creation of spin-off businesses, the development of science and technology parks, enhanced innovation capacities, and greater market impact, ultimately contributing to increased market share for SMEs.

Few studies on electronic entrepreneurship are available in the form of research synthesis or systematic reviews. Therefore, conducting such studies is recommended to gain a comprehensive perspective on electronic entrepreneurship. The model derived from this study can be utilized in intervention or action research studies, and if its effectiveness is confirmed, it can be implemented on a broader scale across various provinces.

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ETHICAL CONSIDERATION

Authenticity of the texts, honesty and fidelity has been observed.

CONFLICT OF INTEREST

Author/s confirmed no conflict of interest.