JOURNAL OF MARITIME RESEARCH

Vol XXII. No. I (2025) pp 302–314

ISSN: 1697-4840, www.jmr.unican.es

The Influence of System Thinking and Mental Models on the E-Business Growth in The Jordanian Maritime Industry

"Mohammad Baker" Altakhaineh[1,*], Dr. Norlinda Binti Mohd Rozar[1], Dr. Alaa Alhourani[1]

ARTICLE INFO

Article history:
Received 29 Aug 2024;
in revised from 02 Sep 2024;
accepted 18 Sep 2024.

Keywords:
System Thinking, Mental Models, E-Business Growth, Maritime Industry, Jordan, Correlation Analysis, Reliability Coefficients.

ABSTRACT

This study examines the obstacles that maritime students at the Universiti Malaysia Terengganu (UMT) encounter when attempting to understand the Convention on the International Regulations for Preventing Collisions at Sea (COLREGs). Given the crucial role of COLREGs in ensuring maritime safety, aspiring seafarers must have a comprehensive understanding of these regulations. However, the learning process is susceptible to various influencing factors, including self-e-learning, classroom teaching, and simulator training. To investigate these challenges, this study employed a quantitative approach, using a structured questionnaire to gather data from a representative sample of UMT maritime students. The collected quantitative data aimed to elucidate students' experiences with self-e-learning, classroom teaching, and simulator training, along with their perceived grasp of COLREGs. The objective of this study was to explain the factors that impede or facilitate the effective learning of COLREGs among maritime students in Malaysia. This knowledge holds significant value for maritime educators, curriculum developers, and policymakers, offering insights into enhancing the quality of maritime education and training programs. By addressing the challenges identified in this study, the UMT and other maritime institutions can better prepare their students for careers at sea, contributing to improved maritime safety and professionalism.

1. Introduction.

The maritime industry, which is a crucial component of global trade and logistics, is experiencing significant changes due to the increasing influence of e-commerce. The introduction of electronic commerce has fundamentally changed how maritime companies conduct their business, communicate, and interact with their customers. This presents opportunities to improve efficiency, simplify processes, and enhance competitiveness. However, successfully implementing and growing e-business in the Jordanian maritime industry requires more than just technological advancements; it also demands a deep understanding of systemic thinking and mental models to effectively direct the complexities of this digital era (Mansour, 2022).

In the context of the Jordanian maritime industry, adopting a holistic approach known as systems thinking is crucial. This approach emphasizes the interconnectedness and interdependencies within the system, recognizing the complex relationships among stakeholders such as shipping companies, logistics providers, port authorities, and customers. By accepting this systemic perspective, businesses can gain a better understanding of the critical components of their e-business ecosystem and how changes in one aspect can affect the entire system.

In addition to systems thinking, the role of mental models cannot be overlooked. These are internal mental frameworks that shape perceptions, beliefs, and decision-making processes. They greatly influence how industry professionals, entrepreneurs, and policymakers interpret and respond to technological advancements, ultimately impacting attitudes toward technology adoption, strategic planning, and innovation. In the specific context of e-business growth in the Jordanian maritime sector, these mental models play a pivotal role in shaping the

[1]Universiti Malaysia Terengganu, Kuala Terengganu, 21030, Malaysia.
[*]Corresponding author: "Mohammad Baker" Altakhaineh. E-mail Address: bakermha@hotmail.com.

trajectory of digital transformation (Johnson, 2014).

Jordan's strategic geographic location and the growing importance of maritime trade make it imperative to capitalize on e-business technologies to boost the country's competitiveness and economic development. Despite the potential advantages, challenges such as resistance to change, inadequate infrastructure, and limited digital literacy continue to hinder the adoption of e-business practices. A comprehensive knowledge of systems thinking and mental models can help identify barriers and facilitators, thereby guiding the development of effective strategies and interventions to support e-business growth (El-Bakey, 2011).

This study aims to investigate the influence of systems thinking and mental models on the advancement of e-business in the Jordanian maritime industry. By analyzing existing literature, empirical evidence, and expert insights, this research intends to uncover the fundamental factors that affect the adoption and implementation of e-business strategies. Furthermore, it seeks to pinpoint the mental models and systems thinking frameworks that most effectively foster innovation, collaboration, and sustainable growth within the Jordanian maritime sector.

2. Problem Statement.

The maritime industry in Jordan is encountering significant challenges in implementation and leveraging e-business technologies despite the clear benefits of increased efficiency, streamlined operations, and enhanced competitiveness. Major obstacles include resistance to change, inadequate infrastructure, and limited digital literacy among industry stakeholders. These challenges are further complicated by the lack of a systematic approach and an underdeveloped understanding of the mental models influencing stakeholders' attitudes and decision-making processes regarding digital transformation. This study aims to address these gaps by investigating how systems thinking and mental models impact the adoption and growth of e-business in the Jordanian maritime industry. The research seeks to identify the critical barriers and enablers of e-business implementation, providing insights that will inform strategies and interventions to foster a more conducive environment for digital innovation and sustainable growth in the sector.

3. Importance of the study.

It is crucial to emphasize the significance of this study, especially in the context of the Jordanian maritime industry's efforts to undergo digital transformation through e-business. The study delves into the urgent requirement for Jordan's maritime industry to improve its global competitiveness by examining how systems thinking and mental models impact the adoption of e-business. Considering Jordan's strategic location and the increasing importance of maritime trade, it is essential to utilize e-business technologies to foster economic growth and retain a competitive advantage.

4. Background.

The marine sector is vital to international trade and economic growth because it supports the movement of products internationally. The quick development of information and communication technologies has made e-business a disruptive force in the maritime industry. E-business is conducting various commercial operations, such as procurement, logistics, communication, and consumer involvement, using electronic platforms, including websites, mobile applications, and online marketplaces.

The adoption and expansion of e-business techniques have grown more crucial in the context of the maritime sector in Jordan. Jordan is a key regional and global marine trade hub due to its advantageous location along the Red Sea and proximity to important commercial routes. The Jordanian marine industry must adopt e-business technologies and seize the advantages they offer, such as greater operational efficiency, cost savings, enhanced customer experience, and increased market reach, to utilize its geographic advantage and boost its competitiveness (Jawabreh et al., 2023)

However, several variables other than technology improvements impact the effective adoption and expansion of e-business in the Jordanian marine sector. System thinking and mental models are important factors in determining how the industry approaches e-business and how it will display (Al-Momani & Mohd Noor, 2009).

System thinking is a method that acknowledges the connections and interdependencies among diverse parts of a system. Understanding the intricate interrelationships among stakeholders, including shipping firms, logistics service providers, port authorities, and customers, is a key component of system thinking in the marine business. Analyzing the flow of data, products, and services along the entire value chain is necessary, as is determining the potential effects of alterations to one area on the overall system. Maritime organizations can create more thorough strategies and make educated decisions about developing and using e-business practices by adopting a system-thinking mentality (AL-Sous et al., 2022).

Mental models, on the other hand, refer to individuals' cognitive frameworks and beliefs that shape their perception of the world and guide their decision-making processes. In the Jordanian maritime industry context, the mental models of industry professionals, entrepreneurs, and policymakers significantly influence their attitudes toward technology adoption, strategic planning, and innovation. Positive mental models that embrace change, technological advancements, and collaboration can foster a conducive environment for e-business growth. Conversely, negative or resistant mental models can hinder the adoption and effective utilization of e-business practices (Dhia'Qasim, & Liñán, 2022).

It is essential to comprehend how system thinking and mental models affect the development of e-business in the Jordanian maritime sector to remove obstacles and promote sustainable development. While having a strong technology foundation and being digitally literate is vital, tackling systemic issues and changing one's mindset can result in more successful strategies, policies, and interventions that promote e-business

growth. By conducting studies in this field, academics and professionals from the industry can learn a lot about the particular system thinking frameworks and mental models that can promote innovation, teamwork, and long-term success in the marine sector in Jordan (Johnson, 2014).

5. Literature review.

5.1. Definition and Key Concepts of E-business in the Maritime Context.

E-business, or electronic business, involves using electronic technologies and digital platforms to conduct business activities within the maritime industry. It utilizes information and communication technologies (ICT) to enhance efficiency, streamline processes, and improve communication and collaboration among maritime stakeholders. Key elements of e-business in the maritime sector include electronic transactions, which encompass the digital exchange of information, documents, and financial transactions, leading to quicker and more efficient operations (Al-Nassar, 2015).

Moreover, e-business relies on various digital platforms such as websites, mobile applications, and online portals to facilitate communication, process transactions, and enable information exchange among industry participants (Sarli et al., 2020).

An essential focus of e-business in the maritime industry is the integration of different supply chain components, including shipping lines, freight forwarders, customs authorities, and customers, to establish a seamless and interconnected operational environment (Al-Momani & Mohd Noor, 2009).

This integrated approach enhances operational efficiency and fosters stronger collaboration and coordination among all stakeholders in the maritime sector. E-business leverages data analytics and business intelligence tools to collect, analyze, and interpret data generated across the maritime supply chain, enabling informed decision-making and strategic planning (Sarli et al., 2020).

E-business also includes e-commerce activities, facilitating direct trade between buyers and sellers in the maritime industry. Online marketplaces and platforms connect shippers and carriers, manage freight bookings, and provide transparent pricing and visibility throughout procurement (AL-Sous et al., 2022).

5.2. Evolution and Development of E-business in the Maritime Industry.

Advancements in information technology, globalization, evolving customer expectations, and the increasing demand for operational efficiency have driven the development of e-business in the maritime industry. Over time, the industry has embraced various e-business practices and technologies, marking significant milestones in its evolution. One of the earliest milestones was the adoption of Electronic Data Interchange (EDI) in the late 20th century, which facilitated the electronic exchange of business documents, such as bills of lading and invoices. This shift reduced paperwork, improved data accuracy, and established a foundation for future e-business advancements (Auh, 2003).

The emergence of online portals and marketplaces marked another transformative phase, as maritime stakeholders leveraged these digital platforms to enhance communication, collaboration, and transaction processing. These platforms have significantly improved connectivity and operational efficiency across the sector (El-Bakey, 2011).

Concurrently, the digitization of documentation and processes, such as the adoption of electronic bills of lading, electronic customs declarations, and digital documentation management systems, further advanced e-business development by reducing administrative burdens, minimizing errors, and expediting cargo clearance processes, ultimately resulting in greater efficiency, cost savings, and enhanced stakeholder collaboration (Fady, 2013).

The rise of e-commerce and digital freight forwarding has also played a critical role in disrupting traditional business models within the maritime industry. These innovations have enabled direct connections between buyers and sellers, facilitated online purchasing, and provided comprehensive door-to-door logistics services. Digital freight forwarding platforms offer solutions for freight booking, quotation management, and shipment tracking, which cater to small and medium-sized enterprises (SMEs) needs and broaden access to international trade (Chen et al., 2022).

Additionally, adopting blockchain technology has emerged as a critical development, enhancing security, transparency, and traceability within the maritime industry. Blockchain's capabilities have improved supply chain integrity, streamlined documentation processes, and enabled secure, trusted transactions, thereby providing substantial benefits to e-business practices in the sector (Chen & Lewis, 2010). These advancements have collectively driven the evolution of e-business in the maritime industry, transforming how stakeholders operate, collaborate, and engage with customers.

5.3. Key Technologies and Platforms Used in E-business within the Maritime Sector.

Electronic Data Interchange (EDI) is a foundational technology that facilitates the electronic exchange of structured business documents among maritime industry stakeholders. This technology enables the seamless transfer of crucial data, including bills of lading, shipping instructions, and invoices, improving operational efficiency and reducing reliance on traditional paperwork (Li & Zhou, 2021).

In addition to EDI, online portals and marketplaces provide a digital platform for maritime stakeholders to access information, conduct transactions, and collaborate more effectively. These platforms streamline shipment space booking, tracking, logistics management, and communication among supply chain participants (Stanford-Smith & Kidd, 2000).

Supply chain visibility is further enhanced through track-and-trace technologies, such as Radio Frequency Identification (RFID) and Global Positioning System (GPS), which enable real-time monitoring of containers, vessels, and cargo. These technologies allow stakeholders to monitor the location and status of shipments throughout the transportation process, thus im-

proving transparency and coordination across the supply chain (Nikitakos & Lambrou, 2007).

In addition to tracking technologies, digital documentation management systems replace traditional paper-based processes with electronic alternatives, allowing for the electronic storage and management of crucial documents like bills of lading, customs declarations, and certificates. This digital shift streamlines administrative processes, reduces errors, and enhances data accessibility (Stanford-Smith & Kidd, 2000).

E-commerce platforms further extend the capabilities of e-business by connecting buyers and sellers within the maritime industry. These digital marketplaces facilitate online purchasing, secure payment processing, and direct trade between businesses, offering a convenient and efficient way to engage in international trade while eliminating geographical barriers and increasing market accessibility (Dourmas & Nikitakos, 2009).

Similarly, digital freight forwarding platforms simplify freight booking by offering online solutions for quotation management, cargo tracking, and documentation handling. These platforms leverage digital technologies to enhance transparency, automate processes, and provide comprehensive logistics solutions to businesses (Wiafe et al., 2020).

Data analytics and business intelligence tools play a crucial role in e-business by enabling maritime stakeholders to collect, analyze, and derive insights from the vast amounts of data generated within the industry. These tools help identify patterns, trends, and key performance indicators, supporting informed decision-making, optimizing operations, and guiding strategic planning (Agrifoglio et al., 2017).

Blockchain technology further strengthens the maritime e-business ecosystem by enhancing security, transparency, and traceability. With its decentralized and immutable ledger, blockchain improves trust and integrity in supply chain transactions, streamlining processes such as bill of lading management, cargo tracking, and authentication (Fady, 2013).

The Internet of Things (IoT) introduces another layer of innovation, with devices such as sensors embedded in containers, vessels, and logistics infrastructure that collect and transmit data in real time. These IoT devices enable stakeholders to monitor conditions, optimize operations, and enhance the visibility and safety of the supply chain (Fady, 2013).

Moreover, Artificial Intelligence (AI) and Machine Learning (ML) technologies are increasingly utilized to analyze complex data sets, identify patterns, and make predictive analyses. AI-powered systems optimize vessel routing, predict maintenance needs, automate decision-making processes, and improve operational efficiency within the maritime industry (Fady, 2013).

Combining these technologies and platforms is crucial in e-business practices within the maritime industry. They empower stakeholders to boost efficiency, foster collaboration, and provide top-notch services to customers. As technology progresses, we anticipate that innovations will continue to reshape the e-business landscape in the maritime sector, bringing about ongoing enhancements and establishing new benchmarks for operational excellence (Zhu et al., 2015).

5.4. Benefits and Challenges Associated with E-business Adoption in the Maritime Industry.

The adoption of e-business in the maritime industry has significantly enhanced operational efficiency by streamlining processes, reducing paperwork, and automating manual tasks. Digital platforms and technologies facilitate faster information exchange, real-time tracking of shipments, and improved coordination among stakeholders, leading to considerable time and cost savings (Fady, 2013). These efficiencies not only optimize daily operations but also enable companies to handle larger volumes of transactions more effectively, thereby supporting the industry's overall growth.

Beyond operational improvements, e-business enhances visibility throughout the maritime supply chain. By leveraging digital tools, stakeholders can track and trace shipments, monitor inventory levels, and access real-time insights into cargo status. This increased visibility supports better planning, optimized inventory management, and more effective decision-making, which helps reduce delays and boosts customer satisfaction (Zhu et al., 2015). The ability to anticipate issues and respond promptly is a key advantage, further strengthening supply chain resilience and efficiency.

E-business also plays a pivotal role in enhancing the customer experience within the maritime sector. Online portals and platforms provide self-service options, allowing customers to easily track their shipments, access essential documentation, and manage their logistics needs conveniently. The improved communication and transparency offered by these digital solutions lead to faster response times, reduced errors, and greater customer satisfaction. This shift towards a more customer-centric approach is increasingly important in today's competitive market, where the ability to provide seamless, efficient service can be a critical differentiator.

Moreover, e-business enables maritime businesses to expand their market reach beyond traditional geographical boundaries. Through online platforms and marketplaces, companies can engage in direct trade between buyers and sellers, creating new opportunities for business partnerships and access to a broader customer base. E-commerce platforms, in particular, facilitate entry into global markets by removing traditional barriers, thereby offering maritime businesses a more accessible and efficient way to connect with international customers. This expanded reach increases business opportunities and encourages greater competition and innovation, driving continuous improvement and growth in the maritime industry.

The adoption of e-business in the maritime industry presents several challenges, primarily related to technological infrastructure, digital literacy, and the need for interoperability and standardization. A robust technological infrastructure is essential for integrating e-business practices, including reliable internet connectivity and adequate hardware and software systems. However, in certain regions or ports, inadequate infrastructure can pose significant barriers, hindering the seamless implementation of e-business solutions (Zhu et al., 2015).

Another critical challenge is the digital literacy and skills gap among the workforce. Effective e-business adoption requires employees who are proficient in using digital tools and

platforms. However, this can be a significant hurdle, particularly for older or less tech-savvy individuals within the maritime sector. A digital skills gap can slow the adoption of new technologies and reduce the overall effectiveness of e-business initiatives (Chu et al, 2010).

Interoperability and standardization also pose substantial challenges in adopting e-business in the maritime industry. Given the involvement of multiple stakeholders across the maritime supply chain, including shipping lines, port authorities, and logistics providers, ensuring seamless integration and collaboration is crucial. However, differences in data formats, systems, and processes can create obstacles to effective communication and data exchange (Gosain et al., 2004).

Balancing the benefits and challenges of e-business adoption in the maritime industry requires strategic planning, investment in technology and infrastructure, skill development, and stakeholder collaboration. Overcoming these challenges can unlock significant opportunities for enhanced efficiency, competitiveness, and growth within the maritime sector (Fady, 2013).

5.5. Definition and Principles of System Thinking.

Systems thinking is an approach that views a system as a complex, interconnected entity composed of various elements that interact and influence one another. Rather than focusing solely on individual components, systems thinking emphasizes understanding the relationships, feedback loops, and interdependencies within the system. This approach considers the system as a whole, accounting for the visible and invisible connections between its parts (Park, 2006).

A fundamental principle of systems thinking is holism, which posits that the whole system is greater than the sum of its parts. This principle highlights the interconnectedness and interdependence of the system's elements, recognizing that changes in one part can significantly impact the entire system. Considering the broader context, systems thinking helps identify how individual components and their interactions collectively influence the overall system behavior (Panagiotopoulos, et al., 2018).

Another crucial aspect of systems thinking is the concept of feedback loops, which are essential for understanding how systems behave over time. Feedback loops can be reinforcing (positive) or balancing (negative) and play a key role in regulating system behavior. Reinforcing feedback loops amplify changes, potentially leading to exponential growth or decline, while balancing feedback loops work to counteract changes, promoting stability within the system. Recognizing and analyzing these feedback mechanisms is vital for predicting and managing the system's responses to various influences (Panagiotopoulos, et al., 2018).

Emergence is also a key principle of systems thinking, which acknowledges that a system's behavior cannot always be fully explained by examining its components. Emergent properties arise from the complex interactions and relationships between the system's elements, leading to behaviors that are not apparent from the parts alone. This principle underscores the importance of analyzing how components work together, as the collective interactions often produce unexpected or non-linear outcomes (Panagiotopoulos, et al., 2018).

5.6. Application of System Thinking in the Maritime Industry.

Systems thinking has numerous applications in the maritime industry, especially in managing the complexities and interdependencies of the industry's operations, interactions, and challenges. By adopting a holistic approach, systems thinking allows stakeholders to understand and address the dynamic relationships within the maritime ecosystem, leading to more effective management and decision-making (Gloor, 2012; Lin & Lin, 2008).

Supply chain management is a key application of systems thinking in the maritime industry. As a crucial component of global supply chains, the maritime sector involves intricate networks of activities, stakeholders, and processes. Systems thinking helps in understanding these interdependencies, feedback loops, and dynamics, enabling the identification of bottlenecks, optimization of logistics operations, and improved coordination among the various stakeholders involved in the movement of goods. This holistic perspective aids in enhancing the overall efficiency and resilience of maritime supply chains.

Another important area where systems thinking can be applied is in port operations. Ports are complex systems with interconnected elements, including terminals, vessels, cargo-handling equipment, and transport networks. Systems thinking provides a framework for understanding the interconnections and interactions between these components, allowing for the optimization of port operations. By applying systems thinking, stakeholders can identify opportunities for improving efficiency, reducing congestion, and enhancing the overall performance of ports. This approach supports better planning and resource allocation, promoting more sustainable and effective port management.

Systems thinking is also critical in fostering stakeholder collaboration within the maritime industry. The industry involves diverse stakeholders, including shipping companies, port authorities, logistics providers, and regulatory bodies, all of whom have interconnected roles and shared interests. Systems thinking encourages recognizing these interdependencies and common goals, promoting cooperation, coordination, and collective problem-solving. By facilitating a shared understanding of the broader system, and systems thinking helps identify win-win solutions and develop strategies that benefit the entire maritime ecosystem. This collaborative approach enhances operational efficiency and strengthens relationships among stakeholders, leading to more cohesive and aligned efforts in addressing industry challenges.

5.7. Role of System Thinking in E-business Strategy Formulation and Implementation.

Systems thinking plays a crucial role in the formulation and implementation of e-business strategies within the maritime industry. It offers a holistic approach that considers the interdependencies, feedback loops, and dynamics of the entire system. This perspective ensures that e-business strategies are comprehensive and aligned with the broader organizational goals and objectives (Weill & Woerner, 2013). By applying systems thinking, organizations can better navigate the complexities of the

maritime ecosystem, optimize outcomes, and drive sustainable growth through more effective e-business strategies.

A key aspect of systems thinking in e-business strategy is the understanding of the complex ecosystem in which maritime organizations operate. This involves identifying and analyzing various industry stakeholders, processes, and interactions. By mapping out the relationships and dependencies, systems thinking helps organizations pinpoint key components and understand their influence on e-business strategies. This comprehensive understanding of the ecosystem allows for more informed decision-making and strategic planning, ensuring that all elements are considered in the development of e-business initiatives (Chaffey et al., 2019).

Systems thinking also enables organizations to balance short-term and long-term objectives when formulating e-business strategies. It encourages a perspective that goes beyond immediate gains, prompting organizations to consider their decisions' long-term impacts and systemic consequences. This broader outlook helps ensure that strategic choices are aligned with sustainable growth and long-term success, as decisions are made with an understanding of their potential ripple effects throughout the entire system (Chaffey et al., 2019).

Furthermore, systems thinking promotes collaboration and alignment among various stakeholders involved in e-business strategies. Recognizing interdependencies and shared goals facilitates cooperation and coordination, which are essential for successful strategy implementation. Systems thinking helps identify potential conflicts or misalignments between stakeholders. It supports the development of collaborative strategies that benefit the entire maritime system, fostering a unified approach to achieving strategic objectives (Chaffey et al., 2019).

Another key component of systems thinking in e-business strategy formulation is an iterative and adaptive approach. It recognizes that the maritime system is dynamic and continuously evolving. By incorporating feedback mechanisms and learning from the outcomes of implemented strategies, organizations can make necessary adjustments and adaptations to enhance the effectiveness of their e-business initiatives. This adaptability is crucial in a rapidly changing environment, allowing organizations to remain agile and responsive to emerging challenges and opportunities (Weill & Woerner, 2013).

Systems thinking promotes performance measurement and evaluation that extends beyond isolated metrics. It encourages organizations to assess the impacts and outcomes of e-business strategies on the entire system, considering both intended and unintended effects. By utilizing system-level metrics, organizations can better evaluate the effectiveness and efficiency of their e-business strategies, ensuring continuous improvement and alignment with strategic goals (Weill & Woerner, 2013).

5.8. System thinking frameworks and models relevant to e-business growth in the maritime sector.

Several systems thinking frameworks and models are relevant to e-business growth in the maritime sector. These frameworks provide structured approaches to understanding and analyzing the industry's complex dynamics. These frameworks help assess the potential impacts and outcomes of e-business initiatives, offering valuable insights into how such strategies can be effectively implemented.

One key framework is **Systems Dynamics**, a modeling approach that utilizes feedback loops, stocks, and flows to understand complex systems and their behaviors over time. Systems Dynamics allows for the simulation and analysis of how e-business initiatives might affect various aspects of the maritime industry, including supply chain dynamics, customer satisfaction, and operational efficiency (Weill & Woerner, 2013).

Another relevant framework is the **Soft Systems Methodology (SSM)**, developed by Peter Checkland. SSM focuses on understanding and managing complex problems by encouraging multiple perspectives and stakeholder involvement. This methodology is particularly useful in the maritime sector, where diverse stakeholders, such as shipping companies, port authorities, and logistics providers, must collaborate to address systemic issues. SSM facilitates the identification of problems and opportunities within the system, promoting a more inclusive and comprehensive approach to e-business strategy formulation (Chaffey et al., 2019).

The **Business Model Canvas** also applies to the maritime industry, providing a visual framework to analyze and design business models. This tool helps organizations evaluate key elements of their business, such as value proposition, customer segments, channels, revenue streams, and partnerships. Using the Business Model Canvas, maritime businesses can explore how e-business initiatives align with their overall strategy and identify areas where digital solutions can enhance business performance and customer engagement (Chaffey et al., 2019).

Value Chain Analysis is another valuable framework that identifies and evaluates the activities and processes that create value for customers. In the maritime industry, Value Chain Analysis can be used to assess the integration of e-business practices within the value chain, highlighting areas for process improvement and opportunities to enhance the customer value proposition. By understanding how each activity contributes to overall value creation, organizations can optimize their operations and leverage e-business strategies to gain a competitive advantage (Weill & Woerner, 2013).

These systems thinking frameworks and models provide systematic approaches to analyzing the maritime industry's complexities and evaluating the potential impacts of e-business growth. By utilizing these tools, organizations can identify opportunities, address challenges, and develop effective strategies for successful e-business implementation in the maritime sector (Yang & Papazoglou, 2000).

5.9. Review of Relevant Theories and Models from Organizational Behavior, Management, and Psychology.

Several theories and models from cognitive psychology, organizational behavior, and innovation studies are relevant to understanding how systems thinking and mental models influence e-business growth in the maritime industry. These frameworks provide valuable insights into decision-making, change management, organizational culture, knowledge management, and

innovation, all of which play crucial roles in successfully adopting and implementing e-business strategies.

Mental Models are cognitive frameworks individuals use to interpret and understand the world around them. These mental representations influence how people perceive situations, solve problems, and make decisions. In the context of e-business, mental models can significantly impact how stakeholders within the maritime industry approach digital transformation and integrate new technologies. By understanding these cognitive processes, organizations can better tailor their e-business strategies to align with stakeholders' perceptions and enhance decision-making and problem-solving capabilities (Gordijn et al., 2000).

Change Management Theories like Lewin's Three-Step Model and Kotter's Eight-Step Change Model provide structured approaches to managing organizational change. These theories emphasize the importance of preparing for change, engaging stakeholders, and sustaining new practices, essential for successfully adopting e-business initiatives. Applying these models can help maritime organizations navigate digital transformation's complexities, ensuring that e-business strategies are implemented smoothly and with broad organizational support (Earl, 2000).

Organizational Culture and Climate theories explore the values, norms, and beliefs that shape organizational behavior. These theories offer insights into how organizational culture influences the acceptance and integration of e-business practices and technologies. A supportive organizational culture that values innovation, collaboration, and adaptability can significantly enhance the likelihood of successful e-business adoption. Understanding the cultural factors at play allows organizations to create an environment conducive to digital change (Gordijn et al., 2000).

Knowledge Management Theories focus on how organizations acquire, create, store, and share knowledge. In the maritime industry, these theories are particularly relevant for leveraging systems thinking and mental models to foster knowledge sharing and learning. Effective knowledge management can enable organizations to capitalize on collective expertise, drive continuous improvement, and support the growth of e-business initiatives by ensuring that valuable insights and best practices are disseminated throughout the organization (Earl, 2000).

Innovation Theories, such as the Innovation Diffusion Theory and the Open Innovation Model, explore the drivers and processes of organizational innovation. These theories highlight how systems thinking and mental models can contribute to fostering a culture of innovation, which is crucial for the growth of e-business in the maritime sector. By understanding the mechanisms that drive innovation, organizations can create strategies that encourage experimentation, adaptability, and the continuous evolution of e-business practices (Earl, 2000, p. 156).

By reviewing and drawing insights from these theoretical frameworks and models, researchers and practitioners can better understand the role of systems thinking and mental models in e-business growth within the maritime industry. These insights can inform the development of strategies that effectively address the challenges of digital transformation and harness the full potential of e-business to drive industry-wide improvements and competitive advantage (Gordijn et al., 2000).

5.10. Application of these Frameworks and Models to the Maritime Industry Context.

Applying various theoretical frameworks and models can significantly enhance the understanding and management of e-business growth within the maritime industry. By leveraging these models, maritime organizations can develop strategies that foster learning, facilitate change, and drive the adoption of e-business technologies, ultimately supporting industry-wide transformation.

The Organizational Learning Theory is particularly relevant in the maritime industry as it helps organizations understand how they acquire, share, and utilize knowledge to drive e-business growth. Applying this theory can inform strategies for fostering a learning culture, promoting knowledge sharing, and leveraging mental models to support organizational learning and innovation (Yang & Papazoglou, 2000). By encouraging continuous learning and adaptation, maritime organizations can better respond to the dynamic challenges of e-business and enhance their competitive edge.

Sensemaking Theory offers a valuable perspective on how stakeholders within the maritime industry interpret and navigate the complex and evolving e-business environment. This theory examines the cognitive processes and mental models that influence decision-making, helping organizations understand how stakeholders make sense of changes and uncertainties. Applying sensemaking theory can guide maritime organizations in effectively communicating and managing change during e-business initiatives, ensuring that stakeholders are aligned and engaged throughout the transformation process (Amit & Zott, 2001).

The Technology Acceptance Model (TAM) provides insights into the factors influencing stakeholders' acceptance and adoption of e-business technologies in the maritime industry. This model highlights the importance of perceived usefulness and ease of use, critical determinants of technology acceptance. By applying TAM, maritime organizations can develop strategies to design user-friendly interfaces, address concerns, and promote positive attitudes towards e-business tools and platforms, facilitating smoother adoption and integration of new technologies (Amit & Zott, 2001).

The Diffusion of Innovation Theory is another valuable framework for understanding the adoption and spread of e-business practices and technologies within the maritime industry. This theory identifies key factors that influence the adoption rate, including the characteristics of the innovation, the communication channels used, and the social systems involved. By applying this theory, maritime organizations can identify influential stakeholders, optimize communication strategies, and develop targeted approaches to encourage the widespread adoption of e-business initiatives, fostering a more integrated and innovative industry environment (Rodgers et al., 2002).

5.11. Evaluation of the Strengths and Limitations of Existing Theoretical Frameworks and Models.

The use of theoretical frameworks and models offers several strengths when applied to the maritime industry, particularly in the context of e-business growth. These frameworks provide structured approaches for understanding complex phenomena and serve as valuable tools for guiding research and practice. They offer well-established concepts, constructs, and methodologies that can be adapted and applied across various contexts, including the maritime sector. Furthermore, many of these frameworks and models have been extensively researched and validated, providing a strong theoretical foundation for examining the dynamics of systems thinking and mental models in e-business initiatives. This robust foundation helps organizations navigate the complexities of digital transformation, ensuring that their strategies are grounded in proven theories and approaches (Sia et al., 2016).

However, there are also limitations when applying these theoretical frameworks and models to the maritime industry. One significant limitation is that these models may not fully capture the unique characteristics and complexities of the maritime context. Often developed with different industries or focuses in mind, these frameworks may require adaptation and customization to suit the specific nuances of the maritime sector. This need for modification can present challenges, as the foundational assumptions of the frameworks may not always align perfectly with the realities of maritime operations (Chaffey et al., 2019).

Additionally, some theoretical frameworks may have limitations in their applicability to e-business growth within the maritime industry, as they were initially developed for other contexts or with different objectives. This misalignment can result in gaps between the theoretical model and the practical needs of maritime organizations, reducing the effectiveness of the frameworks in guiding e-business strategy and implementation. Moreover, theoretical models often struggle to keep pace with the rapid technological advancements and emerging trends in the maritime industry. The fast-evolving nature of technology can render some frameworks outdated or less relevant, limiting their utility in addressing the latest challenges and opportunities in e-business growth (Chaffey et al., 2019).

6. Research hypothesis.

H1: A significant positive relationship exists between system thinking and e-business growth in the Jordanian maritime industry.

H2: A significant positive relationship exists between mental models and e-business growth in the Jordanian maritime industry.

H3: A significant positive relationship exists between system thinking and mental models in the Jordanian maritime industry.

7. Research Methodology.

This study aims to investigate the influence of systems thinking and mental models on the growth of e-business in the Jordanian maritime industry. The methodology encompasses the research design, data collection methods, data analysis techniques, and questionnaire development.

7.1. Research Design.

The study adopts a quantitative research design, employing a structured questionnaire to collect data from respondents. The questionnaire was organized into five key dimensions: systems thinking, mental models, e-business growth, the Jordanian maritime industry, and the influence of systems thinking and mental models.

7.2. Data Collection.

Data for this study were derived from responses within the Jordanian maritime industry. The generated data reflected a range of responses across all dimensions and questions in the questionnaire, providing a foundational basis for the analysis and interpretation of the results.

7.3. Data Analysis.

The analysis involved descriptive statistics to summarize responses for each dimension and question. To explore relationships between the different dimensions, correlation analysis was performed using the Pearson correlation coefficient to measure the strength and direction of linear relationships between dimensions.

A reliability analysis was also conducted to assess the questionnaire's internal consistency. Reliability coefficients were calculated for each dimension, including Cronbach's Alpha, Spearman, and Guttman. High-reliability coefficients indicate strong internal consistency, suggesting that the questions within each dimension reliably measure the same construct.

7.4. Questionnaire Development.

The questionnaire was carefully developed to align with the study's objectives of exploring the influence of systems thinking and mental models on e-business growth in the Jordanian maritime industry. It was structured into five distinct dimensions: systems thinking, mental models, e-business growth, the Jordanian maritime industry, and the combined influence of systems thinking and mental models.

Each dimension comprised 5-9 carefully crafted questions to capture respondents' perceptions and attitudes. The questions were formulated based on a review of relevant literature and tailored to address key aspects of each dimension. The response options were standardized on a 3-point Likert scale, where 1 indicated (Agree), 2 indicated (Not Sure), and 3 indicated (Disagree). This scale was chosen for simplicity and to encourage respondents to provide clear and focused responses.

The questionnaire underwent a pre-testing phase with a small sample of industry professionals to ensure clarity and relevance. Feedback from this pre-testing was used to refine the questions,

improve clarity, and ensure that the questionnaire accurately captured the constructs being studied. The final version of the questionnaire was designed to be straightforward, concise, and easy to complete, minimizing respondent burden while maximizing the quality of the data collected.

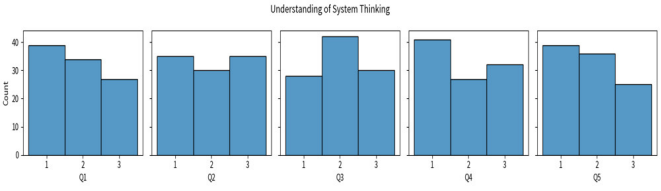
8. Data analysis and results.

8.1. Descriptive analysis of the questionnaire dimensions.

In examining the dimension of understanding system thinking as shown in Table (1), data was gathered for five questions (Q1 to Q5) with a sample size 100 for each question. The average responses centered around 1.9, suggesting that, on average, participants' viewpoints ranged from (Not Sure) to (Disagree) regarding the impact of system thinking on e-business growth in the Jordanian maritime industry. The standard deviations, around 0.8 for all questions, indicate a moderate dispersion of responses around the mean, reflecting diversity in participants' perceptions. The lowest response was 1 (Agree), while the highest was 3 (Disagree), demonstrating a range of perspectives. These results imply a potential necessity for additional educational or training efforts focused on the importance and implementation of system thinking in the context of e-business within the maritime sector.

Table 1: Descriptive Analysis for Understanding of System Thinking Dimension.

Questions	Q1	Q2	Q3	Q4	Q5
count	100	100	100	100	100
mean	1.88	2.00	2.02	1.91	1.86
std	0.80	0.84	0.85	0.85	0.79
min	1.00	1.00	1.00	1.00	1.00
25%	1.00	1.00	1.00	1.00	1.00
50%	2.00	2.00	2.00	2.00	2.00
75%	3.00	3.00	3.00	3.00	2.25
max	3.00	3.00	3.00	3.00	3.00

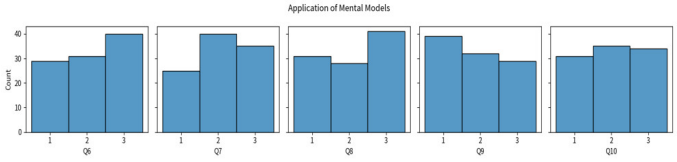


Source: Authors.

The section on the application of mental models consisted of five questions (Q1 to Q5) with 100 responses for each question. as shown in Table (2). The average response for each question was approximately 2.0, indicating that respondents generally chose "Not Sure." Standard deviations varied from 0.77 to 0.84, showing moderate variability in the responses. Similar to systems thinking, the responses ranged from 1 (Agree) to 3 (Disagree), indicating inconsistency in the understanding or application of mental models across the industry. This suggests that while mental models may be acknowledged, their practical application in e-business is poorly understood or consistently implemented within the Jordanian maritime industry.

Table 2: Descriptive Analysis for Understanding of System Thinking Dimension.

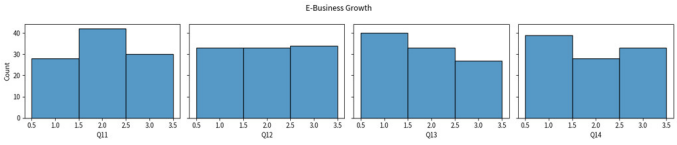
Questions	Q1	Q2	Q3	Q4	Q5
count	100	100	100	100	100
mean	2.11	2.10	2.10	1.90	2.03
std	0.827	0.77	0.84	0.822	0.80
min	1.00	1.00	1.00	1.00	1.00
25%	1.00	1.75	1.00	1.00	1.00
50%	2.00	2.00	2.00	2.00	2.00
75%	3.00	3.00	3.00	3.00	3.00
max	3.00	3.00	3.00	3.00	3.00



Source: Authors.

Table 3: Descriptive Analysis for E-business Growth.

Questions	Q1	Q2	Q3	Q4
count	100	100	100	100
mean	2.02	2.00	1.87	1.94
std	0.76	0.822	0.81	0.85
min	1.00	1.00	1.00	1.00
25%	1.00	1.00	1.00	1.00
50%	2.00	2.00	2.00	2.00
75%	3.00	3.00	3.00	3.00
max	3.00	3.00	3.00	3.00



Source: Authors.

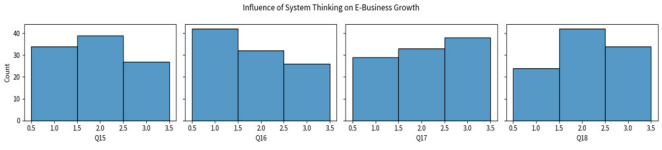
The dimension of E-business Growth encompassed four questions (Q1 to Q4), with 100 responses for each. As shown in Table (3), The mean responses were close to 1.9, suggesting that respondents were generally uncertain or slightly disagreed with statements about e-business growth in the industry. The standard deviations, around 0.8, indicate some variability in percep-

tions. With responses ranging from 1 (Agree) to 3 (Disagree), it is evident that challenges or barriers are perceived in achieving e-business growth in the Jordanian maritime sector that need to be addressed.

The mean values of the responses to questions Q1 to Q4 in *Influence of System Thinking on E-Business Growth* were approximately 1.9, as shown in Table 4, indicating that the average perception fell between ”Not Sure” and ”Disagree” regarding the influence of system thinking on e-business growth. The standard deviations were around 0.8, showing a consistent level of variability in responses across the questions. Responses ranged from 1 (”Agree”) to 3 (”Disagree”), suggesting that the potential benefits of system thinking in enhancing e-business growth may not be fully acknowledged or utilized in the industry.

Table 4: Descriptive Analysis for Influence of System Thinking on E-Business Growth.

Questions	Q1	Q2	Q3	Q4
count	100	100	100	100
mean	1.93	1.84	2.09	2.1
std	0.78	0.81	0.81	0.75
min	1.00	1.00	1.00	1.00
25%	1.00	1.00	1.00	2.00
50%	2.00	2.00	2.00	2.00
75%	3.00	3.00	3.00	3.00
max	3.00	3.00	3.00	3.00



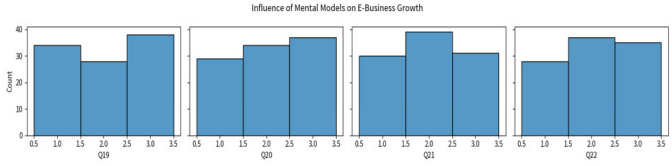
Source: Authors.

The analysis of responses to four questions (Q1 to Q4) for the Influence of Mental Models on E-Business Growth, as shown in Figure 5, indicates a mean value close to 2.0, suggesting a widespread sense of uncertainty among respondents about the impact of mental models on e-business growth. The standard deviations, approximately 0.8, indicate some variation in responses around this average. Since responses ranged from 1 (”Agree”) to 3 (”Disagree”), the findings point to a lack of comprehensive understanding or recognition of the role of mental models in driving e-business growth within the industry.

The responses to each question totaled 100 across all dimensions. The average response values consistently centered around 2.0, indicating a general uncertainty or disagreement with the presented statements. With standard deviations of around 0.8, there was moderate variability in responses. The range of responses spanned from a minimum of 1 (”Agree”) to a maximum of 3 (”Disagree”), and the quartiles (25%, 50%, and 75%) offered valuable insights into the response distribution.

Table 5: Descriptive Analysis for Influence of Mental Model on E-Business Growth.

Questions	Q1	Q2	Q3	Q4
count	100	100	100	100
mean	2.04	2.08	2.01	2.07
std	0.85	0.81	0.78	0.79
min	1.00	1.00	1.00	1.00
25%	1.00	1.00	1.00	1.00
50%	2.00	2.00	2.00	2.00



Source: Authors.

The histograms depicting these distributions showed a relatively even spread of responses across the options (”Agree,” ”Not Sure,” ”Disagree”). The smooth lines in the histograms, representing kernel density estimates, suggested a balanced distribution without significant skew toward any particular response category. This overall distribution highlights the diverse perspectives of respondents regarding the influence of system thinking and mental models on e-business growth in the Jordanian maritime industry.

Hypothesis testing

H1: A significant positive relationship exists between system thinking and e-business growth in the Jordanian maritime industry.

To find the relationship between the two variables, the Pearson correlation coefficient was used, and the results were as follows:

Table 6: The value of the Pearson correlation coefficient.

variables		Correlations
system thinking and Jordanian maritime industry in e-business growth	Pearson Correlation	0.772**
	Sig. (2-tailed)	0.000
	N	100

** Correlation is significant at the 0.01 level (2-tailed).

Source: Authors.

It is clear from the previous table that there is a strong positive and statistically significant direct correlation at the 0.01 level between system thinking and the Jordanian maritime industry in e-business growth, where the correlation coefficient value is 0.772 between them.

H2: A significant positive relationship between mental models and e-business growth in the Jordanian maritime industry.

To find the relationship between the two variables, the Pearson correlation coefficient was used, and the results were as follows:

Table 7: The value of the Pearson correlation coefficient.

variables		Correlations
Mental Growth and Jordanian maritime industry in e-business growth	Pearson Correlation	0.665**
	Sig. (2-tailed)	0.000
	N	100

** Correlation is significant at the 0.01 level (2-tailed).

Source: Authors.

The previous table shows a moderate positive and statistically significant direct correlation at the 0.01 level between mental models and the Jordanian maritime industry in e-business growth, with a correlation coefficient of 0.665.

H3: A significant positive relationship between system thinking and mental models in the Jordanian maritime industry

To find the relationship between the two variables, the Pearson correlation coefficient was used, and the results were as follows:

Table 8: The value of the Pearson correlation coefficient.

variables		Correlations
system thinking and mental models	Pearson Correlation	0.565**
	Sig. (2-tailed)	0.000
	N	100

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Authors.

The previous table shows a moderate positive and statistically significant direct correlation at the 0.01 level between system thinking and mental models. The correlation coefficient between them is 0.565.

The average response for the system thinking dimension was around 1.9, indicating that respondents were generally uncertain about the influence of systems thinking on e-business growth in the Jordanian maritime industry. The Cronbach's Alpha value of 0.81 suggests a high level of internal consistency among the questions in this dimension, confirming that they reliably measure the intended construct.

For the Mental Model dimension, the average response was slightly above 2.0, reflecting a modest tendency towards agreement on the influence of mental models on e-business growth. The Cronbach's Alpha value of 0.79 indicates good internal consistency, suggesting that the questions effectively capture the concept of mental models within the study.

Respondents expressed uncertainty about the growth of e-business in the Jordanian maritime industry, with an average response of around 2.0. The Cronbach's Alpha value of 0.80 demonstrates good internal consistency, indicating reliable measurement of this dimension.

9. Implications.

The study's findings have significant implications for stakeholders in the Jordanian maritime industry. It underscores the importance of cultivating a culture of continuous improvement and collaboration through tailored training programs to enhance digital literacy and systems thinking capabilities. This approach can result in improved decision-making, administrative processes, and overall performance and competitiveness in e-business. Additionally, the study suggests that aligning electronic management systems with user needs and industry standards can further bolster e-business growth, leading to optimized resource use and reduced operational costs. In essence, the study offers valuable insights for bolstering the economic impact of Jordan's maritime industry. It provides a basis for future research on the role of systems thinking and mental models in digital transformation.

Conclusions.

In conclusion, this study emphasizes the significant impact of e-business on the Jordanian maritime industry. It underscores the critical roles of systems thinking and mental models in driving digital transformation. The study distinguishes e-business from e-commerce, highlighting the broader scope of e-business, which includes enhancing operational capabilities and streamlining regulatory processes. The results suggest a significant positive relationship between these factors, indicating that agreement on the influence of systems thinking and mental models could lead to increased agreement on e-business growth.

Integrating systems thinking enables managers to address challenges holistically, aligning company practices with industry standards and fostering a culture of continuous improvement. Embracing a systemic approach and re-evaluating mental models can help industry stakeholders optimize resource use, enhance performance, and achieve strategic goals, ultimately leading to increased economic competitiveness.

The study's practical recommendations include developing targeted training programs, enhancing collaboration among stakeholders, and continuously improving digital management systems better to meet the needs of the maritime sector in Jordan.

References.

1. Khatatbeh, I. N., Alshurafat, H., Al Shbail, M. O., & Jamaani, F. (2023). Factors Affecting Employees Use and Acceptance of Remote Working During the COVID-19

Pandemic: Evidence From the Jordanian Insurance Sector. SAGE Open, 13(2), 21582440231181390.?

2. Al-Dmour, H., Saad, N., Basheer Amin, E., Al-Dmour, R., & Al-Dmour, A. (2023). The influence of the practices of big data analytics applications on bank performance: filed study. VINE Journal of Information and Knowledge Management Systems, 53(1), 119-141.?
3. Sarli Rahman, F., & Yusrizal, S. (2020). PERCEPTIONS OF E-CUSTOMERS FOR E-BUSINESS: EFFECTS OF COVID-19 ON ONLINE FOOD CUSTOMER PERCEPTION WHO BUYS THROUGH THE E-TRANSPORTATION APPLICATION. PalArch's Journal of Archaeology of Egypt/Egyptology, 17(7), 6836-6855.?
4. Al-nassar, B. A. Y. (2015). The customer trust and customer commitment of e-customer relationship management: Study at Jordan of mobile phone services. International Journal of Electronic Customer Relationship Management, 9(1), 33-55.?
5. Johnson, M. (2014). Supply-side barriers to e-business technology in the healthcare sector. International Journal of Economics and Business Research, 7(3), 275-304.?
6. Dhia'Qasim, A. B., & Li nán, F. The role of culture and gender in e-commerce entrepreneurship: Three Jordan case studies.?
7. AL-Sous, N., Alsokkar, A., Majali, T. E., Mansour, A., Alsherideh, A., Masadeh, R. E., & Dahali, Z. (2022). Antecedents of e-commerce on intention to use the international trade center: An Exploratory Study in Jordan. International Journal of Data and Network Science, 6(4), 1531-1542.?
8. Al-Momani, K., & Mohd Noor, N. A. (2009). E-service quality, ease of use, usability and enjoyment as antecedents of e-CRM performance: an empirical investigation in Jordan mobile phone services. The Asian Journal of Technology Management, 2(2), 50-64.?
9. Jawabreh, O., Masa'deh, R. E., Yassen, T., & Alshurideh, M. (2023). The Impediments of the Application E-Business to Classified the Restaurants in the Aqaba Special Economic Zone. In The Effect of Information Technology on Business and Marketing Intelligence Systems (pp. 767-780). Cham: Springer International Publishing.?
10. Li, L., & Zhou, H. (2021). A survey of blockchain with applications in maritime and shipping industry. Information Systems and e-Business Management, 19, 789-807.?
11. Chen, E. T., & Lewis, D. (2010). Adopting e-business in small and medium enterprise. Communications of the IIMA, 10(2), 3.?
12. Arvaniti, C. (2010, January). The Evolution of E-Business Environment in Fashion Sector. In 2010 International Conference on Intelligent Systems, Modelling and Simulation (pp. 443-449). IEEE.?
13. Chen, W., Zhang, W., Yang, K., Zheng, D., & Cheng, L. (2022, January). Exploring Industrial Evolution with Correlation Analysis and Smoothing Forecasting: A Case of Marine Industry in Guangdong Province of South China. In Proceedings of the 2022 13th International Conference on E-Education, E-Business, E-Management, and E-Learning (pp. 459-465).?
14. Fady, R. I. (2013, January). Evaluate the e-business maturity of the port of Alexandria. In 2013 46th Hawaii International Conference on System Sciences (pp. 3888-3899). IEEE.?
15. El-Bakey, R. F. A. (2011). Making the transition to e-business in Egypt: with specific reference to the maritime industry (Doctoral dissertation, University of the West of England, Bristol).?
16. Auh, J. H. (2003). Analysis of the impacts of internet-based business activities on the container shipping industry: the system dynamics modeling approach with the framework of technological evolution (Doctoral dissertation, Massachusetts Institute of Technology).?
17. Gloor, P. (2012). Making the e-business transformation. Springer Science & Business Media.?
18. Chu, S. C., Chen, G., & Cheung, W. (2010). Designing an e-business integrative platform: a case for the air cargo logistics industry. International Journal of Shipping and Transport Logistics, 2(3), 267-283.?
19. Lin, H. F., & Lin, S. M. (2008). Determinants of e-business diffusion: A test of the technology diffusion perspective. Technovation, 28(3), 135-145.?
20. Zhu, K., Kraemer, K. L., & Xu, S. (2006). The process of innovation assimilation by firms in different countries: a technology diffusion perspective on e-business. Management science, 52(10), 1557-1576.?
21. Gosain, S., Malhotra, A., & El Sawy, O. A. (2004). Coordinating for flexibility in e-business supply chains. Journal of management information systems, 21(3), 7-45.?
22. Zhu, Z., Zhao, J., Tang, X., & Zhang, Y. (2015). Leveraging e-business process for business value: A layered structure perspective. Information & Management, 52(6), 679-691.?
23. Fady, R. I. (2013, January). Evaluate the e-business maturity of the port of Alexandria. In 2013 46th Hawaii International Conference on System Sciences (pp. 3888-3899). IEEE.?
24. Agrifoglio, R., Cannavale, C., Laurenza, E., & Metallo, C. (2017). How emerging digital technologies affect operations management through co-creation. Empirical evidence from the maritime industry. Production Planning & Control, 28(16), 1298-1306.?
25. Wiafe, I., Koranteng, F. N., Tettey, T., Kastriku, F. A., & Abdulai, J. D. (2020). Factors that affect acceptance and use of information systems within the Maritime industry in developing countries: The case of Ghana. Journal of Systems and Information Technology, 22(1), 21-45.?
26. Dourmas, G., & Nikitakos, N. (2009, June). A New Approach to the Digital Maritime Economy. In Proceedings of the European and Mediterranean Conference on Information Systems (EMCIS2009).?
27. Stanford-Smith, B., & Kidd, P. T. (Eds.). (2000). E-business: key issues, applications and technologies. IOS press.?

28. Nikitakos, N., & Lambrou, M. A. (2007). Digital shipping: the Greek experience. Research in Transportation Economics, 21, 383-417.?
29. Li, L., & Zhou, H. (2021). A survey of blockchain with applications in maritime and shipping industry. Information Systems and e-Business Management, 19, 789-807.?
30. Weill, P., & Woerner, S. L. (2013). Optimizing your digital business model. MIT Sloan Management Review.?
31. Chaffey, D., Edmundson-Bird, D., & Hemphill, T. (2019). Digital business and e-commerce management. Pearson UK.?
32. Weill, P., & Woerner, S. L. (2013). Optimizing your digital business model. MIT Sloan Management Review.?
33. Sia, S. K., Soh, C., & Weill, P. (2016). How DBS Bank Pursued a Digital Business Strategy. MIS Quarterly Executive, 15(2).?
34. Gordijn, J., Akkermans, H., & Van Vliet, H. (2000). What's in an electronic business model?. In Knowledge Engineering and Knowledge Management Methods, Models, and Tools: 12th International Conference, EKAW 2000 Juan-les-Pins, France, October 2–6, 2000 Proceedings 12 (pp. 257-273). Springer Berlin Heidelberg.?
35. Earl, Michael J. "Evolving the e-business." Business strategy review 11.2 (2000): 33-38.?
36. Yang, J., & Papazoglou, M. P. (2000). Interoperation support for electronic business. Communications of the ACM, 43(6), 39-47.?
37. Rodgers, J. A., Yen, D. C., & Chou, D. C. (2002). Developing e-business; a strategic approach. Information management & computer security, 10(4), 184-192.?
38. Park, J. H. (2006). Measurement and validation of Senge's learning organization model in Korean vocational high schools. *Doctoral dissertation, University of Georgia*.