



Sustainable Legal Development in the Region: Strategy for Integrating E-Commerce Platforms in the Domestic Market in the Era of Industry 5.0

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ABSTRACT

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sustainable development, level of sustainability, regions, E-business, commercial activity, Industry 5.0, legal activity, legal regulations

The purpose of the article is to assess the level of sustainable development in individual countries in one of the regions of the Earth. The object of the study is the development in the Middle East and the e-commerce system. At the same time, the scientific task will be to form a system for an integral assessment of information and e-commerce in these countries in order to understand which countries are ready for the era of Industry 5.0 and which are not. We have determined that sustainable development is a long-term phenomenon in which countries must be prepared both from a technological and legal point of view for the new era of Industry 5.0. The research methodology involves the use of an integral assessment method to determine the level of sustainable development in the countries of the Middle East, and a standardization method to normalize selected indicators. As a result of the study, a methodological approach to assessing the level of sustainable development based on performance indicators of commercial activities in the region was presented. We selected several countries in the Middle East and determined their level of sustainable development based on indicators of commercial activity in the regions in order to understand which are ready for the era of Industry 5.0 and which are not. The study has a limitation by not taking into account all countries in the selected region of the Earth. Prospects for further research will be aimed at expanding the system for assessing the level of sustainable development for a larger number of countries.

1. INTRODUCTION

The active development of commercial activity has a significant positive impact on the level of economic growth in the region. This is manifested in the receipt of new resources in the form of investments in infrastructure development, technological progress and the introduction of innovations in practical activities. The profits received by governing bodies from commercial activities make it possible not only to cover mandatory needs but also to allocate part of the funds to sustainable development projects related to renewable energy, environmental waste management systems, as well as sustainable development of urban infrastructure. Along with the level of public management, most enterprises individually adopt and adhere to corporate social responsibility policies. The key tenet of this policy is to conduct a conscious business with a vector for the development of green technologies and environmentally friendly production methods, logistics and other processes. But, despite the positive developments in this area, it is worth noting that not all commercial activities today

function in favor of sustainable development. Thus, there are still industries that are completely dependent on non-renewable resources or have a large amount of harmful emissions in the process of their activities. This not only does not contribute to sustainable development but also contradicts its principles.

The importance of our research article lies in its timely and strategic examination of the readiness of countries in the Middle East for the technological and economic shifts anticipated in the era of Industry 5.0. As this new era emphasizes the integration of cyber-physical systems, artificial intelligence, and the Internet of Things into industrial production, understanding the current level of sustainable development from both technological and legal perspectives becomes critical. This study provides pivotal insights into which countries are well-prepared to adapt to these innovations and which may face significant challenges. The focus on e-commerce is particularly relevant given its rapid growth and the crucial role it plays in modern economies. By assessing the integration capabilities and sustainability of e-

commerce systems, the research directly contributes to strategic planning and policy-making aimed at boosting economic security and technological advancement in a region that is diverse in terms of economic development and digital infrastructure.

The assessment of sustainable development within the context of the emerging Industry 5.0 era gains paramount importance as this new phase represents a shift towards a more sustainable, human-centric, and resilient industrial model. Industry 5.0 builds on the foundations laid by Industry 4.0, focusing on the integration of smart technologies with a stronger emphasis on environmental sustainability, customisation, and efficiency. It acknowledges the importance of balancing economic growth with environmental stewardship and social well-being. Assessing sustainable development in this context involves evaluating how well countries are incorporating these new industrial paradigms to reduce environmental impact, enhance resource efficiency, and improve quality of life, ensuring that technological advancements contribute positively to sustainability objectives. Moreover, the assessment of sustainable development in light of Industry 5.0 is critical to identify gaps and opportunities for improvement. It allows policymakers, industry leaders, and stakeholders to understand the effectiveness of current strategies and to realign efforts towards more sustainable practices. This assessment is crucial for fostering innovation that contributes to sustainability, ensuring that the benefits of technological advancements are maximized while minimizing environmental degradation and social disparities.

The issue of understanding and effectively assessing the dynamics of sustainable development of commercial activities in the context of Industry 5.0 is relevant and important in modern realities. This is due to a number of factors and reasons. First of all, conducting this type of assessment allows us to identify and analyze the relationships between economic, social and environmental factors in this area and form an integrated approach to the development of commercial activities in the era of Industry 5.0. In addition, in an era of rapid development of information and communication technologies, there is a need to optimize the use of the latter in the context of the principles and goals of sustainable development in order to harmonize modern commercial needs and demands of society with the long-term goals of preserving the environment, social and economic well-being. To summarize, the issue of introducing the principles and norms of sustainable development into the paradigm of commercial activity in the era of transition to Industry 5.0 is key for most countries of the world. This is due to the fact that a large number of countries today are faced with a number of environmental and social problems, the solution of which is possible only with a radical change in the paradigm of activities in the vector of sustainable development. Commercial activity and its modern electronic platforms cannot function separately from the dominant vector of development. Considering that adapting the latter to modern demands for sustainable development will only improve their long-term development prospects, making them relevant to modern needs and leveling threats to the environment and the well-being of future generations.

The structure of the article is presented in Table 1.

Thus, we set ourselves a goal to assess the level of sustainable development in individual countries in one of the regions of the Earth. The object of the study is the development

in the Middle East and the e-commerce system.

Table 1. The structure of the article

Structural Element	Characteristic
Literature Review	Review of scientific and practical literature on the chosen topic of the article
Methodology	Presentation of the key methods used in the research
Results	Highlighting the main results
Discussions	A discussion of how our results differ from others
Conclusions	Key conclusions that were made as a result of the conducted research

2. LITERATURE REVIEW

Al Hammadi and Hussain [1] offer a compelling examination of sustainable organizational performance, highlighting the necessity for businesses to integrate sustainability into their core operations to ensure long-term success. This work underscores the relevance of sustainable practices within the corporate sector, setting a precedent for the importance of integrating such practices in the e-commerce sector as well. Laužikas and Dailydaitė [2] discuss the pivotal role of social capital in transitioning businesses from efficiency-driven models to innovation-driven paradigms. Their findings are critical in understanding how e-commerce platforms can leverage social capital to foster sustainable innovation, particularly in developing regions like the Middle East.

For example, in a study by Belz and Binder [3], it was proposed to use a model of convergent processes, which demonstrates the features of the functioning of sustainable entrepreneurship and its advantages compared to the activities of conventional enterprises. In addition, the authors, through the use of this method, demonstrate ways to overcome possible problems and obstacles to the implementation of the principles of sustainable development in the daily activities of business. This model and the principles of its construction are equally relevant to the issue of the development of e-commerce, which also adapts to the norms and principles of sustainable development. At the same time, Hsu et al. [4] in their work presented methods for assessing and further ranking businesses in terms of the sustainability of their activities. This method allows you to identify gaps and problems in certain areas of business activity and make it more effective in the context of sustainable development. According to Morton et al. [5], the decisive factor in the issue of adapting commercial activities and sustainable development standards is the development of the latter in accordance with the sustainable development goals (SDGs).

Abdel-Rahman Tubishat et al. [6] provide a comprehensive examination of the planning processes aimed at enhancing the efficiency of open systems in commercial relations to ensure sustainable development. Their study focuses on the regional legal frameworks that support these processes, arguing that legal structures must be adaptive to support continuous and uninterrupted development within the context of global e-commerce trends. Their findings suggest that regional policies need to be highly flexible and responsive to the evolving dynamics of international trade and commerce facilitated through advanced digital platforms. Titko et al. [7] explore the

impact of country-level cultural development on achieving SDGs, offering insights into the complex interplay between cultural factors and sustainable development objectives. This perspective is particularly relevant in assessing how cultural nuances in the Middle East affect the integration of e-commerce platforms within sustainable development frameworks.

Accountability and Sustainability Transitions: Sareen and Wolf [8] address the concept of accountability in sustainability transitions, emphasizing the need for transparent and accountable practices in achieving sustainable development. This notion is especially pertinent for e-commerce platforms, which must navigate ethical and sustainable practices in a digital environment. Moya-Clemente et al. [9] conduct a bibliometric analysis on sustainable entrepreneurship, providing a comprehensive overview of the field's evolution and key themes. This analysis underscores the growing importance of sustainable entrepreneurship within the e-commerce sector. Lapinskiene and Peleckis [10] examine how sustainable development indicators impact economic growth, offering a valuable perspective on the economic implications of sustainability initiatives within the e-commerce industry. Wang et al. [11] investigate the role of green knowledge management in achieving green innovation and sustainable development goals. Their findings highlight the importance of organizational green culture in fostering sustainability, which is directly applicable to the context of e-commerce platforms. Kopytko and Sylkin [12] delve into the mechanisms of information support systems that aid in combating corruption

within economic security management. Their research underscores the importance of robust legal and institutional frameworks that can effectively utilize digital tools to monitor and prevent corruption in e-commerce. The integration of such systems is shown to be vital for maintaining transparency and accountability, thus contributing to a more stable and sustainable economic environment. Their model offers insights into the use of data analytics and digital surveillance as tools for enhancing the integrity of e-commerce transactions. The work of Grybaitė and Tvaronavičienė [13] earlier highlighted the importance of estimating sustainable development from an institutional perspective. Although their study predates the current Industry 5.0 era, it provides valuable insights into how institutions can gauge their readiness and adaptiveness to technological advancements in commerce. They argue that sustainable development in the digital age requires institutions to evolve continually to meet new challenges and opportunities presented by e-commerce platforms.

Alazzam et al. [14] discuss the methodological approaches to selecting business management strategies in response to changes in commercial activities. Their research is particularly relevant in the context of Industry 5.0, where technological integration and digital transformation dictate the pace and direction of business strategies. The study proposes a framework that accommodates rapid changes in the market environment, emphasizing the need for businesses to adopt flexible and forward-thinking strategies to thrive in a digital-dominated economy (Table 2).

Table 2. The main gaps in literature

Gaps	Characteristic
Comprehensive assessment frameworks for Industry 5.0 readiness	While existing literature discusses various aspects of sustainable development and the impact of e-commerce, there is a noticeable absence of a comprehensive assessment framework that integrates both with the specific demands and opportunities of Industry 5.0
Technological and legal preparedness for Industry 5.0	The literature provides extensive insight into the technological aspects of e-commerce and its implications for sustainable development. However, there's a discernible gap in studies that simultaneously consider the technological and legal preparedness of countries for the transition to Industry 5.0
Socio-cultural features of commercial activity in the context of the sustainable development paradigm	The reviewed studies provide insufficient information on the impact of social and cultural aspects on the processes and mechanisms of e-commerce adoption in the context of sustainable development, especially in Industry 5.0.
Modern research on e-commerce and its impact on the sustainable development of the region	Despite significant research in both the field of sustainable development and e-commerce, all of it is of a general scientific nature. Thus, there are minimal studies that have described in detail the features of the interaction of these two factors using the example of a specific region. However, research related to the Middle East is even more limited. A focus on detail and a more thorough study of the regional development features of the Middle East will reveal unique challenges and opportunities, especially in the context of the development of Industry 5.0.

It becomes evident that while there is significant scholarship on sustainability in business, the specific intersection of e-commerce and sustainable development within the context of Industry 5.0 remains underexplored.

3. METHODOLOGY

The crux of our research methodology is the integral assessment method, which allows us to evaluate the multifaceted nature of sustainable development. This method involves aggregating various indicators related to e-commerce and sustainable development, providing a holistic view of each country's position relative to Industry 5.0. The indicators we selected include a set of different factors, such as technological infrastructure, regulatory framework, environmental

sustainability, and social inclusion within the modern digital economy. By grouping all these factors into a single integrated and comprehensive assessment, we can identify and analyze the strengths and weaknesses of each country's sustainability performance. We used the standardization method to determine indicators common to all countries that will be used in the research process. This technique involves normalizing the data related to each indicator, thereby converting varied metrics into a uniform scale. The standardization process is crucial for accurately comparing the performance of countries on an equitable basis, eliminating any bias that may arise from the inherent differences in national contexts or the scale of the indicators. Using this method will allow for an objective measurement of the level of progress of each country in achieving sustainable development and readiness in this context for Industry 5.0.

The suitability of these methods is further justified by their ability to adapt to the complex and evolving nature of e-commerce and Industry 5.0. As e-commerce is influenced by both technological innovations and regulatory environments, using a method that can assess these aspects concurrently is essential. The integral assessment provides a comprehensive evaluation of how prepared a country is technologically and legally, offering insights into potential gaps and areas for improvement. Additionally, the normalization of selected indicators ensures that the evaluation is equitable and reflects true differences in readiness rather than disparities in data scale or scope.

Our study focuses on a selection of countries in the Middle East, chosen based on their varied levels of development and engagement with e-commerce. The choice of indicators for assessment was guided by their relevance to both sustainable development and the specific challenges and opportunities of Industry 5.0. These indicators were carefully curated to reflect the integral aspects of sustainability-economic, environmental, and social-while also considering the unique characteristics of the e-commerce ecosystem in the region. The analytical phase of our methodology involves applying the integral assessment method to the standardized data for each selected country. This process yields a comprehensive score for each country, reflecting its overall level of sustainable development and readiness for Industry 5.0. By comparing these scores, we can identify patterns, strengths, and areas requiring improvement across the region. Additionally, the assumption that the chosen indicators of commercial activity comprehensively reflect the sustainable development necessary for Industry 5.0 might overlook other crucial factors such as socio-economic conditions, political stability, and cultural attitudes towards technology and innovation. These factors are evaluating a country's overall readiness for technological advancements and have significant implications on the robustness and applicability of the findings. Such limitations highlight the need for a broader, more inclusive research scope in future studies to ensure a more comprehensive assessment of sustainable development across the entire region.

4. RESULTS OF RESEARCH

For our research, we have chosen several key countries of the Middle East: Jordan, Saudi Arabia, Turkey, Egypt (Figure

1).



Figure 1. The region of the planet selected for research

To begin with, it is necessary to determine many indicators that most fully reveal the essence of the country's sustainable development. The criterion for selecting these indicators are objects of commercial activity that can be assessed using formalized or numerical values. When forming a system of sustainable development indicators, we will be guided by the following principles: 1) systematicity, which involves taking into account not only the structure of the sustainable development system, but also the relationship between them; 2) complexity, that is, the maximum combination of diverse aspects; 3) adequacy, which implies a reflection of the real state of the subjects being studied (therefore, all data is taken exclusively from official statistics); 4) continuity, which involves adjusting existing indicators or introducing new ones, subject to the receipt of updated data or the development of modern research methods.

The initial data for further calculations are presented in the Table 3, which contains eight main indicators that will determine the integral of sustainable development.

Table 3. Input data for calculating the level of sustainable development

	Volume of Commercial Activity % of GDP	Share of Investments in Sustainable Development in the Total Volume of Capital Investments	Number of People Involved in Sustainable Development Programs per 100,000 Population	Number of Commercial Institutions Per 100,000 Population	Coefficient of Realized Commercial Sustainable Development Programs per 10,000 Population	Index of Commercial Potential	Number of E-Commerce Specialists per 100,000 Population	Number of Commercial Law Violations per 100,000 Population
Jordan	11.4	3.6	218.8	3.3	2.7	0.21	0.11	4.1
Turkey	13.8	2.9	227.5	3.3	2.7	0.2	0.12	3.3
Saudi Arabia	13.3	4	234.6	3.5	2.9	0.22	0.06	1.8
Egypt	7.7	3.5	225.2	2.8	3.1	0.21	0.11	2.9

In the case of direct dependence, or unidirectional influence of the growth of factor indicators on increasing the level of sustainable development, such indicators are called stimulator indicators. If the increase in the actual values of some indicators reduces the level of stability, they are called destimulating indicators (in our case, these are indicators 4 and 7). For stimulating indicators, normalization is carried out according to the maximum value, and for destimulating indicators-according to the minimum, which ensures the continuity of the function of the integral index and compliance with the condition of changing the normalized indicators in the range from 0 to 1. Accordingly, all indicators are normalized based on the method of comparison with the reference value as follows in the Eq. (1):

$$z_i = \begin{cases} \frac{x_i}{x_{i,max}} \\ \frac{x_{i,min}}{x_i} \end{cases} \quad (1)$$

If some indicators of the dynamic statistical series are identically equal to zero or are negative, we will shift the statistical axis by the appropriate number of scale units to satisfy the inequality $x_i > 0$.

First, we find the vector matrix of variances D_i and the matrix of absolute values of factor loadings A_i (using axis rotation and quartimax normalization, which establishes

simpler correlations between the relevant variables and factors) for the formed group of indicators. Let's determine the matrices A_i and D_i using the following Eq. (2):

$$A_i = \begin{pmatrix} a_{i1} & a_{ij} \\ a_{j1} & a_{jj} \end{pmatrix}; D_i = \begin{pmatrix} d_1 \\ d_j \end{pmatrix} \quad (2)$$

where, a_{ij} are the absolute values of the matrix elements after axis rotation and quartimax normalization; d_j is the value of variances.

Next, we will form a matrix of weights for indicators of each factor (3):

$$Y_i = k Y_i \quad (3)$$

This makes it possible to determine the scalar values of the integral index of sustainable development (4):

$$I = \prod_{j=1}^n z_j \quad (4)$$

The calculated weighting coefficients and the value of the integral index of sustainable development are given in Table 4. We carry out an integral convolution for indicators of sustainable development of commerce based on the calculation of the dynamic series of the integral index and integral indices of boundary values in a multiplicative form.

Table 4. Integral index of normalized 8 indicators of sustainable development

	Volume of Commercial Activity % of GDP	Share of Investments in Sustainable Development in the Total Volume of Capital Investments	Number of People Involved in Sustainable Development Programs per 100,000 Population	Number of Commercial Institutions per 100,000 Population	Coefficient of Realized Commercial Sustainable Development Programs per 10,000 Population	Index of Commercial Potential	Number of E-Commerce Specialists per 100,000 Population	Number of Commercial Law Violations per 100,000 Population
Jordan	0.75	0.71	0.77	0.79	0.84	0.21	0.16	0.24
Turkey	0.88	0.57	0.8	0.76	0.81	0.216	0.15	0.03
Saudi Arabia	0.91	0.79	0.83	0.73	0.86	0.21	0.3	0.05
Egypt	0.51	0.67	0.8	0.63	0.93	0.2	0.17	0.34

For the clarity of the justification of the limit values, we will use the "t-criterion". In order to increase the level of visualization of the obtained dynamic series of the integral index of sustainable development, as well as to establish the relationship with the obtained limit values, we will plot a graph for the selected countries (Figure 2).

The analysis showed that it is in Egypt that the lowest level of sustainable development is determined in terms of commercial activities, in particular in the issue of e-commerce integration. This fact requires a more detailed analysis of the factors and cause-and-effect relationships that contribute to this. Determining this in the future will allow us to formulate strategic and tactical measures to resolve this situation. Yes, the reasons for Egypt's low position may be a wide range of factors: from a lack of infrastructure to problems in regulatory support and educational barriers to the population. All this may slow down a country's ability to develop e-commerce in the context of sustainable development. First of all, technological infrastructure issues that reduce accessibility to e-commerce platforms are key. This includes significant restrictions on access to the Internet in rural areas and the lack

of reliable and stable electronic payment systems. Along with it, Egypt's legal framework also cannot fully regulate the activities of e-commerce platforms. Thus, in Egypt there is no clear regulatory support for the procedures for creating an online business, legal protection of electronic financial transactions and protection of the rights of buyers when making purchases on electronic platforms.

The results suggest that countries lagging in technological infrastructure require targeted investments to boost their e-commerce capabilities. This could include expanding internet access, enhancing cybersecurity measures, and developing digital literacy programs to ensure that a broader segment of the population can participate in and benefit from e-commerce opportunities. The study highlights the potential benefits of regional collaboration in harmonizing e-commerce laws and infrastructure development. By working together, countries in the Middle East can create a more cohesive and powerful digital market, attracting larger e-commerce players and fostering regional startups, enhancing overall economic resilience and sustainability.

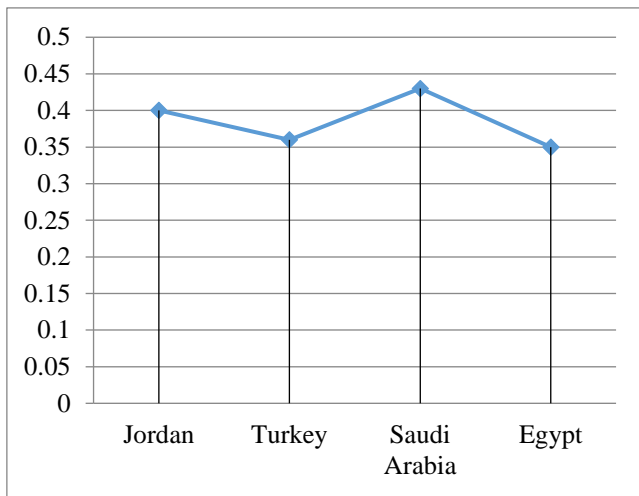


Figure 2. Dynamics of the level of sustainable development for the countries of the Middle East

5. DISCUSSIONS

Our research focuses on the integration of e-commerce platforms in the context of sustainable development in the Middle East as it transitions to the Industry 5.0 era. As a result, qualitatively new ideas were proposed that are relevant today and relevant to other scientific research in this area. Almousa [15] identifies barriers to e-commerce adoption from consumers' perspectives in developing countries, highlighting issues such as trust, technological infrastructure, and regulatory environments. Our findings resonate with Almousa's concerns, particularly emphasizing the need for robust technological and legal frameworks to support e-commerce. However, our study extends beyond consumer barriers, providing a macro-level assessment of countries' readiness for Industry 5.0, including the integral role of e-commerce in achieving sustainable development goals. Nugroho et al. [16] discuss the mediating role of e-commerce adoption between government support and SME performance in developing countries. This study underscores the importance of government intervention in facilitating e-commerce. Our research complements this by illustrating how government support for technological and legal infrastructure directly impacts the broader ecosystem of sustainable development, preparing regions for Industry 5.0.

Guseva [17] explores the electronic commerce quality criteria, essential for understanding what makes an e-commerce platform effective and efficient. Our methodology for assessing sustainable development incorporates these quality criteria as part of the performance indicators, acknowledging that high-quality e-commerce systems are pivotal for sustainable economic growth and integration into the Industry 5.0 paradigm. Bojnec and Papler [18], Su et al. [19], and Zemlickienė et al. [20] provide insights into the relationship between economic efficiency, energy consumption, and sustainable development. Their findings highlight the complex interplay between economic activities and environmental sustainability. Our study builds on this by specifically focusing on how e-commerce platforms can be leveraged to promote sustainable practices, reduce energy consumption, and contribute to economic efficiency in the Middle East.

Zhao et al. [21] examine how digitalization supports the

sustainable integration of culture and tourism. This perspective is valuable for our study as it illustrates the broader implications of digital transformation for sustainable development. It reinforces our conclusion that the integration of e-commerce and digital technologies can serve as catalysts for sustainable growth and diversification of economies in preparation for Industry 5.0. Alazzam et al. [22] and Eniola et al. [23] focus on developing an information model for e-commerce platforms, emphasizing the significance of legal compliance and global digitalization. Our findings align with the need for a comprehensive framework that not only assesses technological readiness but also ensures that e-commerce systems are built on sound legal foundations. This is critical for the sustainable growth and integration of e-commerce in the Industry 5.0 era.

Bazyliuk et al. [24] explore the institutional, focusing on regional development and methodological practices in the publishing and printing sectors. While their study centers on a different industry, the methodological insights concerning institutional dynamics are beneficial. They highlight the importance of contextual and region-specific approaches in assessing development, which aligns with our methodology of tailored assessments for each country in the Middle East. Both studies underscore the necessity of nuanced, localized strategies to effectively measure and enhance sustainable development within specific sectors and regions. The research by Mohammad Bani-Meqdad et al. [25] delves into the modern challenges of protecting intellectual property rights within a cyber-environment, emphasizing its importance for sustainable development in the region. Their findings are particularly relevant as they discuss the legal frameworks necessary for safeguarding rights in the digital era, which complements our discussion on the legal preparedness of countries for Industry 5.0. The interplay between cyber-environment readiness and intellectual property protection offers a broader perspective on the legal dimensions of e-commerce, which are critical for sustainable development in the digital age.

6. CONCLUSIONS

Summarizing the study, we can conclude that it is devoted to the study of integration processes and the impact of modern technologies and e-commerce platforms during the transition to Industry 5.0. Using a methodological complex consisting of an integral assessment method and a standardization method for assessing levels of sustainable development based on indicators of commercial activity, we identified different degrees of readiness of the countries of the studied region to accept the technological and legal problems associated with the era of Industry 5.0. Our study successfully developed and applied a methodological approach to assess sustainable development through the prism of e-commerce activities. By selecting a range of countries within the Middle East, we have identified those that stand on the brink of the Industry 5.0 threshold, equipped with the necessary technological infrastructure and legal frameworks, versus those lagging behind. This differentiation is crucial for understanding regional disparities in technological adaptation and sustainable development (Figure 3).

While our study provides critical insights, it also acknowledges its limitation in scope by not encompassing all countries within the Middle East. This restriction may obscure

a comprehensive view of the region's readiness for Industry 5.0. Future research should aim to include a broader spectrum of countries, potentially offering a more holistic understanding of the region's capability to integrate e-commerce into

sustainable development frameworks. Additionally, further studies could explore the specific barriers that hinder the less prepared countries from embracing the new industrial era, including technological, economic, and regulatory challenges.

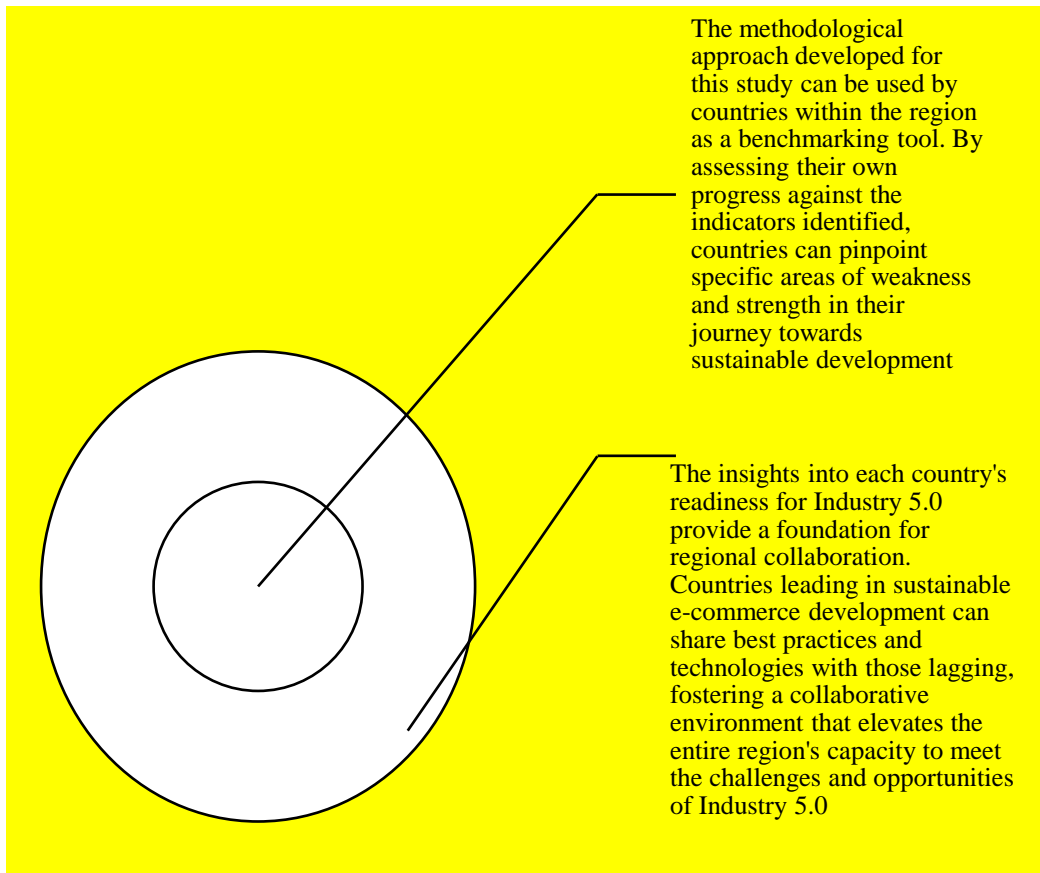


Figure 3. Practical aspect about our results

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