



RESEARCH ARTICLE

Navigating the Digital Frontier: The Role of Commercial Law in Regulating Electronic Companies in the Middle East

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ABSTRACT

The main purpose of the article is to identify the most significant factors of digitalization affecting the regulation of electronic companies in the Middle East. The object of study is the system of regulating electronic companies in the Middle East. The scientific task involves presenting a methodological approach to the hierarchical organization of the most significant digitalization factors affecting the regulation of these companies. The research methodology involves using the method of hierarchies and comparisons to identify and organize these factors. The result was the presentation of the most significant factors of digitalization affecting the regulation of electronic companies in the Middle East. The study has limitations in the form of considering only electronic companies in the Middle East. Further research should be dedicated to examining companies in other regions as well.

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INTRODUCTION

Commercial law is key to the formation and development of the modern e-business environment in the Middle East. The development of commercial law is especially relevant for the Middle East region due to the fact that today it is experiencing the most active period of technological development. In essence, commercial law is a specific branch of law specializing in the development, regulation and provision of business and trade. Some parts of business law specialize exclusively in regulating electronic commerce and services. So, this part of commercial law creates a clear regulatory framework for financial transactions on the Internet, including sales, loans, and financing. Effective implementation of commercial law in the field of digital commerce makes it possible to structure the digital business environment in the most optimal way. The key function of commercial law in the context of managing and ensuring digital transactions is the regulation of trust and security between all market participants. Taking this into account, the current commercial law in the Middle East is being updated to regulate e-commerce activities, in particular, solving problems related to electronic transactions, digital signatures and cybersecurity. These regulations are designed to protect both consumers and businesses, fostering a secure digital commerce environment. This legal protection boosts consumer confidence and helps electronic companies grow, as consumers are more willing to engage in online transactions when they feel their rights are safeguarded.

Additionally, intellectual property rights are a critical aspect of commercial law affecting electronic companies in the Middle East. With a heavy reliance on technology and innovation, protecting software, patents, and trademarks is essential. Commercial law provides the framework for electronic companies to register and protect their intellectual property, deterring piracy and unauthorized use, which is particularly pertinent in regions with burgeoning tech markets like the Middle East. This not only encourages innovation but also attracts foreign investment, as companies feel more secure in markets where their innovations are legally protected. Commercial law also plays a significant role in dispute resolution in the electronics sector. The Middle East features several arbitration and mediation centers specifically geared towards commercial disputes, including those arising from electronic business activities. These legal frameworks help resolve conflicts efficiently and effectively without resorting to the often slower process of traditional litigation. This is vital for maintaining business continuity and relationships in the fast-paced world of electronic commerce, where disputes can range from data breaches to contract disagreements (Fig.1).

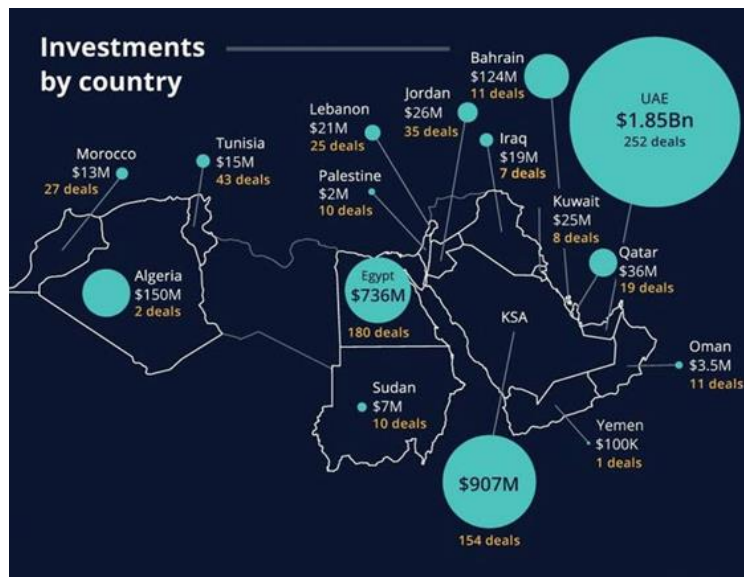


Figure 1. Middle East Investments to Electronic Companies

Lastly, as Middle Eastern countries strive to diversify their economies and reduce their dependency on oil, electronic companies are seen as pivotal to economic transformation. Commercial law supports this transition by providing a stable legal environment that encourages the development of e-commerce and tech startups. Through policies that support innovation while protecting stakeholders, Middle Eastern nations are able to nurture a tech-friendly ecosystem conducive to the growth of electronic companies. This, in turn, supports broader economic goals such as job creation, increased trade, and improved technological capabilities within the region.

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LITERATURE REVIEW

The issues of regulating the activities of electronic companies through updating commercial law in the Middle East are the object of interest of a large number of researchers, each of which is forming new strategies for the development of this area. Taking this into account, before directly implementing the methodology, it is important to study modern literary sources on this topic.

Alazzam et al. (2024) delve into strategic business management in the face of changing commercial activities, emphasizing the need for electronic companies to adapt to new legal norms and commercial practices as digitalization transforms markets. This is complemented by Panchenko et al. (2022) who focus on innovative activities within enterprises, suggesting a methodological approach to integrating these innovations within existing and emerging legal frameworks, highlighting the role of commercial law in facilitating or constraining business innovation.

Technological advancements specific to the electronic commerce sector are addressed by Zhang and Wei (2022), who propose an improved algorithm for image classification in e-commerce, which has implications for the legal standards related to online product representations and consumer rights. Similarly, Alazzam et al. (2023) examine information models for e-commerce platforms, providing insight into how these platforms must evolve within the confines of national and international legal standards to ensure data privacy and transaction security.

The role of tax regulation in e-commerce is explored by Abramova et al. (2021), who assess the VAT administration systems in Eastern European e-commerce, offering lessons that could be applicable to Middle Eastern contexts where similar digital market expansions are underway. This regulatory aspect is extended by Bani-Meqdad et al. (2024), who explore the cyber-environment's impact on human rights and intellectual property law, stressing the importance of robust legal protections in fostering a safe and equitable digital marketplace. Further exploring personnel and safety within electronic companies, Kopytko et al. (2023) discuss the management of personnel in the context of industry 4.0, touching on safety and security measures that are increasingly important as companies rely more on digital technologies and platforms. This is critical for understanding how commercial law not only governs commerce but also workplace safety and security in highly digitalized environments. Jasińska-Biliczak (2022) investigates the customer perspective in e-commerce, particularly during the COVID-19 pandemic, highlighting the rapid changes in consumer behavior and the legal challenges these pose in terms of consumer protection laws and the fair presentation of products online. Lastly, Farshidi et al. (2023) address the selection of business process modeling languages, which are crucial for designing systems that comply with legal standards and facilitate compliance in complex regulatory environments.

These studies collectively underscore the multifaceted impact of commercial law on electronic companies in the Middle East, from strategic business management to the protection of consumer and intellectual property rights, emphasizing the necessity for an adaptive legal framework capable of supporting sustainable development in the digital era (Table 1).

Table 1. The main gaps in literature review

Gaps	Characteristics
Comparative Regional Analysis	The study primarily focuses on electronic companies within the Middle East and does not extend its findings to other regions. This creates a gap in understanding how digitalization factors affecting electronic companies are regulated across different legal and economic landscapes. Comparative studies are crucial for understanding the broader implications of digitalization in a global context, providing insights into whether the regulatory frameworks in the Middle East are unique or consistent with global trends. Further research could broaden the scope to include comparative analyses with regions that have advanced digital economies, such as Europe, North America, or East Asia, to draw parallels, contrast regulatory approaches, and provide a more comprehensive understanding of global digital commerce regulation

Depth of Hierarchical Analysis	While the study employs a methodological approach to organize digitalization factors hierarchically, there is a gap in understanding the interdependencies and the impact of these factors on each other. The hierarchical organization might oversimplify complex relationships between different elements of digitalization, such as the interaction between technological advancements and legal frameworks. Future studies could employ more nuanced analytical methods like systems dynamics or network analysis to map out these interdependencies more comprehensively and provide deeper insights into how changes in one aspect of digitalization might affect others within the regulatory framework
Sector-Specific Implications	The article generalizes across electronic companies without delving into the nuances that different sectors within the electronic industry might exhibit. Electronic companies can range from e-commerce platforms to software development firms, each facing unique regulatory challenges. A gap exists in sector-specific studies that could detail how digitalization impacts various sub-sectors differently under commercial law. Further research should consider the sector-specific challenges and regulatory needs of different types of electronic companies, such as fintech, healthtech, or edutech, which may face very different regulatory priorities and challenges in the context of digitalization

Addressing these gaps could significantly enhance our understanding of how digitalization interacts with commercial law in the regulation of electronic companies, not only within the Middle East but also globally. This could aid policymakers, business leaders, and legal experts in crafting more effective and nuanced regulatory frameworks that promote innovation while ensuring security, compliance, and consumer protection.

METHODOLOGY

In the context of our methodology, the hierarchy method was used, which in scientific research is also called the analytical hierarchy method. The use of this method begins with determining the key goal of the study, which in the context of our research will concern the identification of key factors of digitalization that have the greatest impact on the regulatory framework in this area. After defining the key goal, criteria and sub-criteria are identified from it, in the context of our research, each of which will become a key aspect of digitalization. The use of this hierarchical structure will allow for a systematic assessment of the level of influence of one or another factor on the formation of regulatory support. This method also allows for a quantitative assessment of each of the criteria through the paired comparison method, giving an understanding of their interdependence and importance. In this regard, the method we have chosen is key and effective in the process of making complex and strategic decisions, which makes it the most relevant in the matter of improving commercial law.

The method of comparisons, integral to our hierarchical analysis, involves pairwise comparisons of the criteria identified in the hierarchical structure. For each pair of factors, stakeholders and experts in the field of commercial law and digital economics are asked to provide judgments on which of the two factors is more important with respect to the regulation of electronic companies and by what margin. These inputs are quantified using a scale typically ranging from 1 to 9, where 1 indicates equal importance and 9 represents extreme importance of one factor over another.

The data collected through these comparisons are processed using matrix operations to calculate the priority weights of each factor. The consistency of these judgments is also assessed to ensure logical coherence in the evaluations. This method not only quantifies the subjective judgments of experts but also allows for a robust aggregation of opinions, providing a democratic and comprehensive view

of the most critical factors. Upon establishing the hierarchical organization and completing the pairwise comparisons, the resulting data are synthesized to present a clear and structured overview of the significant factors of digitalization affecting the regulation of electronic companies in the Middle East. This synthesis is crucial for identifying key regulatory focus areas that can enhance the digital ecosystem's effectiveness and resilience.

RESULTS

Before starting the modeling, a list of the most significant digitalization factors affecting the regulation of the activities of electronic companies in the Middle East should be compiled (Fig. 2).

CybersecurityMeasures	F ₁
DataPrivacyLaws	F ₂
E-commerceRegulations	F ₃
IntellectualPropertyRights	F ₄
DigitalTaxation	F ₅
Cross-borderDataFlow	F ₆
ConsumerProtection	F ₇
DigitalPaymentSystems	F ₈
ArtificialIntelligenceandAutomation	F ₉

Figure 2. The current set of digitalization factors influencing the regulation of electronic companies in the Middle East

V₁. Cybersecurity Measures. With increasing digital activities, the emphasis on cybersecurity to protect data and prevent breaches has become paramount. Regulations must address not only the protection of consumer data but also the safeguarding of company assets against cyber threats.

V₂. Data Privacy Laws. The handling of personal and sensitive data by electronic companies calls for stringent data privacy laws, which are crucial in maintaining trust and compliance. Regulations such as GDPR-like frameworks are being considered or implemented in the region to align with global standards.

V₃. E-commerce Regulations. This element includes laws and regulations governing online transactions, consumer rights on the Internet, and the implementation of Internet contracts. These regulatory frameworks are critical to creating a secure and optimal digital environment for e-commerce. This element also includes regulations on electronic signatures and digital records.

V₄. Intellectual Property Rights. Given the proliferation of digital products and services, the issue of intellectual property protection has become a critical element for e-commerce. This area of regulation must evolve alongside the development of e-commerce to address unique challenges and issues.

V₅. Digital Taxation. The implementation of taxes on digital goods and services, including VAT on e-commerce sales, poses significant regulatory challenges and impacts how electronic companies operate financially.

V₆. Cross-border Data Flow. Regulations concerning the transfer of data across borders are crucial, especially for multinational electronic companies operating in the Middle East. These laws impact how data is stored and accessed across different jurisdictions.

V₇. Consumer Protection. Enhanced laws to protect consumers in the digital age, addressing issues such as online fraud, misleading digital advertising, and fair trading practices, are increasingly relevant as more consumers shop online.

V₈. Digital Payment Systems. The regulation of digital payments, including cryptocurrencies and other electronic payment methods, is vital to ensure security and reliability in transactions. This also ties into broader financial regulations and anti-money laundering laws.

V₉. Artificial Intelligence and Automation. As AI and automation technologies play a larger role in business operations, their regulation needs to be considered. This includes ethical use policies, accountability for automated decisions, and the impact on employment laws.

The list of digitalization factors $V = \{V_1, V_2, V_3, V_4, V_5, V_6, V_7, V_8\}$ is presented in the form of a set, between the components of which there is a connection, to demonstrate which a graph is constructed (Fig. 3).

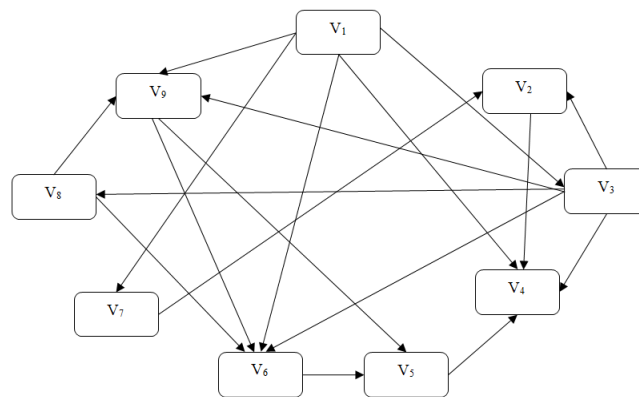


Figure 3. The graph of connections within the formed list of digitalization factors affecting the regulation of electronic companies in the Middle East

In the context of evaluating and ordering digitalization factors that affect the regulation of electronic companies in the Middle East, constructing binary matrices of dependence and reach is essential for several reasons. Firstly, binary dependence matrices allow for a structured and systematic analysis of how different digitalization factors influence one another. In a region as diverse and dynamically changing as the Middle East, regulations are often impacted by a multitude of interdependent factors, including technological advancements, market dynamics, legal frameworks, and cultural considerations. By representing these relationships in a binary dependence matrix, where rows and columns represent digitalization factors and the entries denote the presence (1) or absence (0) of a direct influence, stakeholders can visualize and analyze the direct dependencies among factors. This method provides a clear depiction of the direct interactions and assists in identifying key drivers and inhibitors in the regulatory environment, facilitating more informed decision-making (1):

$$\begin{matrix}
 & V1 & V2 & V3 & V4 & V5 & V6 & V7 & V8 & V9 \\
 \begin{matrix} V1 \\ V2 \\ V3 \\ V4 \\ V5 \\ V6 \\ V7 \\ V8 \\ V9 \end{matrix} & \begin{pmatrix} 0 & 0 & 1 & 1 & 0 & 1 & 1 & 0 & 1 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 1 & 0 & 1 & 0 & 1 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 1 & 1 & 0 & 0 & 0 \end{pmatrix} & (1)
 \end{matrix}$$

Further, the binary reach matrix, derived from the dependence matrix, extends the analysis by incorporating indirect influences among the factors. This matrix helps in understanding not only the direct but also the indirect pathways through which digitalization factors affect one another. In the fast-evolving sector of electronics, where regulatory needs may evolve rapidly in response to new technological innovations, understanding these indirect influences is crucial. The reach matrix computes transitive closures in the dependency graph, identifying all possible chains of influence between any two factors. This comprehensive view supports regulators and industry leaders in anticipating broader impacts of specific changes or interventions, enhancing strategic planning and policy development to better align with the digital transformation challenges and opportunities in the region. Such matrices thus serve as powerful tools in simplifying complex interdependencies and providing a holistic understanding necessary for effective governance in the digital age. The calculated dependency matrix forms the necessary basis for determining the content of the reach matrix of key digitalization factors affecting the regulation of electronic companies in the Middle East (2):

$$\begin{matrix}
 & V1 & V2 & V3 & V4 & V5 & V6 & V7 & V8 & V9 \\
 \begin{matrix} V1 \\ V2 \\ V3 \\ V4 \\ V5 \\ V6 \\ V7 \\ V8 \\ V9 \end{matrix} & \begin{pmatrix} 1 & 0 & 1 & 1 & 0 & 1 & 1 & 0 & 1 \\ 0 & 1 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 1 & 1 & 0 & 1 & 0 & 1 & 1 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 1 & 1 \\ 0 & 0 & 0 & 0 & 1 & 1 & 0 & 0 & 1 \end{pmatrix} & (2)
 \end{matrix}$$

Now, given the graph in Fig. 3 and the results of the matrix, we can finally build a hierarchical model. To do this, you must first create an appropriate iterative table, where the column S(V) is those factors that are achieved, and P(V) are the predecessor factors (Table 2).

Table 2. Iterative table for determining the level of influence of digitization factors

S(V)	P(V)	S(V) ∩ P(V)
V1;V3;V4;V6;V7;V9	V1	V1
V2;V4	V2;V3;V7	V2
V2;V3;V4;V6;V8;V9	V1;V3	V3
V4	V1;V2;V3;V4;V5	V4
V4;V5	V5;V6;V9	V5
V5;V6	V1;V3;V6;V8;V9	V6

V2;V7	V1;V7	V7
V6;V8;V9	V3;V8	V8
V5;V6;V9	V1;V3;V8;V9	V9

The lowest level will have the factor V1, since the equality $S(V) \cap P(V) = P(V)$ is fulfilled for it. At the same time, this line is removed everywhere and the procedure continues until the last factor remains. We will omit the intermediate calculations and proceed directly to the construction of the model itself (Fig. 4).

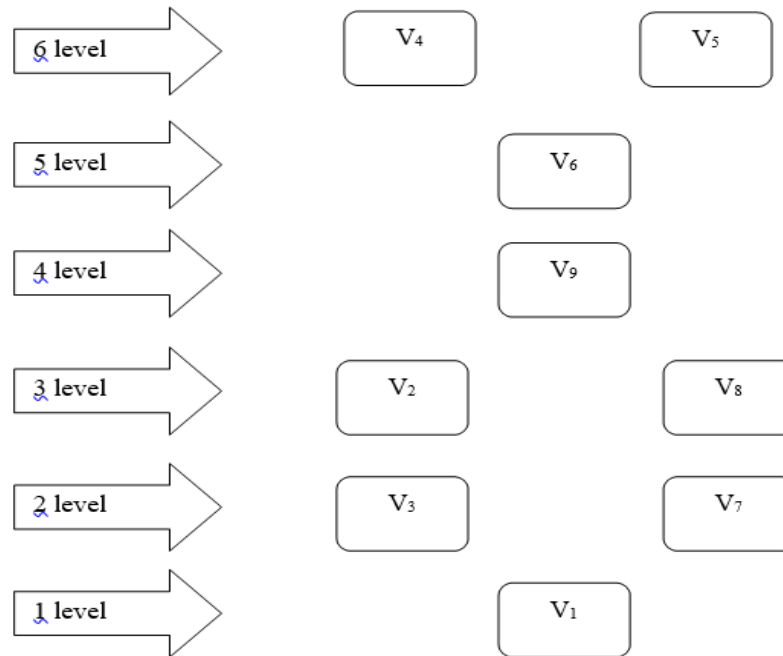


Figure4. Hierarchical model of the influence of digitalization factors on the regulation of electronic companies in the Middle East

Intellectual Property Rights (V4) play a pivotal role in the regulatory landscape for electronic companies in the Middle East, particularly as digital products and services continue to proliferate. The significance of protecting intellectual property (IP) in this context cannot be overstated, given that IP is the cornerstone of innovation and competitive advantage in the tech industry. As digitalization accelerates, new forms of content and technology emerge, such as software, apps, and digital media, which necessitate robust IP laws. Without adequate IP regulations, companies may face the rampant misuse or unauthorized replication of their innovations. This undermines investment in research and development, as businesses may be reluctant to invest heavily in new technologies if they cannot sufficiently protect their inventions. Therefore, evolving IP laws to address these new digital realities ensures that creators can retain the benefits of their creations and continue to drive technological advancement, which is crucial for the economic vitality and competitive positioning of the Middle East in the global market. On the other hand, Digital Taxation (V5) introduces a critical aspect of regulation that directly affects the financial operations of electronic companies in the region. The implementation of taxes on digital goods and services, including VAT on e-commerce sales, represents a significant shift in how businesses are taxed in the increasingly digital economy. For electronic companies, this means navigating new tax structures that can influence pricing strategies, consumer behavior, and ultimately, profitability. The challenge lies in designing tax frameworks that can keep pace with the fast-evolving nature of digital transactions, which often lack physical presence and cross multiple jurisdictions. Effective digital tax regulations can ensure a fair

and equitable tax system that captures value created in the digital space, providing governments with the necessary revenue to invest in public services without stifling business growth. Consequently, the way digital taxation is implemented can greatly influence the operational landscape for electronic companies, dictating market dynamics and competitive strategies in the digital economy of the Middle East.

DISCUSSION

Jasińska-Biliczak (2022) examines the impact and consequences of the COVID-19 pandemic on e-commerce activities, noting the importance of establishing governance frameworks to ensure the development of an effective digital environment. Our research complements the work of Jasińska-Biliczak (2022) by highlighting the importance of developing e-commerce in the context of developing appropriate regulatory frameworks that are adaptive and flexible, allowing for effective solutions to problems and issues unique to the digital environment. The importance of network security, as discussed by Lainjo (2020) and Yemanov et al. (2023), aligns closely with our findings regarding cybersecurity as a key factor in the regulation of electronic companies. Both studies emphasize the critical need for robust public administration systems and legal frameworks to ensure cybersecurity. Our research extends this by suggesting that the hierarchical organization of regulatory priorities should prominently feature cybersecurity measures to protect both businesses and consumers in the digital economy.

The study by Ginevičius, Petraškevičius, & Šimkūnaitė (2010) on the influence of market concentration on enterprise activities resonates with our findings regarding the need for regulations to adapt to market structures. In highly concentrated markets, particularly in digital platforms where few players dominate, regulations need to be especially considerate of fostering competition and preventing monopolistic practices. This comparison highlights the necessity for commercial law to be flexible and responsive to market dynamics. Nugroho et al. (2024) discuss the mediating role of e-commerce adoption in enhancing SME performance with government support. This dovetails with our identification of government regulation and support as significant factors in digitalization. The alignment of governmental frameworks with digital advancements is essential for ensuring that SMEs can compete on a level playing field in e-commerce. The management of cryptocurrency assets, as investigated by Saleh et al. (2020), and the cryptanalysis for cross-border e-commerce by Shi, Liu, & Petrović (2019), highlight the evolving landscape of digital transactions and the associated legal challenges. These studies provide context to our findings on the need for commercial laws to continuously evolve to address new technological advancements and their implications on security and legality in business transactions.

Lastly, the work by Tubishat et al. (2024) on regional legal aspects to ensure sustainable development in open systems commercial relations provides a broader regional perspective that complements our study's focus on the Middle East. Their emphasis on planning and legal frameworks to support sustainable development mirrors our conclusion that digitalization requires a well-structured legal approach to foster uninterrupted growth and innovation (Table 2).

Table 2. The main innovation in our study

Innovations	Characteristics
Focus on the Middle East	While many studies examine digitalization and commercial law, few specifically analyze these aspects within the Middle Eastern context. The Middle East has unique legal, cultural, and economic frameworks that differ significantly from those in Western countries. This study fills a critical gap by tailoring its analysis to the region's specific needs and challenges, offering localized insights that are more applicable and valuable for policymakers and businesses operating there

Use of Hierarchical Analysis	The study employs the Analytic Hierarchy Process, a well-regarded decision-making framework that helps in structuring complexity into a multi-level hierarchical architecture of objectives, criteria, and sub-criteria. This approach is innovative in the context of legal and regulatory studies as it quantitatively evaluates the weight and significance of various factors that affect the regulation of electronic companies. By breaking down the broad concept of digitalization into digestible and comparable elements, the study provides a clear, prioritized list of regulatory focal points
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Through these comparisons, our study situates the hierarchical organization of digitalization factors within a broader scholarly dialogue, emphasizing the complex interplay between technological advancements, market dynamics, consumer behavior, and the evolving legal frameworks necessary to navigate the digital frontier effectively.

CONCLUSION

Summing up the results of our research, we can conclude that the issue of digitalization in the Middle East is complex and complex. This area in this region requires the adoption of innovative solutions, cybersecurity measures and a regulatory framework that will ensure effective protection of consumer interests. Due to the use of the hierarchical analysis method, we were able to form clear priorities among a number of factors influencing this area. Thus, it is a technological innovation that has become the key driver of the processes being studied, which can fundamentally change the methods and framework for regulating e-commerce and business. At the same time, an equally important role is played by cybersecurity and the protection of personal data, which requires increased attention to the security of financial transactions in the digital sphere. With this in mind, compliance with regulations and evolving standards has been identified as a key ongoing challenge for e-commerce and business, requiring the implementation of effective adaptation, management and monitoring measures.

The findings of this study have important implications for policymakers, business leaders, and legal professionals in the Middle East. By understanding the hierarchy of significant factors, regulatory bodies can better devise laws that address the most pressing needs of the digital marketplace while fostering an environment conducive to innovation and growth. For business leaders, our study highlights the importance of proactive engagement with these regulatory changes to leverage digital opportunities effectively and ethically. Legal professionals will find the results relevant in advising clients on compliance and in navigating the increasingly complex landscape of digital law.

We recommend that policymakers continue to refine digital regulations that not only enhance economic competitiveness but also ensure robust consumer protection and data security. It is also vital that these regulations remain flexible to accommodate future technological developments. Businesses should invest in robust cybersecurity measures and compliance programs to align with these regulations, ensuring sustainable growth and consumer trust. Our study was limited to electronic companies within the Middle East, providing a focused yet somewhat restricted view of the broader implications of digitalization. Future research should expand this inquiry to other regions, allowing for comparative analyses that could reveal universal challenges or unique regional solutions. Additionally, exploring sector-specific impacts of digitalization could uncover nuanced insights that would benefit more targeted regulatory approaches.

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