IJEM
International Journal of Economics and Management
Journal homepage: http://www.ijem.upm.edu.my

Digital Economy Reformulation and Economic Competitiveness of Smart Cities: An Application of Soft Systems Methodology

FARID SUBKHAN[a,b*], MOHAMMAD SYAMSUL MAARIF[a], NURUL TAUFIQU ROCHMAN[c] AND YUDHISTIRA NUGRAHA[d]

[a]*School of Business, IPB University, Bogor, Indonesia*
[b]*Management Department, Perbanas Institute, Indonesia*
[c]*The National Research and Innovation Agency (BRIN), Indonesia*
[d]*School of Computing, Telkom University, Indonesia*

ABSTRACT

Smart cities have become a new trend in urban development worldwide, and digital economy plays a crucial role. Therefore, this study aimed to create a novel formulation of digital economy that contributes to improving competitiveness of smart cities and provides practical guidance on digital economy strategies. A Soft System Methodology (SSM)–based action that utilizes the concept of systems was used to investigate conceptual models from different perspectives, from conceptual thinking to real-world–based action. Moreover, Indonesia was selected as a case study due to its extensive implementation of smart cities over the past five years, with over 250 cities participating in the program. The study successfully identified five scopes of digital economy, namely digital technology, digital service, shared economy and platform, digitalized economy, and financial services. It also identified six crucial criteria of economic competitiveness, namely human resources, product offerings, innovation capability, economic productivity, ease of business and investment, as well as financial capital. In conclusion, local cities and regencies' governments need to accelerate digital economy by creating supporting policies, making collaboration, effective digital marketing, improving digital literacy, guaranteeing cyber security, as well as protecting consumers and data privacy.

JEL Classification: O18, O21, O38, P35, P43, P46
Keywords: Competitive Economy; Digital Economy; Digital Economy Strategy, Smart City; Soft System Methodology (SSM)-Based Action

Article history:
Received: 10 January 2024
Accepted: 30 July 2024

* Corresponding author: Email: subkhanfarid@apps.ipb.ac.id
DOI: http://doi.org/10.47836/ijeam.18.2.07

INTRODUCTION

Cities are intricate systems influenced by demographic, ecological, and economic changes (Dembski et al., 2020). Smart cities specifically integrate and monitor the state of all critical infrastructure, better use resources, schedule preventive maintenance, monitor security issues, and optimize services for residents. Moreover, systems and structures can actively evaluate the conditions of smart cities and execute repairs (Camero and Alba, 2019). An ambitious idea that has gained traction globally is "smart cities," aiming to improve residents' quality of life and inclusivity (Ahad et al., 2020). Smart cities are places where information, digital technology, and telecommunications are used to improve cities operations for the benefit of residents. This often leads to more adaptable, efficient, and sustainable networks and services (Guo et al., 2019). In this context, smart cities offer a workable way to combine human capital, social capital, information, and communication technologies that support sustainable development (Guimarães et al., 2020). These cities have various aspects of development, such as governance, economy, living, society, environment, health, industry, human mobility, facilities, and smart communication (Liu et al., 2019). More importantly, smart cities put economic development in digital age as an essential milestone through smart economy, showing the importance of digital economy practices. Smart economy is characterized by implementing digital economy or technology-driven economy (Kumar and Dahiya, 2017; Tyas et al., 2019). This commercial activity is common in urban areas, ranging from supply chains, logistics, and financial centers to tourism (Lau et al., 2019). It corresponds with the principal drivers of economic growth, namely technological advancement, the level of human resources, and the accumulation of knowledge (Su et al., 2021). For digital economy to succeed and remain competitive, it needs to focus on generation, transmission, and preservation of knowledge (Širá et al., 2020). However, there is still a gap in understanding how digital economy can improve economic competitiveness of smart cities.

Considering the rapid growth of globalization, the advancement of information and communication technology (ICT), as well as inventions in economics and technology sectors, digital economy has significantly raised global competitiveness (Androniceanu et al., 2020). Moreover, the growth of digital economy has altered international competitive dynamics and emerged as a driver for economic expansion (Su et al., 2021). Digital economy helps in daily processes, including governance, regulations, services, input, and automation, and is accessible globally through smart device. Automation has effectively helped to reduce environmental threats through economical and ecologically friendly methods (Ahad et al., 2020). The notion of economic competitiveness is rooted in three economic theories, namely microeconomic growth, international commerce, and economic growth. Many scholars believe competitiveness should be considered under different circumstances (Roszko-Wójtowicz and Grzelak, 2020). However, establishing a competitive economy should be implemented at the municipal level rather than solely at the national level (Širá et al., 2020). There is a crucial need to develop a robust digital economy management framework to drive economic competitiveness of smart cities.

Indonesia was selected as study area due to the massive implementation of smart cities initiative. By the end of 2023, more than 250 cities across the nation were proclaimed smart cities, having developed a detailed 10-year master plan supported by the Ministry of Communication and Informatics. Moreover, with a population of 345 million by 2030, the International Monetary Fund (IMF) forecasts that Indonesia will achieve substantial digital economic supremacy in Southeast Asia (Adriansyah, 2022). The Coordinating Minister of Economy stated that digital economy created a value of USD 82 billion in 2023, the highest in Southeast Asia, and will continue to grow significantly by 2030 at USD 330 billion. Digital economic value of Indonesia was also projected to consistently grow up to 9 times from 2021, contributing around 20% or USD 2,030 billion to the national GDP in 2045 (Adriansyah, 2022; Limanseto, 2023; Cuaca, 2024). Furthermore, digital economy has become an essential part of smart cities development in Indonesia. Collaboration among all stakeholders is crucial to achieving the objective of digital economy and creating economic competitiveness in Indonesia. This includes engagement from the public and private sectors, investors, and the community (Niankara, 2023). Digital economy can facilitate the realization of an equitable and socially inclusive digital society, primarily driven by the need to achieve the objectives of economic competitiveness and sustainability of smart cities. Many new and old technologies are combined to establish a networked system of interconnected devices and entities within smart cities (Ahad et al., 2020).

Studies have shown a lack of digital economy management models for smart cities, hindering the rise of economic competitiveness. Therefore, there is a need to identify the strategies required to successfully achieve

milestones in this topic. Ren et al. (2021) and Chen et al. (2022) specifically discussed digital economy in the context of government, while Stavytskyy et al. (2019) examined from a social perspective. Other studies related to digital economy and smart cities discussed the use of sensors & Internet of Things (IoT), green technology, knowledge transformation, and digital healthcare (Hasmawaty et al., 2022; Kindhi et al., 2023; Panjaitan et al., 2023; Rohmah et al., 2023). Ding et al. (2022) identified different facets of digital economy pertaining to technology advancement, incorporation of industries, expansion of markets, and enhancement of promotional standards in economic progress. However, there is a dearth of study on a robust digital economy framework influencing economic competitiveness of smart cities.

Digital economy is a crucial component of smart cities, specifically in Indonesia, but a specific framework and guidelines have not been established. This includes identifying the critical elements necessary for developing digital economy, providing a framework, and offering competitiveness guidance as essential factors for developing smart cities in Indonesia. A bibliometric literature conducted by Uula and Surbakti (2024) only identified digital economy thematic aspects such as technology, industry, economy, government, policies, country, community, system, innovation, COVID-19, and service, with the exemption of framework development. Furthermore, a qualitative and secondary study on the development of digital economy by Tayibnapis et al. (2018) only addressed a micro-analysis of technology role in economic activities within the banking and non-banking sectors to provide services to the public, particularly micro, small, and medium enterprises (MSMEs). Several studies link digital economy with digitalization of economy in the tourism sector, halal industry, MSMEs' financial statements, and the use of ICT in home-based businesses (Tyas et al., 2019; Sari et al., 2021; Hasan and Pasyah, 2022; Imansyah et al., 2023; Komala and Firdaus, 2023). Even though experts show the importance of digital economy in Indonesia, a comprehensive developmental strategy, primarily covering infrastructure and government policy, has not been formulated. Utami et al. (2022) specifically decribed government policy in e-commerce sector. Indonesia's digital economy development roadmap did not adequately state the importance of achieving economic competitiveness as the primary objective of digital economy development. A comprehensive study using secondary data analytics and primary data interviews by Xuyao et al. (2023) identified the parameters for developing competitiveness regarding macroeconomic stability, government and institutional settings, financial resources, business, human resources, and the quality of life and infrastructure. Moreover, Indonesia's 2030 digital economy policy roadmap concerning competitiveness highlights a few aspects, such as people, innovation, capital, and ease of business.

The absence of a clear framework related to digital economy and economic competitiveness of smart cities encourages addressing this challenge. The current study provided valuable insights on digital economy and smart cities' stakeholders, mainly local government, digital economy players, and the society at large, in the form of digital economy development framework that helps cities become more economically competitive. The framework was developed using soft system-based action study involving highly qualified and credible experts in the field of smart cities and digital economy in Indonesia. Therefore, this study aimed first to develop a framework for digital economy practice in smart cities. Second, develop digital economy strategy framework for smart cities. Third, develop economic competitiveness framework as an impact of implementing digital economy practice in smart cities. The results could guide smart cities to improve economic competitiveness. Smart cities have more advantages and tend to perform better than others (Knudsen et al., 2021). Smart cities and digital economy can address slow economic growth, which is a primary step toward achieving high-quality, sustainable development and growth (Chen et al., 2022).

LITERATURE REVIEW

Relation of Smart Cities, Digital Economy, and Economic Competitiveness

Smart cities are complex systems connected, among other aspects, to dynamic economy, ecological dynamics, and demography. Applying a variety of more or less novel approaches and technological ideas is becoming the norm for addressing the challenges posed by complex systems (Dembski et al., 2020). In this context, smart cities are a novel approach to delivering first-rate amenities to residents through the dynamic optimization of urban resources. The most excellent services for improving the quality of life for residents in smart cities can be found in education, energy use, transportation, and healthcare. Cities are consistently expanding, and despite the promising future, security concerns are becoming more pressing (Bhushan et al., 2020). Also, the fundamental

components of smart cities are smart infrastructure, governance, policies, transportation, healthcare, agriculture, education, economy, environment, industry, energy, and feedback mechanisms, contributing to the full realization of the ecosystem concept of smart cities (Lau et al., 2019; Ahad et al., 2020). Smart economy is a crucial element in smart cities characterized by digital economy (Galperina et al., 2016; Syalianda and Kusumastuti, 2021; Shan and Pan, 2022). Moreover, financial technology is an essential service in digital economic activity. City with a solid financial capacity is expected to adaptively face various changes in the external environment and contribute to forming a harmonious and prosperous society. With digitalization, companies using platform business models have originated in multiple economic areas (Stallkamp and Schotter, 2021).

Digital economy is defined as the process of economic digitization, which is crucial for national prosperity, and is a prerequisite for achieving technological advancements with significant impact on productivity (Yuan et al., 2021). It can efficiently increase the total factor productivity of cities, and address the challenges of slow economic growth, which is a primary step toward achieving a high-quality, sustainable development, and growth (Chen et al., 2022). The underlying technologies and platforms of digital economy are promising to improve productivity and connect consumers, workers, businesses, as well as sectors serving underrepresented populations globally (Sturgeon, 2021). In this regard, digital economy practice in Jakarta City, Indonesia, has been implemented through the digitizing of micro, small, and medium enterprises (MSMEs), JAKmikro for MSMEs, and MikroPay for financial management of MSMEs (Syalianda and Kusumastuti, 2021). Therefore, increasing the scale of digital payment implementation for MSMEs in Indonesia is essential due to the lack of knowledge regarding perceived ease of usage, usefulness, attitudes, and trust (Najib and Fahma, 2020). Despite the numerous benefits of digital economy, several challenges are still faced. This includes balancing technological developments with the quality of human resources capable of developing digital economy (Litvinenko, 2020; Upadhyay, 2020). Investigations on digital economy model in Indonesia was conducted by Sari et al. (2021) through a literature review and focus group discussion focused on tourism industry by incorporating the factors of people, processes, and technology. The "people" factor refers to the community actors involved, "process" includes services, access, and collaboration, and "technology" consists of the use of platforms or data. These aspects are insufficient to represent digital economy framework within smart cities fully. Conversely, a qualitative study by Tayibnapis et al. (2018) showed the role of digital banking and non-banking services in economic activities of both individuals and businesses, particularly micro, small, and medium enterprises (MSMEs). Utami et al. (2022) also conducted an investigation on digital economy, showing the role of technology in online trade services or e-commerce.

Studies on digital economy strategy in Indonesia have not been able to address the needs and challenges of digital economy in developing smart cities. A normative legal study by Hasan and Pasyah (2022) stated the importance of government involvement in halal certification program for food and beverage industry within digital economy ecosystem in Indonesia. A secondary study by Komala and Firdaus (2023) showed the need to improve the quality of financial statements for MSMEs by using data and traceable transaction processes within digital economy mechanism in Indonesia and Malaysia. According to secondary data from the Indonesia National Statistic Bureau (BPS), Imansyah et al. (2023) showed that the development of ICT in digital economy in Indonesia contributed to the reduction of CO2 emissions, particularly in e-commerce. In the National Digital Economy Strategy 2030, the Indonesian government focuses on building digital economy around infrastructure and policy aspects.

Globally, smart cities initiatives are expanding at a rapid rate, with an audacious objective of making local communities more competitive while giving community members a better quality of life (Appio et al., 2019). Moreover, sustaining a suitable pace of economic growth is crucial for both competitive economy and social advancement (Jiao and Sun, 2021). The objective includes a massive investment plan supporting the initiatives and reducing the gap to transform cities into modern, resource-efficient, and competitive economies (Włodarczyk et al., 2021). The term "competitiveness" describes a country's standing in the global economy concerning commerce in goods and services, as well as the financial and technology markets that impact the welfare of the populace (Roszko-Wójtowicz and Grzelak, 2020). Understanding the influence of digital economy on the value of current resources and capabilities as well as the effect on the development of new, potentially valuable resources and capabilities, is essential to comprehend the impact on competitive outcomes (Knudsen et al., 2021). Therefore, economic stability is key to growing competitiveness and, consequently, economic development of cities (Roszko-Wójtowicz and Grzelak, 2020). When examined at the national level,

competitiveness refers to economy's capacity to offer citizens a high standard of life sustainably and some level of employment (Androniceanu et al., 2020). Fernando (2020) claimed productivity as a good indicator of economic competitiveness. Moreover, study and development (R&D) and innovation significantly raised productivity to measure competitiveness (Fernando, 2020; Simionescu et al., 2021). Širá et al. (2020) affirmed that developing the knowledge economy and sustained competitiveness was essential. This provides businesses of all sizes a competitive edge and enables the creation of scale, as well as beneficial spillover effects, which lowers costs (Stavytskyy et al., 2019). Implementing digital economy in Indonesia under smart cities concept has driven cities toward a competitive, superior, and adaptive economic ecosystem (Bahari et al., 2021).

A comprehensive study by The Asia Competitiveness Institute (ACI) in 2023 examined competitiveness of Indonesian digital economy. Xuyao et al. (2023) conducted an extensive assessment, evaluating Indonesian digital economy's competitiveness based on four factors, namely macroeconomic stability, financial-business-human resources, government and institutional quality, as well as quality of life and infrastructure development. The study showed that human capital and infrastructure in Indonesia played a crucial role in creating a competitive economy, with Jakarta being the most competitive city in the country. The observation and interview conducted by Tyas et al. (2019) showed the importance of using digital technology to improve competitiveness of digital economic transactions within home-based enterprises (HBEs) in Indonesia. This enhancement aims to increase sales transactions, expand transaction channels, boost short-term and long-term income, and improve business brand value. In the 2030 digital economy development strategy, the Indonesian government states the need for improvements in human resources, study and innovation, ease of doing business, and access to capital.

Studies have shown a lack of digital economy models and frameworks for smart cities, particularly regarding the impact on economic competitiveness. Therefore, there is a need to identify the strategies required to successfully achieve milestones in this topic. Ren et al. (2021) and Chen et al. (2022) explained the significance of government in digital economy. Stavytskyy et al. (2019) descibed the critical role of digital society in realizing digital economy. Moreover, Hasmawaty et al. (2022) stated that smart cities development model empowered by technology was also suitable for a green economy program. Panjaitan et al. (2023) investigated the knowledge transformation process of smart cities implementation by the regional and municipal governments. Kindhi et al. (2023) showed sensors and IoT could be used for inundation mitigation, while Rohmah et al. (2023) described that smart cities implementation could facilitate digital transformation for health services of the citizens. Recent investigations on digital economy described the impact of industrial green transformation, provision efficiency of health services, environmental quality, as well as social and economic processes (Afonasova et al., 2019; Li et al., 2021; Lyu et al., 2022; Du and Ren, 2023). Regarding digital economy strategy, Sturgeon (2021) identified three key essential strategies for commercial organization, namely interchangeability of modularity, open innovation practice, and digital platforms. Therefore, digital economic development strategies should be reinforced in digital society (Borowiecki et al., 2021).

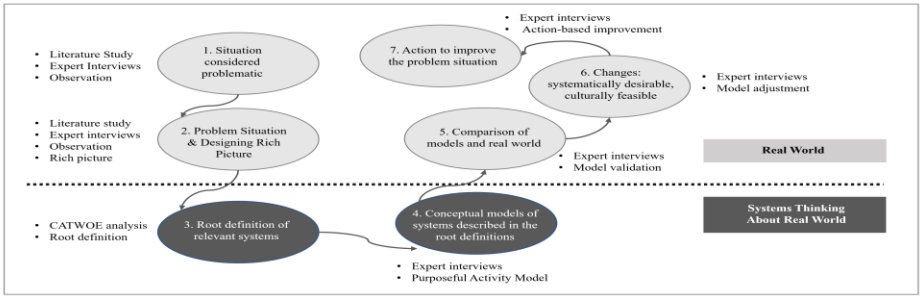
STUDY METHODOLOGY

Soft System Methodology (SSM)-Based Action Approach

Previous studies on digital economy in Indonesia used diverse approaches such as literature review, secondary data analysis, quantitative interviews, qualitative in-depth interviews, observation, and focus group discussions (Tayibnapis et al., 2018; Tyas et al., 2018; Sari et al., 2021; Hasan and Pasyah, 2022; Hasmawaty et al., 2022; Imansyah et al., 2023; Komala and Firdaus, 2023; Xuyao et al., 2023). These approaches were unable to provide in-depth analysis, despite involving experts in the field of digital economy and smart cities and did not allow for counter ideas and results re-evaluation through literature review, experts' thoughts or opinions. Moreover, the results were not compared with real-world conditions or re-evaluated at different times. The current study used SSM-based action approach to address the study objectives and draw a more comprehensive and realistic model of digital economy in Indonesia. SSM also helped in conducting in-depth interviews and discussions with more flexible times for experts.

This study was conducted from an insider perspective, thoroughly examining human perspectives. Furthermore, it culminates in the comprehensive classification of all systems, covering all human activities (Checkland, 2000). To effectively acquire knowledge from this experience, conceptual and theoretical

framework were prioritized, serving as foundational standpoint before commencing the study. Also, a structured process was used to comprehend and address issues, construct a conceptual model, assess the feasibility and desired modifications (Davies and Ledington, 1991). As a soft approach, SSM used the system notion to assess and discover processes from various perspectives (Moumivand et al., 2022). The method is based on explicit forms of knowledge, with the aim of observing whether a notion is true or false. To produce results that better reflect real-world situations based on field practices, the study combined SSM with action study approach. This was conducted to confirm and criticize expert interviews with practices and evaluations by smart city actors from cities or district level. Action study can address study problems using practical action and continual evaluation (Li et al., 2022). Experts often identify action based on epistemic learning originating from interaction and experience realized at that level with SSM-based action reality. SSM-based action has an accommodation mechanism that allows users to consider comments and adjust to varying viewpoints, backgrounds, and genetic predispositions (Suryaatmaja et al., 2020).



Source: Checkland & Poulter (Checkland and Poulter, 2010) and analysis (2024)

Figure 1 SSM-Based Action Stages

SSM-based action can be used to structure study problems, define boundaries and activities of a system, create an activity-based model, and consider consensus rather than imposition. Conversely, simulation generates dynamic models to investigate interaction. These combinations increase the tendency of implementation (Moumivand et al., 2022). SSM-based action aims to create a systemic learning process whereby participants, in problem scenarios, learn to respect other perspectives and are enabled to compromise (Suryaatmaja et al., 2020). Based on Figure 1, data were collected through expert interviews and observation as an enrichment of the literature review. The interviews were conducted with 25 expert participants from 5 (five) major smart cities in Indonesia that had been implementing digital economy initiatives. Cities included Jakarta, Bandung, Semarang, Banyuwangi, and Makassar. The inclusion criteria were those who had worked as study experts, digital economy, or smart cities actors within the last five years. Expert participants were chosen to represent the central government, financial authorities, local government leaders, digital economy actors, academia, associations, and media.

Data collection and analysis were conducted using SSM-Based Action approach, through the following steps:

Step 1 determine the phenomenon that occurred in relation to the study topic. This was conducted by searching literature studies, interviewing related parties, and observation.

Step 2 determine the phenomenon being studied and provided valuable insights, ensuring the direction of future studies.

Step 3 determine the root definition of the relevant system using CATWOE analysis.

Step 4 conduct expert interview with 25 participants relevant to Indonesia's digital economy and smart cities.

Step 5 compare the model created based on interviews with existing real conditions while validating the model. Expert interviews with local government leaders were conducted in 5 smart cities, namely Jakarta, Bandung, Semarang, Banyuwangi, and Makassar.

Step 6 ensure the model is systematically desirable and culturally feasible, while conducting interview with local government smart cities leaders.

Step 7 evaluate the model for further improvement, formulating actions in real terms based on the real situation faced by digital economy and smart cities leaders. The final stage found the right model for digital economy to drive economic competitiveness in smart cities.

Expert Participant Profile

A total of 25 participants relevant to digital economy and smart cities in Indonesia was interviewed. A detailed profile of participants is presented in Table 1.

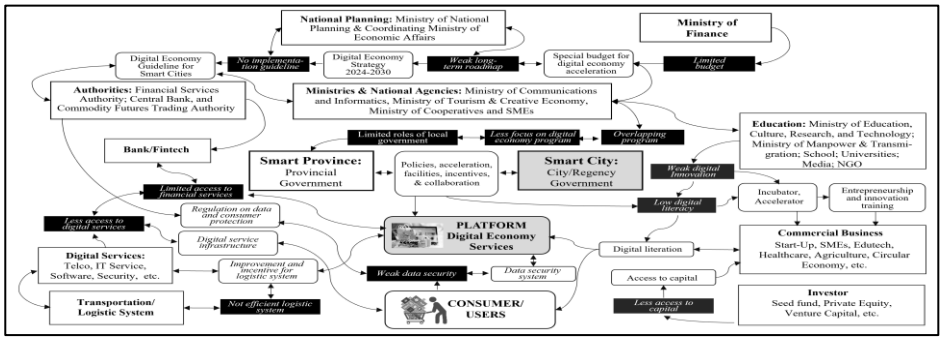
Table 1 Respondent Profile

No	Position	Education Level			Years of Experience			Total
		Bachelor	Master	PhD	11-20	21-30	31-40	
1	National Government Leader		2	3		4	1	5
2	Financial Authority Leader		2	1	1	2		3
3	Local Government Leader		3	2		4	1	5
4	Digital Economy Players		3	1		3	1	4
5	University Professor			4		2	2	4
6	Association	1	1		1	1		2
7	Media		2			2		2
	Total	1	13	11	2	18	5	25

RESULTS AND DISCUSSION

Rich Picture

Based on Figure 2, stages 1 and 2 provided valuable insights for this study. The results showed national government should provide enough support to guarantee the successful implementation of digital economy in smart cities. This is because national government currently has several challenges, such as limited financial resources, a weak strategic plan, and no specific guidelines. At the national level, there remains a deficiency in the coordination of intervention programs across various ministries, inadequate focus and initiative, and low participation from local government. Meanwhile, the implementation of smart cities in Indonesia, embraced by over 250 cities and regencies, has not deeply considered the aspects of digital economy. The country places more emphasis on bureaucratic governance and administrative services for citizens. Figure 2 shows various digital economy issues raised in society, namely low digital economy innovation, low digital literacy, limited access to capital for economic players such as start-ups and small and medium enterprises (SMEs), as well as limited access to fintech services. This impedes the growth of the local economy through digitization. In order to address these issues, local governments should play a more significant role in establishing digital economy economic competitiveness of smart cities. Moreover, it is crucial to actively develop local regulations as a translation of national policies, accelerate the implementation of policies, provide incentives and resources for local economy, and foster collaboration among different digital economy stakeholders. Smart cities' digital economy also needs strong support from all industry stakeholders, namely banking and fintech services, digital service providers, transportation and logistics firms, commercial organizations, as well as investors. Digital economy platforms connect digital economy suppliers and consumers, functioning as a conduit for economic collaboration and sharing. This includes assistance in developing digital literacy skills from educational institution, fostering entrepreneurship and innovation, as well as financial support from investors and financial institutions. The issue of data security and consumers protection continues to pose a critical challenge. Therefore, the governments need to guarantee consumers secure and convenient access to digital economy platforms.



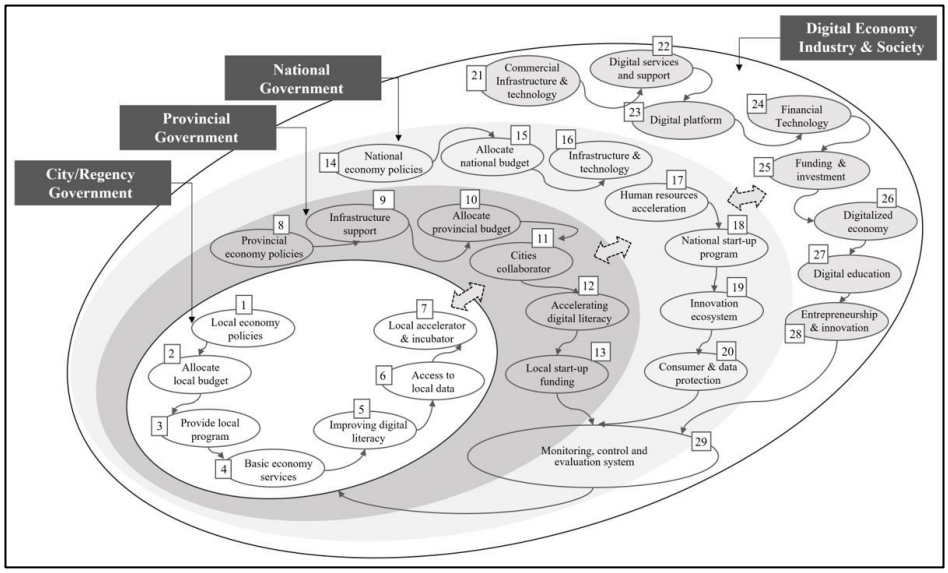
Source: Literature study, expert interviews, and observation (2024)

Figure 2 Rich Picture Analysis

Root Definition (CATWOE)

Root definition means human activity system's goal based on CATWOE framework (Suryaatmaja et al., 2020). CATWOE provides useful think-ahead to anticipate and inquire study experts about the performance metrics used to evaluate the functioning of notional system (Checkland and Poulter, 2010). Finally, in stage three of this study, CATWOE-root definition was designed as follows:

Customers: users of digital economy products and services in smart cities, both personal and organizational.
Actors: City/Regency Government, Provincial Government, Ministries/National Agencies, Financial Service Providers, Companies & Start-Up, and Community.
Transformation: digital economy governance that contributes to economic competitiveness of smart cities.
World view: synergy and collaboration between stakeholders.
Owner: smart cities – municipal and regency government in Indonesia.
Environment: Digital technology, digital services, sharing economy and digital platforms, digital economy activities, digital financial services, and comparative advantage.



Source: expert interviews, observation, and analysis (2024)

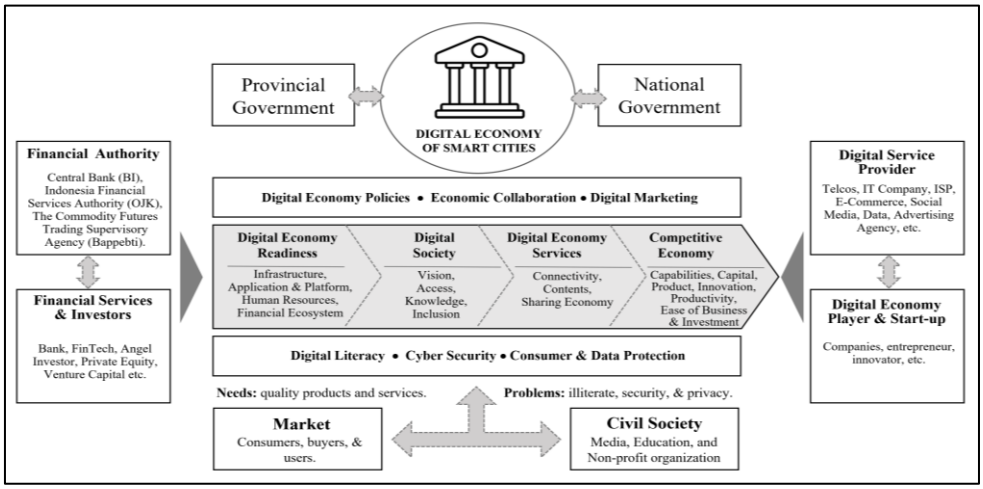
Figure 3 Conceptual Model of Digital Economy for Smart Cities

Conceptual Model of Digital Economy for Smart City

In the fourth stage, presented in Figure 3, a conceptual model of a system was developed based on the preceding root definition. There were four distinct groups of actors in digital economy responsible for economic

competitiveness of smart cities. The groups included city governments, provincial governments, the national government, and digital economy industry and society. Other actors were financial service providers, commercial businesses, start-ups, customers, and the community. Each actor had a unique role that complements the others, such as strategic planning, policy formulation, providing infrastructure and technology, financial assistance, promoting digital literacy, program implementation, provision of data services, services delivery, providing digital platforms, digitalized economy, entrepreneurship and innovation, and monitoring systems.

In the fifth stage, presented in Figure 4, a conceptual model comparison was constructed by using real-world occurrences. This model is based on individual and collective learning, tacit knowledge, discussions with experts, and exploring divergent opinions (Suryaatmaja et al., 2020). According to analysis, the duties of smart cities governments included developing digital economy policies, promoting economic cooperation, and executing digital marketing campaigns. In this context, the critical steps in developing digital economy include establishing digital economy readiness, creating digital society, and providing digital economy services. Incorporating this process can bolster economic competitiveness of cities. Economic competitiveness is determined using six main criteria, namely human resource capabilities, financial capital, product offerings, innovation, productivity, as well as ease of business and investment. In addition, uninterrupted efforts to improve digital literacy, cyber security, as well as consumer and data protection guarantees are crucial for facilitating digital economic services for individuals and society.



Source: expert interviews, observation, and analysis (2024)

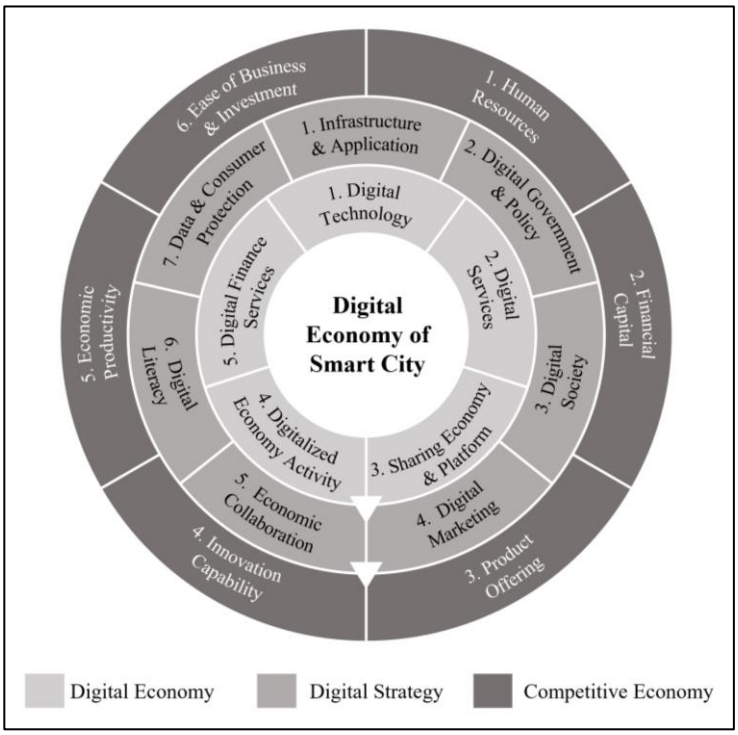
Figure 4 Model Comparison of digital Economy for Smart Cities

SSM – Based Action for Digital Economy

In the sixth and seventh steps, SSM was used to modify and improve digital economy model by incorporating practical measures required by municipal and regency governments when executing smart cities initiatives. In addition to the perspectives of 25 expert panels specializing in digital economy and smart cities, SSM-based action study conducted clarification and interviews with prominent digital economy and smart cities leaders in Jakarta, Bandung, Semarang, Makassar, and Banyuwangi. The objective was to finalize a robust model for digital economy in smart cities, devise effective strategies for fostering digital practice, and establish a competitive economy.

Based on Figure 5, digital economy was defined as economic services enabled by information technology. Its efficacy in improving economic competitiveness of smart cities depends on the enforcement of strategies to synchronize and maximize the resources and capabilities of cities or regencies. Digital economy has five essential elements, namely digital technology, digital services, sharing economy and platform, digitalized economy, and digital financial services. Each element is interdependent and has a crucial impact on one another. The desire for a higher quality of life, constantly shifting conditions that give rise to new demands, and the increasingly competitive nature of cities over human resources, financial capital, product offerings, innovation capability productivity, and ease of doing business and investment show the need for robustness against economic shocks (Bruneckiene et al., 2018). Moreover, digital economy facilitates business interactions,

breaks up long chains of intermediaries, speeds up various transactions, removes challenges to market access, eliminates geographical restrictions, and builds alternative commercial platforms (Yau and Tan, 2022).

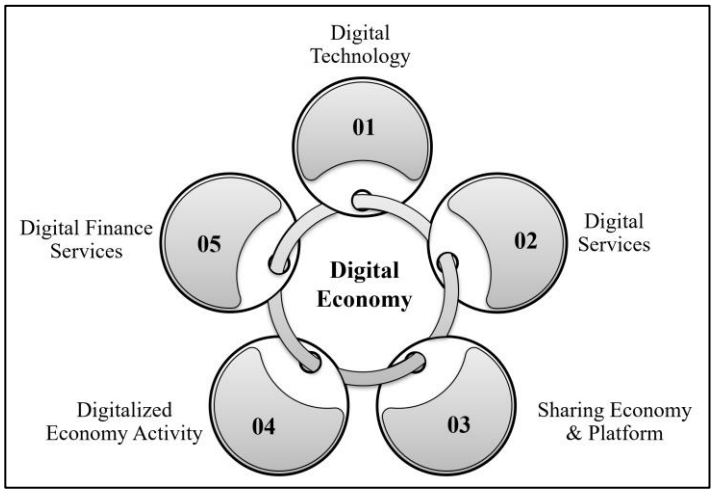


Source: expert interviews and analysis (2024)

Figure 5 Digital Economy Scopes, Strategies, and Competitiveness Impact

Digital Economy Scopes

Digital economy is not necessarily assessed based on the achievement of national economic growth but has a broader perspective (Goh et al., 2018; Soebagyo et al., 2019). It is a rapidly growing global economic phenomenon, becoming more prevalent in the market economy. Digitalization is wide-ranging, impacting all aspects of human lives and micro-business operations to major corporations and state laws (Tiutiunyk et al., 2021).



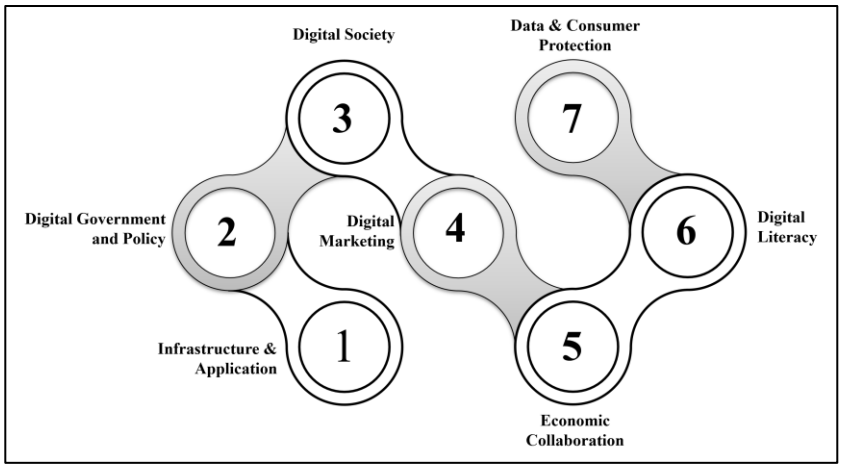
Source: expert interviews, observation, and analysis (2024)

Figure 6 Digital Economy Framework

Based on Figure 6, digital technology is a critical component of digital economy. To advance digital economy practice, smart cities need to invest in technology. Without solid technology support, digital economy does not exist (Allam and Dhunny, 2019). Technology support is foundation of digital economy services that help industry, consumers, and society collaborate and encourage local economic growth. Digital services are offered in an intelligent, well-structured manner that may be controlled and coordinated for numerous concurrent applications (Vasauskaite et al., 2017). However, the challenge is to provide a platform to facilitate the practice of a shared economy digitally. Economic sharing refers to ongoing joint activities such as economic exchange between organizations (Xue et al., 2021). A collaboration between app developers, government, and other economic actors is crucial to the success of this activity. Furthermore, digital economy encourages economic actors' participation in digital-based business process, such as healthcare, education, small and medium enterprises (SMEs), agriculture, circular economy, etc. Digitalization increases the value of innovation and the needs of people accessing and reducing costs (Chen, 2020). The functioning of digital economy is contingent upon the assistance of digital financial services or fintech. Business activities need financing from officially licensed financial institutions (Niankara, 2023). In line with this, most cities in Indonesia currently promote using Quick Response Code Indonesian Standard (QRIS) as digital payment method for e-commerce and conventional trades.

Digital Economy Strategies

Effective strategies are crucial to developing digital economic competitiveness in smart cities. Experts in smart cities and digital economies showed the importance of seven strategies for digital economy of smart cities. Based on Figure 7, these strategies included infrastructure and application, digital government and policy, digital society, digital marketing, economic collaboration, digital literacy, as well as data and consumers protection.



Source: expert interviews, observation, and analysis (2024)

Figure 7 Digital Economy Framework

Infrastructure and application serves as a foundation for digital economy strategy. For instance, it guarantees whether price information or distribution of goods can be smoother and more effective or facilitate supply chain circulation with infrastructure, ships, and land transportation. Infrastructure is the backbone of smart cities networks (Ahad et al., 2020). The foremost tool for digital technology operation is digital connectivity infrastructure (Chong et al., 2023). Software development is a form of creative business usually run by a few individuals who share the same interest in information technology, specifically in application creation (Anggadwita et al., 2016). Therefore, digital government and policies are critical in hastening society's adoption of digital economy. Digital government practice is showed by the percentage of public service delivered online. Digital economy policies are needed to encourage and accelerate the practice of digital economy by all local and national stakeholders. Furthermore, it is an instrument of authority used by the government to produce supporting policies (Widyaningrum et al., 2019).

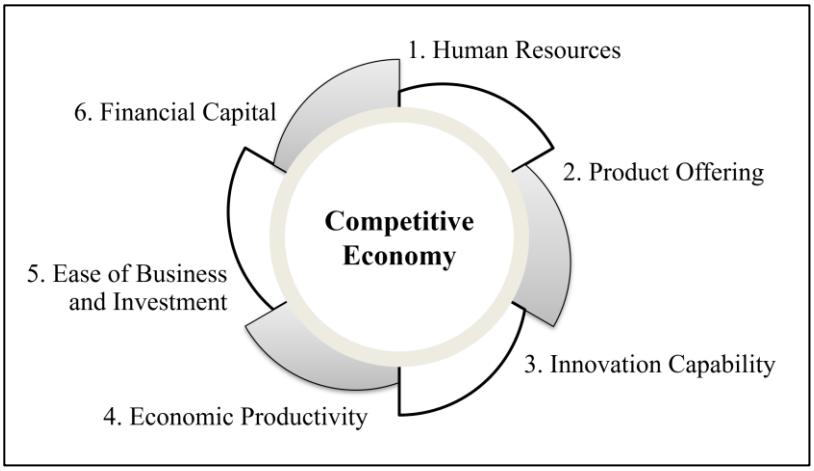
Based on Society 5.0, digital access is critical, with digital society being a foundational strategy. Digital society is characterized by digital inclusion, knowledge, behavior, attitude, ethics, and responsibility. This situation contributes to achieving full employment and competitiveness in a sustainable economy while

upholding equality principles and opportunities for intergenerational growth (Borowiecki et al., 2021). Another important strategy in digital economy is practicing effective digital marketing, namely social media marketing, search engine optimization (SEO), search engine marketing (SEM), online advertising, and mobile marketing. This includes maximizing the use of social media, such as Instagram, Facebook, TikTok, YouTube, and Twitter (X) platforms, for marketing purposes. According to Li et al. (2023), consumers interaction evolves as digital economy era dawns, necessitating digital marketing to adapt to changing circumstances.

Another significant strategy is economic collaboration, which plays a crucial role as a catalyst of digital economy. Local governments of smart cities are expected to orchestrate the collaboration of digital economy among different stakeholders. For instance, it is important to understand how digital platform connect micro, small, and medium enterprise (MSME) craft producers in Banyuwangi with buyers in Jakarta. While digital economy adds value to national economy (Appio et al., 2019), its growth is contingent on human capital's capabilities. Improving digital literacy is essential for raising awareness and increasing human capital capability in digital economy. This was supported by severals studies, showing that a knowledge-based economy greatly influenced a nation's performance and living standards (Sabri et al., 2021). Digital education is also critically needed to support the massive development of applications, technology, and digital economy. A collaboration between higher education, vocational education, content providers, and edutech platforms is crucial to improving digital literacy across digital economic stakeholders. Lastly, consumers protection and data need to be treated securely. Ensuring robust system and data security is also important for digital economy actors and governments. Therefore, each digital economy actor should focus on security improvements due to the rapid change of technology (Lau et al., 2019). Prioritizing data security and consumers data protection within digital economy ecosystem of smart cities is also crucial. This is essential to ensure dependable and convenient services to society.

Competitive Economy

The application of effective digital economy strategies is expected to improve economic competitiveness of smart cities. Competitiveness refers to cities' ability to outperform domestic and international cities economically. Digital economy competitiveness comprises six elements, namely human resources, product offerings, innovation capability, economic productivity, ease of business and investment, as well as financial capital.



Source: expert interviews, observation, and analysis (2024)

Figure 8 Competitive Economy Framework

Human resources, as a critical component of cities competitive economy, quantifies the abilities required to capitalize on digital opportunities (Laitsou et al., 2020). Human resources integrate cross-function technology with the need to maximize economic productivity. Competitive product offerings produced in cities are crucial to drive local economic growth. Therefore, product quality, price, and value should be well-curated and managed to meet market demand. Product development should be based on comparative advantages and potentialities owned by particular cities, namely agriculture, micro, small, and medium enterprises (MSME), crafts, and

fisheries. Previous studies have investigated elements contributing to the qualities of a creative idea and influencing product innovation (del-Corte-Lora et al., 2023). The ability to create competitive products is directly linked to innovation capability of cities. Smart cities are expected to have a solid capability to innovate, maximize, and localize market potential. Digital economy helps products to reach a larger audience and find greater demand through cross-border transactions. This could raise innovation's value and explain the rapid development of global innovation (Chen, 2020). The interaction of high-quality human resources, product offerings, and innovation capability increases economic productivity of cities. The ability to achieve increasing levels of productivity over time also has an impact on better wages for human resources and a more profitable return on capital for physical and financial assets, becoming a fundamental long-run determinant of a nation's standard of living (Reyes and Useche, 2019). Local governments are expected to strongly commit to building solid human resources supplies as a fundamental factor of digital economic competitiveness. Moreover, productivity has long-term effects from the initial adoption of internet-related technologies and digitalization practices (Tranos et al., 2021)

Another competitive factor of digital economy is 'ease of doing business and investment.' This includes the presence of a robust startup ecosystem as a critical indicator of how conveniently the younger generation and entrepreneurs can grow businesses in cities. Ease of doing business can streamline or disrupt existing business processes to support the effectiveness of a consumption-based economy through digital services. Digital economy contributes to high-quality economic development and a rise in entrepreneurial activity, leading to economic sustainability (Su et al., 2021; Zhao et al., 2023). Competitive cities should be open for new investment to support digital economy ecosystem. As a result, financial capital has become a vital factor for each digital economy actor to contribute significantly to the growth of local economy. This includes the governments, commercial businesses, start-ups, and SMEs actors in digital economy in smart cities. Digitalization significantly contributes to financial development (Pei, 2022). Several studies have claimed financial capital as a vital part of competitive advantage of local economy, though it is not a primary factor of success in digital economy.

CONCLUSION

In conclusion, this study obtained valuable insights from interviews and discussions with digital economy and smart city experts using SSM-based action approach. SSM incorporated an accommodation system that enabled users to carefully analyze comments and adapt to different perspectives, backgrounds, and cultural predispositions. Based on analysis, digital economy originated as a consequence of advancements in technology that had disrupted economic governance of smart cities. This study successfully reformulated digital economy framework, with the aim of empowering stakeholders in smart cities to improve economic competitiveness. It also showed the success of adopting digital economy depended on various aspects. Digital economy comprised five fundamental components, namely digital technology, digital services, sharing economy and platform, digitalized economy, and financial services. The development of a robust digital economy in smart cities was contingent on implementing seven essential strategies, namely infrastructure and application, digital governance and digital policy, digital society, digital marketing, economic collaboration, digital literacy, as well as data and consumers protection.

This study provided valuable insights for digital economy stakeholders of smart cities globally, using Indonesia as a case study. The critical digital economy actors in smart cities, mainly cities or regency governments, were supported by provincial and national governments. On the financial side, financial services, investors, and financial authorities played a significant role in the ecosystem. On the supply side, active participation of digital service providers and digital economy players, including start-ups, was essential to digital economy activities. On the demand side, the power of the market and civil society needed to be developed. Effective digital economy strategies could increase local economy competitiveness, comprising six criteria, namely human resources, product offerings, innovation capability, economic productivity, ease of business and investment, and financial capital. These insights were expected to guide all digital economy stakeholders in optimizing the interactions between the different aspects and strategies of digital economy to improve economic competitiveness of smart cities. Smart cities administrations were recommended to translate national digital economy policies into local regulations to foster local economic competitiveness through digital economy

practices. Moreover, local governments should play a more significant role in accelerating digital economy growth, providing facilities and incentives to digital economy actors like start-ups and SMEs, and driving collaboration across all digital economy stakeholders.

REFERENCES

Adriansyah, R., 2022. *Digital Technology To Grow Business & National Economy*. Jakarta.

Afonasova, M. A. et al., 2019. Digitalization in economy and innovation: The effect on social and economic processes. *Polish Journal of Management Studies*, *19*(2), pp. 22–32. https://doi.org/10.17512/pjms.2019.19.2.02.

Ahad, M. A. et al., 2020. Enabling technologies and sustainable smart cities. *Sustainable Cities and Society*, *61*(May), p. 102301. https://doi.org/10.1016/j.scs.2020.102301.

Allam, Z. and Dhunny, Z. A., 2019. On big data, artificial intelligence and smart cities. *Cities*, *89*(January), pp. 80–91. https://doi.org/10.1016/j.cities.2019.01.032.

Androniceanu, A.M. et al., 2020. A multidimensional approach to competitiveness, innovation and well-being in the eu using canonical correlation analysis. *Journal of Competitiveness*, *12*(4), pp. 5–21. https://doi.org/10.7441/joc.2020.04.01.

Anggadwita, G. et al., 2016. Competitive strategy of creative application content in the ASEAN economic community: Software development using SWOT analysis in Indonesia. *International Journal of Economics and Management*, *10*(SpecialIssue1), pp. 95–107.

Appio, F.P., Lima, M. and Paroutis, S., 2019. Understanding Smart Cities: Innovation ecosystems, technological advancements, and societal challenges. *Technological Forecasting and Social Change*, *142*, pp. 1–14. https://doi.org/10.1016/j.techfore.2018.12.018.

Bahari, B. A., Susanto, T. D. and Gunawan, J., 2021. *Smart City Measurement: Identification of Smart Economy Performance Indicators in Indonesia*. Proceedings of the 2nd International Conference on Business and Management of Technology (ICONBMT 2020), *175*, pp. 294–300. https://doi.org/10.2991/aebmr.k.210510.046.

Bhushan, B. et al., 2020. Blockchain for smart cities: A review of architectures, integration trends and future research directions. *Sustainable Cities and Society*, *61*, p. 102360. https://doi.org/10.1016/j.scs.2020.102360.

Borowiecki, R. et al., 2021. Developing digital economy and society in the light of the issue of digital convergence of the markets in the european union countries. *Energies*, *14*(9). https://doi.org/10.3390/en14092717.

Bruneckiene, J. et al., 2018. Measuring regional resilience to economic shocks by index. *Engineering Economics*, *29*(4), pp. 405–418. https://doi.org/10.5755/j01.ee.29.4.18731.

Camero, A. and Alba, E., 2019. Smart City and information technology: A review. *Cities*, *93*(March), pp. 84–94. https://doi.org/10.1016/j.cities.2019.04.014.

Checkland, P., 2000. Soft Systems Methodology: A Thirty Year Retrospective a. *Systems Research and Behavioral Science Syst. Res*, *17*, pp. 11–58. https://doi.org/10.1002/1099-1743(200011)17:1+<::aid-sres374>3.0.co;2-o.

Checkland, P. and Poulter, J., 2010. Soft systems methodology. in Systems Approaches to Managing Change: A Practical Guide. *Springer London*, pp. 191–242. https://doi.org/10.1007/978-1-84882-809-4_5.

Chen, X., Teng, L. and Chen, W., 2022. How does FinTech affect the development of the digital economy? evidence from China. *North American Journal of Economics and Finance*, *61*(April), p. 101697. https://doi.org/10.1016/j.najef.2022.101697.

Chen, Y., 2020. Improving market performance in the digital economy. *China Economic Review*, *62*(April), p. 101482. https://doi.org/10.1016/j.chieco.2020.101482.

Chong, M. T. et al., 2023. Digital Connectivity Bridging Digital ASEAN. *International Journal of Economics and Management*, *17*(1), pp. 139–149. https://doi.org/10.47836/ijeam.17.1.10.

Cuaca, W., 2024. *Digital Competitiveness Index 2024, Realizing Indonesia's digital sovereignty*. Jakarta. https://east.vc/report/east-ventures-digital-competitiveness-index/.

Davies, L. and Ledington, P., 1991. *Information in Action Soft Systems Methodology*. London: MACMILLAN EDUCATION LTD.

del-Corte-Lora, V. et al., 2023. A configurational approach to innovation performance: The role of creativity. *International Journal of Innovation Studies*, *7*(3), pp. 171–186. https://doi.org/10.1016/j.ijis.2023.03.001.

Dembski, F. et al., 2020. Urban digital twins for smart cities and citizens: The case study of Herrenberg, Germany. *Sustainability*, *12*(6), pp. 1–17. https://doi.org/10.3390/su12062307.

Ding, C. et al., 2022. Digital Economy , Technological Innovation and High-Quality Economic Development : Based on Spatial Effect and Mediation Effect. *Sustainability*, *14*(1). https://doi.org/10.3390/su14010216.

Du, M. and Ren, S., 2023. Does the digital economy promote industrial green transformation? Evidence from spatial Durbin model. *Journal of Information Economics*, *1*(1), pp. 1–17. https://doi.org/10.58567/jie01010001.

Fernando, I. N., 2020. Tourism Competitiveness by Shift-Share Analysis to way-forward Destination Management: A case study for Sri Lanka. *Journal of Tourism and Services*, *11*(21), pp. 88–102. https://doi.org/10.29036/jots.v11i21.139.

Galperina, L. P., Girenko, A. T. and Mazurenko, V. P., 2016. The Concept of Smart Economy as the Basis for Sustainable Development of Ukraine. *International Journal of Economics and Financial Issues*, *6*(Special Issue), pp. 307–314. https://econjournals.com/index.php/ijefi/article/view/3757.

Goh, L. T., Kaliappan, S. R. and Ishak, S., 2018. Income inequality and crime: Evidence from a dynamic panel data approach. *International Journal of Economics and Management*, *12*(Special Issue 2), pp. 479–490. http://www.ijem.upm.edu.my/vol12_noS2/14) Income Inequality and Crime.pdf.

Guimarães, J. C. F. De et al., 2020. Governance and quality of life in smart cities: Towards sustainable development goals. *Journal of Cleaner Production*, *253*. https://doi.org/10.1016/j.jclepro.2019.119926.

Guo, Y. M. et al., 2019. Bibliometric analysis on smart cities research. *Sustainability*, *11*(13). https://doi.org/10.3390/su11133606.

Hasan, K. N. S. and Pasyah, T., 2022. Challenges of Indonesian Halal Industry in the Digital Economic Era. *Sriwijaya Law Review*, *6*(2), pp. 319–335. https://doi.org/10.28946/slrev.Vol6.Iss2.869.pp319-335.

Hasmawaty, Utami, Y. T. and Antoni, D., 2022. Building Green Smart City Capabilities in South Sumatra, Indonesia. *Sustainability*, *14*(13), pp. 1–16. https://doi.org/10.3390/su14137695.

Imansyah, M. H. et al., 2023. The Impacts of Digital Economy on Green Economy: The Indonesian Miyazawa Model. *Polish Journal of Environmental Studies*, *32*(2), pp. 1609–1619. https://doi.org/10.15244/pjoes/159123.

Jiao, S. and Sun, Q., 2021. Digital Economic Development and Its Impact on Economic Growth in China : Research Based on the Prespective of Sustainability. *Sustainability*, *13*(18), p. 10245. https://doi.org/10.3390/su131810245.

Kindhi, B. Al et al., 2023. Sensor and internet of things based integrated inundation mitigation for smart city. *International Journal of Electrical and Computer Engineering*, *13*(3), pp. 2695–2703. https://doi.org/10.11591/ijece.v13i3.pp2695-2703.

Knudsen, E. S. et al., 2021. Stability in turbulent times? The effect of digitalization on the sustainability of competitive advantage. *Journal of Business Research*, *128*(February), pp. 360–369. https://doi.org/10.1016/j.jbusres.2021.02.008.

Komala, A.R. and Firdaus, D. W., 2023. Improving the Quality of Financial Statements and the Survival of MSMEs Through Digital Economy: the Case of Indonesia and Malaysia. *Journal of Eastern European and Central Asian Research*, *10*(5), pp. 752–763. https://doi.org/10.15549/jeecar.v10i5.1435.

Kumar, T. M. V. and Dahiya, B., 2017. *Smart Economy in Smart Cities*. in Advances in 21st Century Human Settlements, pp. 3–76. https://doi.org/10.1007/978-981-10-1610-3_1.

Laitsou, E., Kargas, A. and Varoutas, D., 2020. Digital Competitiveness in the European Union Era: The Greek Case. *Economies*, *8*(4). https://doi.org/10.3390/ECONOMIES8040085.

Lau, B. P .L. et al., 2019. A survey of data fusion in smart city applications. *Information Fusion*, *52*(January), pp. 357–374. https://doi.org/10.1016/j.inffus.2019.05.004.

Li, S. et al., 2023. A Bibliometric Analysis of Brand Orientation Strategy in Digital Marketing: Determinants, Research Perspectives and Evolutions. *Sustainability*, *15*(2). https://doi.org/10.3390/su15021486.

Li, X. et al., 2022. Applying blended synchronous teaching and learning for flexible learning in higher education: an action research study at a university in Hong Kong. *Asia Pacific Journal of Education*, *42*(2), pp. 211–227. https://doi.org/10.1080/02188791.2020.1766417.

Li, Z., Li, N. and Wen, H., 2021. Digital economy and environmental quality: Evidence from 217 cities in china. *Sustainability*, *13*(14), pp. 1–20. https://doi.org/10.3390/su13148058.

Limanseto, H., 2023. *Government Encourages Faster Economic Recovery by Optimizing Digital Economic Potential*. Coordinating Ministry for Economic Affairs, Republic of Indonesia, 28 February.

Litvinenko, V. S., 2020. Digital Economy as a Factor in the Technological Development of the Mineral Sector. *Natural Resources Research*, *29*(3), pp. 1521–1541. https://doi.org/10.1007/s11053-019-09568-4.

Liu, Y. et al., 2019. Intelligent Edge Computing for IoT-Based Energy Management in Smart Cities. *IEEE Network*, *33*(2), pp. 111–117. https://doi.org/10.1109/MNET.2019.1800254.

Lyu, Y. et al., 2022. *Impact of Digital Economy on the Provision Efficiency for Public Health Services : Empirical Study of 31 Provinces in China*.

Moumivand, A., Azar, A. and Toloie Eshlaghy, A., 2022. Combined soft system methodology and agent-based simulation for multi-methodological modelling. *Systems Research and Behavioral Science*, *39*(2), pp. 200–217. https://doi.org/10.1002/sres.2802.

Najib, M. and Fahma, F., 2020. Investigating the adoption of digital payment system through an extended technology acceptance model: An insight from the Indonesian small and medium enterprises. *International Journal on Advanced Science, Engineering and Information Technology*, *10*(4), pp. 1702–1708. https://doi.org/10.18517/ijaseit.10.4.11616.

Niankara, I., 2023. The impact of financial inclusion on digital payment solution uptake within the Gulf Cooperation Council Economies. *International Journal of Innovation Studies*, *7*(1), pp. 1–17. https://doi.org/10.1016/j.ijis.2022.09.004.

Panjaitan, J. M. P. et al., 2023. Diagnosing the voids of knowledge in the transformation process in managing and standardizing smart city development: the case of the government of Indonesia. *Frontiers in Sustainable Cities*, *5*. https://doi.org/10.3389/frsc.2023.1288714.

Pei, J., 2022. Approaches Toward Building the Digital Enterprise and Sustainable Economic Development: The Moderating Role of Sustainability. *Frontiers in Psychology*, *13*(March), pp. 1–11. https://doi.org/10.3389/fpsyg.2022.835602.

Ren, S. et al., 2021. Digitalization and energy: How does internet development affect China's energy consumption?. *Energy Economics*, *98*. https://doi.org/10.1016/j.eneco.2021.105220.

Reyes, G. E. and Useche, A. J., 2019. Competitiveness, economic growth and human development in Latin American and Caribbean countries 2006-2015: A performance and correlation analysis. *Competitiveness Review*, *29*(2), pp. 139–159. https://doi.org/10.1108/CR-11-2017-0085.

Rohmah, A. 'Ainur, Rachmawati, R. and Mei, E.T.W., 2023. Smart City Achievement through Implementation of Digital Health Services in Handling COVID-19 Indonesia. *Smart Cities*, *6*(1), pp. 639–651. https://doi.org/10.3390/smartcities6010030.

Roszko-Wójtowicz, E. and Grzelak, M.M., 2020. Macroeconomic stability and the level of competitiveness in EU member states: A comparative dynamic approach. *Oeconomia Copernicana*, *11*(4), pp. 657–688. https://doi.org/10.24136/OC.2020.027.

Sabri, M. F. et al., 2021. Financial Literacy, Behavior and Vulnerability Among Malaysian Households: Does Gender Matter?. *International Journal of Economics and Management*, *15*(2), pp. 241–256. http://www.ijem.upm.edu.my/vol15no2/6. Financial Literacy, Behavior and Vulnerability Among Malaysian Households.pdf.

Sari, R. et al., 2021. Tourism digital economy model based on digital transformation concept for tourist village in Indonesia. *International Journal of Emerging Technology and Advanced Engineering*, *11*(10), pp. 81–87. https://doi.org/10.46338/IJETAE1021_10.

Shan, S. and Pan, J., 2022. The Effectiveness Evaluation Method of Regional Digital Economy Innovation Model Based on Intelligent Computing. *Mathematical Problems in Engineering*, *2022*. https://doi.org/10.1155/2022/8136437.

Simionescu, M. et al., 2021. The main drivers of competitiveness in the EU-28 countries. *Journal of Competitiveness*, *13*(1), pp. 129–145. https://doi.org/10.7441/joc.2021.01.08.

Širá, E. et al., 2020. Knowledge economy indicators and their impact on the sustainable competitiveness of the EU countries. *Sustainability*, *12*(10). https://doi.org/10.3390/su12104172.

Soebagyo, D. et al., 2019. Income Inequality and Convergence in Central Java under Regional Autonomy. *International Journal of Economics and Management*, *13*(1), pp. 203–215. http://www.ijem.upm.edu.my/vol13no1/15) Income Inequality.pdf.

Stallkamp, M. and Schotter, A.P.J., 2021. Platforms without borders? The international strategies of digital platform firms. *Global Strategy Journal*, *11*(1), pp. 58–80. https://doi.org/10.1002/gsj.1336.

Stavytskyy, A., Kharlamova, G. and Stoica, E.A., 2019. The Analysis of the Digital Economy and Society Index in the EU. *Baltic Journal of European Studies*, *9*(3), pp. 245–261. https://doi.org/10.1515/bjes-2019-0032.

Sturgeon, T. J., 2021. Upgrading strategies for the digital economy. *Global Strategy Journal*, *11*(1), pp. 34–57. https://doi.org/10.1002/gsj.1364.

Su, J., Su, K. and Wang, S., 2021. Does the Digital Economy Promote Industrial Structural Upgrading? - A Test of Mediating Effects Based on Heterogeneous Technological Innovation. *Sustainability*, *13*(18), p. 10105. https://doi.org/10.3390/su131810105.

Suryaatmaja, K. et al., 2020. Uncovering the failure of Agile framework implementation using SSM-based action research. *Palgrave Communications*, *6*(1), pp. 1–18. https://doi.org/10.1057/s41599-019-0384-9.

Syalianda, S.I. and Kusumastuti, R.D., 2021. Implementation of smart city concept: A case of Jakarta Smart City, Indonesia. *The 1st Journal of Environmental Science and Sustainable Development Symposium*, *716*(1). https://doi.org/10.1088/1755-1315/716/1/012128.

Tayibnapis, A.Z., Wuryaningsih, L.E. and Gora, R., 2018. The Development of Digital Economy in Indonesia. *International Journal of Management and Business Studies*, *8*(3), pp. 14–18. https://www.ijmbs.com/Vol8/issue3/2-ahmad-zafrullah-tayibnapis.pdf.

Tiutiunyk, I. et al., 2021. The impact of digital transformation on macroeconomic stability: Evidence from EU countries. *Journal of International Studies*, *14*(3), pp. 220–234. https://doi.org/10.14254/2071-8330.2021/14-3/14.

Tranos, E., Kitsos, T. and Ortega-Argilés, R., 2021. Digital economy in the UK: regional productivity effects of early adoption. *Regional Studies*, *55*(12), pp. 1924–1938. https://doi.org/10.1080/00343404.2020.1826420.

Tyas, W. et al., 2018. *Applying Smart Economy of Smart Cities in Developing World : Learnt from Indonesia ' s Home Based Enterprises*. in International Conference on SMART CITY Innovation 2018. https://doi.org/10.1088/1755-1315/248/1/012078.

Tyas, W.P. et al., 2019. *Applying Smart Economy of Smart Cities in Developing World: Learnt from Indonesia's Home Based Enterprises*. in IOP Conference Series: Earth and Environmental Science. Institute of Physics Publishing. https://doi.org/10.1088/1755-1315/248/1/012078.

Upadhyay, N., 2020. Demystifying blockchain: A critical analysis of challenges, applications and opportunities. *International Journal of Information Management*, *54*(March 2019), p. 102120. https://doi.org/10.1016/j.ijinfomgt.2020.102120.

Utami, W.F., Saputro, G.E. and Suwarno, P., 2022. Implementation of Digital Economy Policy in Indonesia. *Int. J. Social Science Humanities Research*, *05*(05), pp. 1–09. https://doi.org/10.5281/zenodo.6778542.

Uula, M.M. and Surbakti, H., 2024. Digital Economics in Indonesia: Development and Research Trend. *Digital Economics Review*, *1*(1). https://doi.org/10.58968/der.v1i1.473.

Vasauskaite, J., Teufel, S. and Teufel, B., 2017. Smart framework: Application under the conditions of modern economy. *Engineering Economics*, *28*(2), pp. 180–186. https://doi.org/10.5755/j01.ee.28.2.17631.

Widyaningrum, W., Setiawan, D. and Brahmana, R.K., 2019. Factors Affecting Rebudgeting in Local Government: From Organizational Feature to Political Variables. *International Journal of Economics and Management*, *13*(1), pp. 139–152. http://www.ijem.upm.edu.my/vol13no1/10) Factors Affecting Rebudgeting.pdf.

Włodarczyk, B. et al., 2021. Assessing the sustainable development and renewable energy sources relationship in eu countries. *Energies*, *14*(8). https://doi.org/10.3390/en14082323.

Xue, Y., Fang, C. and Dong, Y., 2021. The impact of new relationship learning on artificial intelligence technology innovation. *International Journal of Innovation Studies*, *5*(1), pp. 2–8. https://doi.org/10.1016/j.ijis.2020.11.001.

Xuyao, Z., Satria, B. and Kurniawati, H., 2023. *Indonesia and Its Digital Economy: A Sub-national Competitiveness Analysis*. Singapore: Asia Competitiveness Institute, Lee Kuan Yew School of Public Policy, National University of Singapore.

Yau, J. J. G. and Tan, S. H., 2022. The Kuznets Curve, Information and Communication Technology, and Income Inequality in Malaysia. *International Journal of Economics and Management*, *16*(2), pp. 163–177. https://doi.org/10.47836/ijeam_16.2.02.

Yuan, S. et al., 2021. Digitalization of economy is the key factor behind fourth industrial revolution: How G7 countries are overcoming with the financing issues?. *Technological Forecasting and Social Change*, *165*(July 2020), p. 120533. https://doi.org/10.1016/j.techfore.2020.120533.

Zhao, T., Jiao, F. and Wang, Z., 2023. Digital economy, entrepreneurial activity, and common prosperity: Evidence from China. *Journal of Information Economics*, *1*(January), pp. 59–71. https://doi.org/10.58567/jie01010005.