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Japan's Digital Economy: A Way Forward for Economic Revivalism

Japonya'nın Dijital Ekonomisi: Ekonomik Canlanma için Daha İleriye

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ABSTRACT

The term "digital economy" refers to a variety of commercial and economic activities that rely on electronic communications and technology such as e-commerce and digital marketing. This trend promotes innovation and allows small and medium-sized businesses to penetrate global markets with little expenditure. Furthermore, digital data from online interactions provides insights into consumer behaviour, which helps with marketing tactics and product development. Despite Japan's technological legacy, difficulties such as an ageing population and economic stagnation need the use of digital breakthroughs to stimulate growth. Empirical study demonstrates that the digital economy has a positive impact on industry restructuring in Japan. Regional disparities highlight the importance of specialized solutions, with government involvement critical, particularly in places lacking digital development. Future success is contingent on investments in talent and technology. Japan may achieve long-term economic development by adopting the digital economy and investing in human capital. As technology advances, Japan must adapt and innovate to remain competitive on the global stage. This necessitates continual research and development investments, as well as the promotion of an entrepreneurial and digital literate culture. Japan can solve its economic challenges by leveraging its technology expertise and embracing full digital transformation. In light of issues like population ageing and economic stagnation, the study intends to explore how industry restructuring in Japan might be fueled by the digital economy. It highlights the crucial role that government engagement plays in mitigating regional differences and advancing specialized solutions.

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ÖZ

"Dijital ekonomi" terimi, e-ticaret ve dijital pazarlama gibi elektronik iletişim ve teknolojiye dayanan çeşitli ticari ve ekonomik faaliyetleri ifade etmektedir. Bu eğilim inovasyonu teşvik etmekte ve küçük ve orta ölçekli işletmelerin az bir harcamayla küresel pazarlara girmesine

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olanak sağlamaktadır. Ayrıca, çevrimiçi etkileşimlerden elde edilen dijital veriler, pazarlama taktikleri ve ürün geliştirmeye yardımcı olan tüketici davranışları hakkında bilgi sağlamaktadır. Japonya'nın teknoloji açısından ileri olmasına rağmen, yaşlanan nüfus ve ekonomik durgunluk gibi zorluklar, ekonomik büyümeyi teşvik etmek için dijital atılımların artırılması gerektirmektedir. Bu çalışma, dijital ekonominin Japonya'da endüstrinin yeniden yapılandırılması üzerinde olumlu bir etkisi olduğunu göstermektedir. Bölgesel farklılıklar, özellikle dijital gelişimin daha az olduğu yerlerde hükümet katılımının kritik önem taşıdığı özel çözümlerin önemini vurgulamaktadır. Gelecekteki başarı, yetenek ve teknolojiye yapılan yatırımlara bağlıdır. Japonya, dijital ekonomiyi benimseyerek ve insan sermayesine yatırım yaparak uzun vadeli ekonomik kalkınma sağlayabilir. Teknoloji ilerledikçe, Japonya küresel sahnede rekabetçi kalabilmek için uyum sağlamalı ve yenilik yapmalıdır. Bu da sürekli araştırma ve geliştirme yatırımlarının yanı sıra girişimci ve dijital okuryazar bir kültürün teşvik edilmesini gerektirmektedir. Japonya, yaşanabilecek ekonomik sıkıntılarını teknoloji uzmanlığından faydalanarak ve tam dijital dönüşümü benimseyerek çözebilir. Nüfusun yaşlanması ve ekonomik durgunluk gibi sorunlar ışığında, bu çalışma Japonya'da sektörün yeniden yapılandırılmasının dijital ekonomi tarafından nasıl desteklenebileceğini araştırmaktadır. Bölgesel farklılıkların azaltılmasında ve özel çözümlerin geliştirilmesinde hükümet katılımının önemine de değinilmektedir.

1. INTRODUCTION

A group of business and economic endeavours that utilize digital technologies and electronic communications are collectively referred to as the "digital economy". Activities including digital marketing, cloud services, software development, computer gaming, digital content creation, e-commerce, and digital financial services are common in this kind of economy. Online and digital business partnerships have become increasingly important as a result of the digital economy, which depends on digital technologies and electronic communications for economic and commercial activity. Furthermore, the digital economy encourages innovation and entrepreneurship by facilitating rapid scaling and lowering entry barriers for new businesses. Small and medium-sized businesses can reach global markets with little infrastructure investment by using digital platforms and marketplaces. Furthermore, the abundance of digital data generated by online transactions and interactions can provide organizations with valuable insights into consumer behaviour, interests, and market trends. This allows for a more targeted marketing approach and product development activities.

The digital economy is altering work and employment relationships, opening up new possibilities for remote work, freelance labour, and flexible hours. However, difficulties such as the digital skills gap exist, stressing the importance of educational and training activities to provide individuals with the required abilities for the digital age. Japan is facing enormous economic issues, such as an ageing population, limited economic development, and low labour productivity. The study explains how digital discoveries are critical for increasing productivity and fueling Japan's economic growth, particularly given estimates of GDP reduction in the future decades. Despite Japan's long history of technological supremacy, current evidence points to a slowing of its technological growth. Since Japan is perfectly positioned to use digital technology to address social concerns and propel economic growth, this paper investigates the causes that have contributed to this decline and underlines the importance of using digital technology to resuscitate Japan's economy and reclaim its competitive edge.

Empirical studies show that digital economy development has a positive impact on industry restructuring in Japan. It assesses regional differences and emphasizes the need for government engagement in promoting industry change, particularly in areas with poor digital economic development. Looking ahead, how the digital economy helps Japan's economy modernize and become more competitive in the global market is the starting point. Investments in people development and technology adoption are critical for sustaining economic growth and fostering innovation in the digital era. The linked studies are reviewed in the next section. The conceptual framework and the hypothesis are both covered in Section 3. Section 4 explains the data, and estimating technique and also provides an interpretation of the estimation outcomes. The final section concludes this paper.

2. LITERATURE REVIEW

The digital economy is significantly impacted by the labour markets, which are altering the nature of work and employment relationships. Although concerns about job loss are heightened by automation and technology improvements, these developments also open up new possibilities for remote work, freelance labour, and flexible work hours. Employers and employees both face difficulties as a result

of the digital skills gap, which emphasizes the value of funding educational and training initiatives. Participants leave these courses with the ability to succeed in the digital age. In summary, the dynamic and quickly changing digital economy affects 21st-century consumer behaviour, societal structures, and the economic environment.

However, boosting Japan's productivity requires a digital transition. An ageing labour force, slower economic development, and poorer labour productivity were only a few of the issues facing Japan's economy before the COVID-19 pandemic. Japan's ageing population is expected to cause the country's workforce to shrink by 20% between 2017 and 2040, while throughout the preceding 20 years, the country's annual labour productivity growth has been less than 2% (WEF, 2020a,b). According to IMF projections, there might be a real gross domestic product (GDP) decline of about 25 percent in the country between 2019 and 2059 as a result of these tendencies (IMF, 2023). As a result, digital breakthroughs are needed to increase economic productivity and fuel Japan's growth engine.

Japan has always been a leader in technology, but in recent years, the nation's rate of technological advancement has decreased. Japan is renowned for its technological advances in the electronics sector and inventions like the bullet train. But today, the nation faces the danger of losing its creative advantage. The Global Innovation Index, which ranks countries based on 80 innovation factors, states that Japan dropped three places in a year, from 13th in 2019 to 16th in 2022 (WIPO, 2023). This suggests that there were large opportunities lost by the nation's enterprises. Businesses could revolutionize old business structures to increase the value of their goods and boost productivity by utilizing digital technologies.

In light of the pandemic, this trend has intensified. It had experienced a "digital defeat" against the pandemic due to the tardiness in implementing digital measures to counteract the effects of the viral epidemic. According to Jaumotte et al. (2023), only 28% of the nation's firms have online remote work solutions in place, and 45% had neither considered nor knew about such digital technology.

Because of the unique significance of digital technologies, this new economy is growing and expanding and has been identified in several countries as a major engine of economic development and growth. The digital economy encompasses many industries, such as cloud services, software, computer games, digital content creation, digital marketing, and digital financial services. Because of this, the digital economy provides businesses and consumers with the chance to swiftly and readily obtain goods and services as well as to generally have better user experiences. The digital economy is always changing and has a big impact on different aspects of the social, cultural, and economic spheres.

For several reasons, Japan is especially well-suited for this kind of research. Japan is a developed industrial democracy that possesses the ability to tackle several major issues that digitization has been suggested as a solution for. In particular, many believe that digitization holds the answer to solving Japan's major issues, namely the country's ageing population and labour scarcity. Furthermore, Japan is frequently cited as a nation that has successfully incorporated technology into the workplace in a way that positively impacts businesses and the overall economy.

According to Liu et al. (2022), Japan is considered a prominent player in the production of robots and the application of robots in the service industry. Wright argues that compared to its competing nations, such as China and South Korea, the Japanese government is more concentrated in its support of robotics product development. Ford describes how a particular chain of sushi restaurants in Japan has led the way in utilizing cutting-edge technologies, making it the most competitive in the business (Sheikh et al., 2023).

Japan is likewise at the forefront of robotics globally, and their introduction of Japan's robotization serves as a model for the restaurant, hotel, and eldercare industries (Carvajal-Escobar et al., 2008; Brody et al., 2018). Through an anthropological lens, Kovacic (2018) contends that robot technologies are situated within Japanese society in a way that allows them to blend in with the country's "thinking culture" (monozukuri), well-known brands, and nostalgic vision of anime characters (Ema et al., 2016, Yamamoto, 2019). As a result, the technology is likely to become socially acceptable without much difficulty. Japan, then, is sometimes described as a "crucial case"—a nation where digitalization can lead to considerable changes in socioeconomic conditions through the use of technology.

3. METHODOLOGICAL FRAMEWORK

3.1. Conceptual Framework and Hypothesis Formulation

The digital economy is a new economic paradigm that relies heavily on information networks as key distribution channels. It continuously raises the degrees of digitization and intelligence in traditional businesses by fusing cutting-edge digital technologies with established economic frameworks. The rapid expansion of infrastructure, which provides an essential base, is integral to the advancement of the digital economy. The information and communication sector's rapid growth provides digital technologies, goods, and services that are necessary for the auxiliary sectors' digital transformation. Simultaneously, the rapid expansion of the Internet provides a fundamental basis that is essential to maintaining the course of development of the digital economy.

The Internet is currently undergoing a period of rapid expansion in Japan, and its use is steadily affecting a wide range of industries throughout the country's economy. Additionally, research and development projects in science and technology are crucial because they provide the technological foundations needed to grow the digital economy. The rapid advancement of artificial intelligence is especially noteworthy in the current post-epidemic environment

since it provides substantial benefits to daily living. In this framework, the digital economy manifests as a powerful force, promoting the development and restructuring of several sectors within the Japanese economy.

The engine of digital technology's ongoing innovation and development is industrial convergence, which also boosts departmental productivity and efficiency in the digital economy. Simultaneously, the real economy is undergoing a smooth digital revolution, spearheaded by the service sector. Numerous businesses are establishing online platforms via social networks like the Internet. Digital technology integration gives rise to a multitude of applications and mini-programs that not only make consumer life easier but also increase the productivity and operational efficiency of businesses. The digital transformation has led to a boom in the e-commerce sector and a significant increase in online retail sales. Generally speaking, the development of the digital economy will make it easier to successfully upgrade the industrial structure, integrate industries deeply, and innovate inside them.

4. RESEARCH DESIGN

Hypothesis: The evolution of the digital economy may encourage an upgrade in the industrial structure.

4.1. Dependent variable

Industrial construction level (ICL): Each province's industrial structure level is explained by the industrial structure level coefficient, which has the following formula:

$$ICL = \sum_{i=1}^{3} q_i \times i = q_1 \times 1 + q_2 \times 2 + q_3 \times 3$$

q is the proportion of the I industry.

The dependent variable chosen for the robustness test is the ratio of the gross domestic product of the secondary industry to the gross domestic product of the tertiary industry (RTS).

4.2. Independent Variable

The digital economy's development level (DED) is the independent variable in this study; nevertheless, the degree of development of the digital economy lacks a normative indicator. Thus, from the three dimensions of basic, resource-based, and technological digital economy development levels, nine indicators were chosen to gauge the state of the digital economy. The digital economy development level is determined by standardizing the beginning value and applying the entropy weight approach, as described in Xueling and Yuexia's (2017)'s calculating method.

Economic development level (EDL): To determine an area's economic development level, use its per capita GDP. The industrial structure will be reversed upgraded and optimized once the economy reaches a certain degree of development.

Economic Openness (EO): It is computed by dividing the GDP by the total volume of commodities imported and exported from each province (translated using the average annual rate of exchange between the RMB and the US dollar). New machinery and equipment are included in the products that are imported and exported. The area's industrial structure will be upgraded with the adoption of high-tech equipment. The area's economic openness increases with the overall volume of commodities imported and exported.

Government intervention (GI): The ratio of general budget expenditures by local government to GDP within the municipality serves as a proxy for the government intervention function. In its market, the local government's spending is a major factor. The local government can successfully encourage the upgrading of the industrial structure and has a compensating effect on market regulation that is stronger the more fiscal expenditure it makes. Human capital (HC): The degree of human capital is determined by the average years of education index. The quality of the labour force in a region is correlated with its degree of human capital, and this correlation can support the upgrading of the industrial structure in that region.

This paper's theoretical study leads to the construction of the multivariate linear empirical model that follows:

$$ICL_{it} = \alpha_0 + \alpha_1 DED + \Sigma\beta_j Control_{j,it} + \varepsilon_{it}$$

The province and year are represented by the subscripts I and t, respectively, while the random disturbance term that is unrelated to the dependent variable is represented by the letters j, which stands for the jth control variable.

4.3. Analysis

Regressions using both fixed-effect and random-effect models are conducted using the panel data samples used for this investigation. To decide which model needs to be examined further, the robust Hausman test is employed. With a p-value of 0.0191, the robust Hausman test of basic regression findings shows that the fixed effect model's estimation result is the most robust and desirable.

The hypothesis has been supported by the regression findings shown in Table 1, which also show that the coefficient related to the degree of development in the digital economy is beyond the critical threshold of 1%. This observation highlights the significance that the development of the digital economy has had in providing incentives for the industrial structure to modernize. Additionally, at the 1% level, the coefficient corresponding to economic openness shows a statistically significant positive association, indicating a positive relationship between economic openness and the improvement of industrial structure. At the 1% significance level, the statistically significant positive coefficient related to economic openness indicates a strong positive correlation between economic openness and the improvement of industrial structure. The utilization of technology capital contributes to improving innovation effectiveness and promoting industrial growth, ultimately initiating the modernization of the industrial structure. Further supporting the effectiveness of government action in promoting the

Table 1. Basic regression results and robustness test results

Variables	FE	RE	RE
	ICL	ICL	RTS
DED	0.0491***	0.0615***	0.0283**
	(0.00122)	(0.00116)	(0.00584)
EDL	1.48e-04***	1.25e-04***	0.71e-04***
	(1.98e-05)	(1.74e-05)	(0.48e-04)
EO	0.348***	0.197***	0.0519
	(0.0018)	(0.0196)	(0.267)
GI	0.237***	0.108***	2.326***
	(0.108)	(0.0547)	(0.312)
HC	0.0356**	0.0847***	0.0416
	(0.0337)	(0.0728)	(0.0341)
Constant	2.784***	1.935***	-2,142
	(0.213)	(0.0493)	(0.618)
robust	4.29**		
Hausman test	[0.0238]		
N	88	88	88
R²	0.719	0.925	0.726

Notes: It is important to remember that the symbols *, **, and ***, respectively, stand for statistical significance at the 10, 5, and 1 percent levels. The standard error is located in ( ).

modernization of the industrial structure within the economy is the statistically significant positive coefficient associated with government intervention, which is also seen at the 1% significance level.

The features of Japan's economic development and the growth of the digital economy are examined as this article looks at two regions. Table 2 displays the fixed effects model's regression findings. As per the findings, the digital economy development level in the northern area has a statistically significant positive coefficient of 1%, but the digital economy development level in the western regions has a positive coefficient, but it is not statistically significant.

The government may effectively encourage the modernization of the industrial structure by economic intervention, as evidenced by the surprisingly positive value of the government intervention coefficient at the 1% level. This might be because the northern region has a lesser degree of industrial structure and there is a greater disparity in the expansion of the digital economy when compared to the western region. It is too soon to tell how the industrial structures' modernization will be aided by the growth of the digital economy. In conclusion, the level of development of the digital economy has a favourable influence on the modernization of the industrial structure.

Conclusion

To summarize, the term "digital economy" refers to a wide range of economic activities that rely on electronic communications and digital technologies, including e-commerce, digital content creation, and cloud services.

Table 2. Regression results of regional heterogeneity

Variables	Northern	Western
	ICL	ICL
DED	0.0219***	0.00124***
	(0.0027)	(0.0018)
EDL	1.54e-05***	2.73e-05***
	(1.29e-06)	(4.23e-07)
EO	0.0724**	0.453***
	(0.0416)	(0.0857)
GI	1.249***	0.933***
	(0.173)	(0.183)
HC	0.0471*	0.0298
	(0.0253)	(0.0359)
Constant	1.947**	1.162**
	(0.281)	(0.0934)
N	88	88
R²	0.681	0.819

Note: Please take note that the symbols *, **, and ***, respectively, indicate statistical significance at the 10, 5, and 1 percent levels.

This shift to digital business transactions not only encourages innovation and entrepreneurship but also allows small and medium-sized businesses to enter global markets with little infrastructure expenditure. Moreover, businesses can gain important insights into consumer behaviour thanks to the abundance of digital data created by online interactions.

This helps to create targeted marketing campaigns and product development activities. Japan has long been a technological powerhouse, but it is struggling to keep up with the rapid advances in the digital economy. Given the country's ageing population, slow economic growth, and low worker productivity, a digital transformation is required to boost productivity and growth. Despite Japan's status as a technological leader, renewing its digital ecosystem is critical, as seen by recent indicators such as its decreasing place in the Global Innovation Index. The COVID-19 outbreak showed Japan's digital weaknesses, emphasizing the critical need to immediately embrace digital solutions to strengthen resilience in disaster scenarios.

Given Japan's ability to employ digitization to tackle socioeconomic problems, the country is at a tipping point when adopting digital technology can result in big changes. Japan is an excellent example of how to employ digitalization to accelerate socio-economic growth because of its significant expertise with robots and technological integration across industries. Japan can handle its demographic and economic challenges while revitalizing its industrial environment by investing wisely in digital infrastructure and human capital development. This study's empirical findings show how industry restructuring has profited from the expansion of the digital economy. The study emphasizes the intricate relationship between industrial modernisation and digital economic growth by examining regional variations. Government action is necessary to promote industrial change, particularly in places with low levels of digital economy development. The preceding findings highlight the importance of comprehensive approaches that include the advancement of digital infrastructure, human resource allocation, and proactive government measures to effectively actualize the digital economy's capacity to propel Japan's industrial revolution and sustained economic expansion.

5. CONCLUSION

Global commercial and economic environments are being transformed by the digital economy, which has become a revolutionary force. Technology innovation is highly prized in Japan, where the digital economy presents both opportunities and challenges to the nation's economic development. To revitalize its economy, Japan has to adopt digital technology due to its ageing population and weak productivity development. The COVID-19 pandemic has brought Japan's readiness for remote labour and digital solutions to light, underscoring the necessity for digitization. However, Japan is a leader in applying digital advancements to address societal and economic challenges due to its long history of technological proficiency, particularly in robotics and automation. Japan can enhance its competitiveness in the global market and expedite its economic modernization by promoting innovation and incorporating digital technologies into many industries.

Digitalization has a significant impact on economic development, as evidenced by studies on Japan's industrial structure and response to the digital economy. Japan's digital economy is developing differently, according to empirical studies using regional data. The development of the digital economy and the modernization of the industrial structure have a different impact in the western regions than in the northern ones, where there is a noticeable positive correlation. This regional variability highlights the complexity of the Japanese economy and the need for targeted policies aimed at optimizing industrial structures throughout the country.

To maintain economic growth and promote innovation, Japan must make investments in talent development and technology adoption as it deals with the challenges of an ageing workforce and technological disruption. Through the adoption of the digital economy and allocation of resources towards human capital, Japan can establish a favourable position for sustained economic growth in the digital era.

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