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Evaluation of the Effectiveness of E-Readiness in Implementing E-Business

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ABSTRACT

In the current era, becoming a global company and sustaining in fields such as e-business requires a competitive advantage. In this regard, assessing e-readiness in societies and organizations is a prerequisite for optimal planning to achieve e-business implementation. Generally, an e-ready society is one that has access to electronic communication networks at the highest level and where the continuous use of Information and Communication Technology (ICT) has become a dominant culture. When e-readiness is adequately established, it can provide a conducive environment for implementing e-business. Therefore, a proper understanding of the level of this readiness is essential for formulating appropriate strategies, and organizations need to evaluate their readiness for realizing diverse ICT applications using suitable assessment tools. This study aims to investigate the effectiveness of e-readiness in implementing e-business in an insurance company using fuzzy set theory. The statistical population consists of 70 managers and employees of the insurance company. Due to the limited population size, no sampling methods were used, and the entire population was examined. Data were collected by distributing a questionnaire among the statistical population, with its validity and reliability confirmed. The results indicate that the level of e-readiness in the studied company is satisfactory, with no significant gap between the current and ideal states of e-readiness criteria.

KEYWORDS: E-Business, E-Readiness, E-Readiness Assessment, Fuzzy Sets

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1. Introduction

In recent decades, rapid advancements in Information and Communication Technology (ICT) and economic globalization have fundamentally transformed the business environment. These changes have compelled organizations to adopt innovative approaches to maintain competitive advantages and survive in dynamic markets (Neely et al., 2002). E-business, as one such approach, leverages digital technologies to enable process automation, enhance customer interactions, and reduce operational costs (Tamizi & Akbari, 2004). However, the success of e-business implementation heavily depends on an organization's e-readiness, encompassing technical, legal, social, and economic infrastructures necessary for adopting and utilizing digital technologies (Iran Industrial Development and Renovation Organization, 2002).

E-readiness refers to the ability of organizations and societies to effectively use ICT to achieve strategic objectives. This concept not only involves access to technological infrastructure but also relies on organizational culture, digital literacy, and supportive policies (Amiri & Shafiei Nikabadi, 2010). Recent studies suggest that organizations with high e-readiness levels are better equipped to implement e-business and gain competitive advantages. For instance, Susanty et al. (2020) demonstrated that IT infrastructure, such as high-speed networks and data management systems, plays a critical role in e-business success. Similarly, Haider Syed et al. (2021) emphasized that employee training in digital tools directly impacts the effectiveness of electronic technology implementation.

Advancements in emerging technologies, such as artificial intelligence (AI) and blockchain, have introduced new opportunities for e-business. Chu et al. (2022) showed that AI-based tools can accelerate customer data analysis and improve user experiences. However, implementing these technologies requires advanced computational infrastructure and skilled human resources (Fiedler et al., 2025). In small and medium-sized enterprises (SMEs), which often face resource constraints, e-readiness is vital for bridging the competitive gap with larger organizations. Hermawan (2023) found that SMEs investing in digitalization and training can enhance productivity and global market access.

In the insurance industry, which is highly data-driven and competitive, e-readiness is particularly significant. Al-Abri & Rahim (2020) demonstrated that insurance companies using customer relationship management (CRM) systems and data analytics can offer personalized services, increasing customer satisfaction. Additionally, Hakami et al. (2024) highlighted that blockchain technology enhances data transparency, strengthens customer trust, and streamlines insurance processes. Furthermore, Pyzuk (2024) underscored the importance of collaboration between technical and business departments to foster a digital culture within organizations.

Assessing e-readiness requires comprehensive models that cover various aspects of this concept. The Economist Intelligence Unit (EIU) model is one of the most widely used, examining five key indicators: electronic services support, network and technology infrastructure, business environment, firm and customer compatibility, and cultural and social infrastructure (ITU Website, 2005). Due to its comprehensiveness and flexibility, this model has been adopted in numerous

studies. For example, Khatami Firouzabadi & Shafiei Nikabadi (2008) used it to evaluate e-business efficiency.

Given the importance of e-readiness in e-business implementation, this study aims to assess the effectiveness of e-readiness in an insurance company using fuzzy set theory and insights from managers and employees. The study seeks to identify the strengths and weaknesses of e-readiness to provide recommendations for improving e-business implementation in this organization.

2. Theoretical Framework

E-business involves the use of ICT in business operations through computer networks, including the internet. A business model, beyond delivering value to one or more segments, can be applied in a company's architecture and collaboration networks to create, market, and deliver this value, linking it to investments for generating sustainable revenue and profits. Various definitions of e-business have been proposed:

Timmer (Rowley, 2002) views a business model as an architecture for products, services, and information flows, encompassing descriptions of various business actors, their roles, potential benefits, and revenue sources. Currie (2004) describes e-business as a depiction of roles and relationships among customers, consumers, partners, and suppliers, identifying key flows of products, information, and money, and creating core benefits for stakeholders. Andrew et al. (2006) define e-business as the automation of transactions, exchanges, and communications through communication and computer technologies for economic purposes. Botto (2003) considers it a broad concept encompassing all aspects of IT use in business, including the integration of internal and external processes and communications. Haig (2001) describes it as the integration of traditional business processes with internet technologies in B2B, B2C, and business-to-individual scenarios. A Comergent Ewhitepaper (2006) characterizes it as work processes in virtual or electronic environments, such as the World Wide Web. Shafiei Nikabadi (2008) introduced the concept of dynamic e-businesses, which allow rapid adjustments to work systems during changes in business processes. Chu et al. (2022) also demonstrated that AI technologies can strengthen digital value chains and create new value for customers. The primary objectives of e-business include increasing sales, building trust, raising brand awareness, providing enhanced services, expanding business, and maintaining continuous stakeholder engagement (Amiri & Shafiei Nikabadi, 2010). Its benefits include market expansion, cost reduction, customization, competitive advantage, and reduced time between investment and product/service delivery (Khatami Firouzabadi & Shafiei Nikabadi, 2008).

Various definitions of e-readiness exist. The Asia-Pacific Economic Cooperation (APEC) (APEC Website, 2005) considers a country e-ready if it has free trade, a regulated industry, ease of exports, and alignment with governmental standards and trade agreements. The Computer Systems Policy Project (CSPP) (CSPP Website, 2005) defines an e-ready society as one with high-speed network access in a competitive market, sustainable ICT use in schools, government offices, businesses, homes, and healthcare centers, ensured security and privacy in electronic methods, and supportive

government policies for network connectivity. Haider Syed et al. (2021) emphasized that digital literacy training for citizens strengthens e-readiness. The main components of e-readiness include infrastructure, government, citizens, and economic enterprises (Neely et al., 2002). Hermawan (2023) showed that SMEs can improve e-readiness through digitalization. Al-Abri & Rahim (1999) also demonstrated that small firms using IT enhance productivity and customer services.

Components of E-Readiness:

a) **Infrastructure**: Includes technical, telecommunication, legal, and human resource infrastructures that facilitate e-readiness access. b) **Government**: National ICT policies for education, healthcare, and public and private sectors are essential. c) **Citizens**: Literacy and willingness to adopt IT are critical for leveraging its applications. d) **Economic Enterprises**: Using IT in daily operations keeps enterprises competitive in global markets.

The e-readiness process at the organizational level comprises four stages (Neergaard, 1992):

1. Selecting an appropriate assessment tool based on a clear understanding of national (organizational) ICT integration goals;
2. Conducting the e-readiness assessment;
3. Developing a detailed action plan to guide the country (organization) toward its goals;
4. Implementing the plan.

Hadjimanolis (1999) showed that small firms pursue e-readiness for reasons such as increased productivity, streamlined workflows, improved customer services, and better record-keeping. Hakami et al. (2024) also emphasized that emerging technologies like blockchain can enhance data storage in organizations.

The Economist Intelligence Unit (EIU) has provided an e-readiness assessment model since 2000 (ITU Website, 2005). This model includes five main indicators:

1. **Electronic Services Support**: Environmental conditions for IT development.
2. **Network and Technology Infrastructure**: Access to telephones, computers, and networks.
3. **Business Environment**: The need for a regulated environment for e-business.
4. **Firm and Customer Compatibility**: Alignment of technologies used.
5. **Cultural and Social Infrastructure**: Digital literacy and workforce skills.

Pyzuk (2024) emphasized that a digital organizational culture is key to this model's success. Fiedler et al. (2025) also showed that advanced computational infrastructure is essential for its implementation.

3. Research Methodology

This study is applied in purpose and descriptive in nature. The statistical population consists of managers and employees of an insurance company, with 70 questionnaires distributed and all (100%) collected. Due to the limited population size, no sampling methods were used, and the entire population was examined. To evaluate and extract appropriate criteria, library studies were conducted, and various models were reviewed. The EIU model was selected as the basis, considering five major indicators affecting e-readiness, with sub-indicators designed based on the organizational environment and local conditions. Based on these criteria, a questionnaire titled "Assessment of E-Readiness in E-Business Development" was prepared and distributed among the target population. The questionnaire's validity was determined through face validity, with the measurement tool provided to several experts and university professors for review. After collecting their feedback and revising some questions, it was concluded that the questionnaire had high validity. The reliability of the questionnaire was measured using Cronbach's alpha coefficient, with results for each e-readiness dimension presented in Table 1.

Table 1: Cronbach's Alpha Coefficient for System Inputs

Variable	Cronbach's Alpha Coefficient
Electronic Services Support	0.925
Network and Technology Infrastructure	0.747
Business Environment	0.816
Firm and Customer Compatibility	0.892
Cultural and Social Infrastructure	0.759

Based on the Cronbach's alpha coefficients, it was concluded that the questions designed for each e-readiness dimension have high reliability.

Fuzzy set theory was used for data analysis. To fuzzify variables, the triangular function (Equation 1) was applied, with Diagram 1 illustrating triangular numbers in the (α, β) interval. A three-option spectrum with equal intervals was used to fuzzify the dimensions of electronic services support, network and technology infrastructure, business environment, firm and customer compatibility, and cultural and social infrastructure (Buckley, 1985). The fuzzy numbers corresponding to these indicators are presented in Table 2.

Table 2: Partitioning of Linguistic Variables and Corresponding Fuzzy Numbers

Indicators	Fuzzy Number (α, m, β)	Low/Weak	Medium	High/Strong
Electronic Services Support	(0, 0, 0.5) / (0, 0.5, 1) / (0.5, 1, 1)	Low	Medium	High
Network and Technology Infrastructure	(0, 0, 0.5) / (0, 0.5, 1) / (0.5, 1, 1)	Weak	Medium	Strong
Business Environment	(0, 0, 0.5) / (0, 0.5, 1) / (0.5, 1, 1)	Low	Medium	High
Firm and Customer Compatibility	(0, 0, 0.5) / (0, 0.5, 1) / (0.5, 1, 1)	Low	Medium	High
Cultural and Social Infrastructure	(0, 0, 0.5) / (0, 0.5, 1) / (0.5, 1, 1)	Weak	Medium	Strong

Each linguistic variable can also be represented graphically. Since each input is partitioned with three linguistic variables, the fuzzy number for each is shown in Diagram 2.

4. Findings

After collecting the questionnaires, each respondent's answers were converted to fuzzy numbers using the triangular function. The fuzzy (triangular) average was calculated for each questionnaire, representing one respondent's opinion. The average opinions of the 70 respondents for each criterion were then computed, yielding a number representing the collective opinion for each criterion. Since the obtained average is fuzzy, it required defuzzification. The following relations were used for calculating the fuzzy average and defuzzification. Table 3 summarizes the results of these calculations.

Table 3: Fuzzy Average and Calculated Score for Each Indicator in the Insurance Company

Indicator	Fuzzy Average	Defuzzified Average
Electronic Services Support	(0.656, 0.744, 0.875)	0.759
Network and Technology Infrastructure	(0.701, 0.853, 0.916)	0.824
Business Environment	(0.452, 0.508, 0.698)	0.553
Firm and Customer Compatibility	(0.613, 0.726, 0.841)	0.727
Cultural and Social Infrastructure	(0.565, 0.649, 0.882)	0.699

Based on the questionnaire data and conversion of fuzzy numbers to crisp numbers using Equation 3, the insurance company's e-readiness for e-business implementation can be relatively determined. The following diagram illustrates the company's current e-readiness status for each dimension, highlighting the gap with the ideal state.

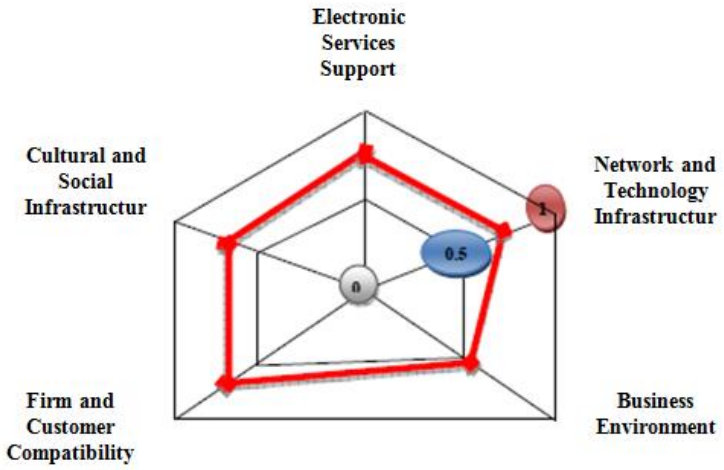

Figure1. Current E-Readiness Status of the Insurance Company Compared to the Ideal State

Table 4: Calculation of the Gap Between Current and Ideal States

Criterion	Current State	Ideal State	Gap Between Current and Ideal States
Electronic Services Support	0.759	1	0.241
Network and Technology Infrastructure	0.824	1	0.176
Business Environment	0.553	1	0.447
Firm and Customer Compatibility	0.727	1	0.273
Cultural and Social Infrastructure	0.699	1	0.301

5. Conclusion

The results of theoretical discussions, studies, and analysis of questionnaire data indicate that the e-readiness dimensions in the studied insurance company are at a satisfactory level, with a relatively small gap from the ideal state. The gaps for each e-readiness dimension are presented in Table 4.

As shown in Table 4, the gap between the current and ideal states is largest for the business environment, followed by cultural and social infrastructure, firm and customer compatibility, electronic services support, and network and technology infrastructure. Overall, it can be stated that to create an appropriate foundation for e-readiness in companies for e-business implementation, all e-readiness dimensions (aligned with environmental conditions and contextually) must be developed and implemented in tandem. Therefore, relevant organizations should strive to address observed weaknesses in each criterion through corrective actions to reduce the gap between current and ideal states.

In general, the study's results indicate that the insurance company is in a favorable position regarding e-readiness for e-business implementation. However, achieving the ideal level requires coordinated and contextual development of all e-readiness dimensions. Pyzuk (2024) emphasized that collaboration between technical and business departments and fostering a digital culture can facilitate this coordination. Additionally, Hermawan (2023) showed that investments in digitalization can reduce existing gaps, particularly in resource-constrained organizations.

These findings align with previous studies in the insurance industry. For instance, Al-Abri & Rahim (2020) demonstrated that insurance companies strengthening digital infrastructure and employee training can provide better services and increase customer satisfaction. Chu et al. (2022) also highlighted the potential of AI technologies in improving data analysis and service personalization, which requires robust e-readiness.

These results can assist the insurance company in enhancing e-readiness to successfully advance e-business implementation and strengthen its competitive advantage in the market. For future research, it is recommended to replicate this study in other insurance companies or similar industries to enable comparison and generalization of results. Additionally, exploring the impact of emerging technologies, such as the Internet of Things (IoT), on e-readiness could pave the way for new research.

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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.