IMPLICATION OF SMART ECONOMY GOVERNANCE: A PERSPECTIVE OF SMART CITIES IN AN EMERGING COUNTRY

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Abstract

The smart economy integrates smart technologies across all aspects of life, driving digital economic growth, enhancing security, and fostering competitiveness (Kumar & Dahiya, 2017). In Thailand, the concept of smart cities has been embraced, holding the potential for improved urban living (Thinphanga & Friend, 2023). This research provides a framework to guide Thailand's smart city development, aiming to enhance economic growth and residents' quality of life. Employing qualitative methods, this study engaged eight key informants through purposive sampling to understand the dynamics of Thailand's smart cities and economy. Utilizing content analysis and NVivo software, the research identified essential elements for the success of smart cities in Thailand. Critical is the development of digital infrastructure like high-speed Internet and cloud services for nationwide access. Additionally, adopting technologies such as Big Data Analytics, artificial intelligence (AI), and Internet of Things (IoT) is vital for improving services and enhancing life quality. Effective public-private partnerships (PPPs) and addressing digital gaps, skill shortages, cybersecurity threats, and regulatory challenges are also crucial. The study underscores the importance of digital education and skills for future readiness. Ultimately, Thailand's shift towards smart cities could significantly improve economic and social outcomes, provided these strategic areas are addressed.

Keywords: Smart Economy, Smart Cities, Impact, Thailand

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1. INTRODUCTION

Smart cities are like digital drivers for economic growth (Sancino & Hudson, 2020). The development of smart cities helps develop the economy, as evidenced by the global smart cities industry (Global Industry Analysts, 2024). It is reported that in 2022, the global market value of smart cities was estimated at US$998.7 billion and is expected to grow to US$5.2 trillion by 2030. The concept of developing smart cities emerged in response to deficiencies in urban management systems during

the era of the Fourth Industrial Revolution. This approach addresses issues like population density, construction density, traffic congestion, and environmental pollution. These challenges arise from mismatches in management systems that fail to keep pace with changes in urban communities' activities. Smart cities represent a transformative shift in urban management systems, necessitating the full utilization of technology in urban development and monitoring. This entails harnessing data and integrating comprehensive infrastructure, municipal governments, businesses, communities, and other sectors (Albino et al., 2015; Kumar et al., 2020; Liu & Wu, 2023). Smart cities have become a global model, revolutionizing urban management systems to prioritize efficiency and effectiveness, with a strong focus on information technology (IT) and communications. This modern approach to urban development, grounded in the smart city concept, emphasizes the urgent use of technology and innovative solutions to efficiently manage resources and the urban environment. Its goal is to meet the needs of urban residents and enhance their quality of life. The application of technology and the Internet of Things (IoT) by governments and citizens contribute to improving urban living standards, making life in cities more enjoyable. Moreover, smart cities play a pivotal role in facilitating learning and knowledge enhancement for researchers, students, and business professionals, encouraging experimentation and the development of new innovations across various sectors. They serve as essential tools in creating sustainable cities capable of adapting to technological and societal changes, ultimately making cities more livable and instilling confidence in their future development (Adejuwon, 2018; Tyas et al., 2019; Xia et al., 2023).

The concept of a smart city is evolving in many different dimensions according to the needs of the city. One of these dimensions, as highlighted by the Organisation for Economic Co-operation and Development (OECD, 2019), is the development of smart cities in the dimension of the smart economy. This dimension focuses on the use of technology to create economic opportunities and increase economic competitiveness. The smart economy is considered an important component of the smart city ecosystem because it can provide the necessary resources for implementing smart city solutions. It can create innovations that improve the quality of life in cities, increase economic competitiveness, and have the potential to improve the sustainability and quality of life of citizens in smart cities (Ahvenniemi et al., 2017; Malek et al., 2021). The smart economy encompasses the integration of smart technologies into all aspects of life (Kalenyuk & Uninets, 2020). This integration has the potential to drive economic growth in the digital sphere, including digital technology, finance, and information sectors. It extends to the distribution and processing of goods through economic activities, ensuring market stability. The smart economy also enhances economic security, supports urban growth, and contributes to the well-being of residents in those areas. Furthermore, it fosters an efficient and competitive market environment, promoting the adoption of technologies that transform traditional economic models into modern ones, thereby preparing for higher value-added businesses (Pajilani et al., 2022). However, there remains much to explore regarding the components of the smart economy (Kalenyuk & Uninets, 2020). Hence, the aim of the research is to investigate and understand the factors influencing the success of the smart economy within the context of smart cities in Thailand. The primary objective of this study is to assess the smart economy's impact on smart cities in Thailand. By undertaking this exploration, the research contributes valuable insights into the intricate mechanisms and strategies required to shape a smart economy within the Thai context. Through this holistic exploration of the interplay between a smart economy and smart cities, this research extends our understanding of the broader dynamics driving urban development and technological integration in Thailand, thus providing essential knowledge for policymakers, stakeholders, and researchers alike. The research process used the method of in-depth interviews with key informants related to the development of the smart economy and smart cities in Thailand. The study's results revealed key themes derived from participant feedback, including the development of digital infrastructure, technological advancements, public-private collaboration, strategies for addressing challenges and regulatory issues, and the importance of workforce development and enhancing the quality of life. Interviews were analyzed using content analysis with NVivo software. The expansion of digital infrastructure is crucial for equitable access to digital resources, with investments facilitating efficiency in businesses, accessibility to education and healthcare, and opportunities for rural communities. Embracing technology and innovation, such as Big Data Analytics and artificial intelligence (AI), enhances service delivery and efficiency in smart cities. Public-private collaboration is pivotal, with the private sector leveraging technology and the government providing supportive policies. Addressing challenges like digital infrastructure disparities and cybersecurity concerns requires proactive measures, alongside regulatory adaptability. Lastly, prioritizing workforce development and digital education ensures preparedness for the demands of a smart economy, fostering economic growth and an improved quality of life.

The structure of the paper is as follows: Section 2 provides a literature review, Section 3 outlines the research methodology, Section 4 presents the study's results, Section 5 discusses the study's findings, and Section 6 includes conclusions, limitations, and recommendations.

2. LITERATURE REVIEW

A smart city is developed to provide convenience and a high quality of life for its residents while efficiently utilizing available resources. It aims to create a livable and interconnected urban community through the use of IT systems to optimize city management. Its concept serves as a focal point for decentralizing power and enhancing local governance capabilities. It empowers citizens and communities to participate in decision-making, express their opinions, and access various forms of information for city management. For instance,

an application that allows residents to report infrastructure damage to the city authorities can result in tangible improvements in planning and budget allocation. This approach can revolutionize city budget planning in various sectors and stimulate investment (Gurick & Felger, 2022; Gracias et al., 2023; Phaiporn et al., 2023).

The development of smart cities coincides with the rapid advancement of IoT technology, which forms the basis for connecting devices and objects within our surroundings to an Internet-based communication network. Streetlights, for example, could indicate the city's status, cars could communicate traffic information, and even wearable devices could transmit health data to hospitals for monitoring. IoT is expected to drive mass-market adoption of technology for increased convenience, efficiency, and access to information. Furthermore, smart home technology and wearable devices will most likely lead the way, initially via mobile applications. In the future, system developments within vehicles and a variety of services that improve various aspects of community living can be expected. This will almost certainly lead to significant investments in city infrastructure and local support for smart city management, as well as the expansion of IoT to community-level access (Alahi et al., 2023; Hawkins-Stark et al., 2022; Kim et al., 2017; Rock et al., 2024).

Industries that were previously focused on electronic device manufacturing for mass markets are now transitioning to become service providers for city infrastructure management and overall quality of life, from household to national levels. This change in position may lead to investment partnerships between cities and businesses, following a public private partnership (PPP) model, to manage IT infrastructure and communication systems necessary for smart city services and IoT. In addition to the electronic and telecommunications industries, businesses in other sectors are also attempting to tap into the growth potential of smart cities and IoT, which are considered critical drivers of the new global economic S-Curve. For example, major firms in the automotive industry are partnering with tech firms to offer integrated services (Phaiporn et al., 2023). The sustainability of smart city development is contingent on the interpretations and priorities set by key actors. The prevalent "top-down" implementation of smart city initiatives in various countries poses a risk of disconnecting from local stakeholders, potentially exacerbating social disparities within cities. Sontiwanich et al. (2022) examined the socio-political contexts of a smart city, focusing on citizens' perspectives and awareness in Phuket, Thailand. The findings indicate disparate awareness of Phuket Smart City across demographic groups, with greater familiarity among middle-aged, highly educated, high-income locals in leadership positions residing near the city centre. Residents' perceived lack of knowledge, time, information, and relevance affected their willingness to engage in smart city development. The study emphasizes the need for active communication and grassroots engagement to enhance public awareness and participation in smart city implementation, promoting meaningful and equitable development. Furthermore, Irvine et al. (2022) explored future possibilities for a peri-urban superblock north of Bangkok, Thailand, using a smart city framework based on seven pillars: environment, economy, energy, mobility, people, living, and governance. Community well-being, supported by information and communication technology (ICT), was a central focus. Key findings highlighted the value of connected green spaces in enhancing community well-being and resilience to flooding, the potential for a seamless public transit system for mobility and sustainable development, and the preparation for Thailand 4.0 through improved integration of industry, community, and universities. This including plans for a digital village and co-working space.

Thailand has embraced the concept of smart cities, which holds the potential for improved urban living. The definition of a "smart city" can be vague, but in Thailand, it is built upon seven core pillars: environment, economy, mobility, governance, living, people, and energy. The agenda aims to enhance people's quality of life, reduce inequality, and promote prosperity, security, and sustainability. Of particular significance is the smart governance pillar, which aspires to ensure fairness, transparency, and increased citizen involvement in governance. However, the current planning process for smart cities in Thailand seems to exclude a majority of urban citizens, lacks transparency and accountability, and falls short of facilitating meaningful participation in shaping cities for the benefit of all (Crumpton et al., 2021; Thinphanga & Friend, 2023).

Smart Economy is the integration of digital technology into the urban environment to improve economic growth and development. It can create a more efficient and productive economic system (Apostol et al., 2015; Frank & Fernández-Montesinos, 2020). Take Singapore, for example. The government has implemented policies to promote the development of the smart economy in smart city projects, as evidenced by the Smart Nation Initiative, which aims to transform Singapore into a smart city and smart country through the use of digital technology and a thriving smart economy (Smart Nation and Digital Government Office [SNDGO], 2018; Joo, 2023). This initiative affects overall economic benefits, having a positive impact on the local economy and creating new job opportunities in various sectors (United Nations Conference on Trade and Development [UNCTAD], 2021). There are two scopes of the smart economy: a narrow scope and a broad scope. In the narrow sense, the smart economy is seen as a vital part of creating smart cities and organizing economic relationships and linkages within specific areas. This is achieved through the use of the latest sustainable technology and principles of social responsibility, with the aim of creating comfortable and secure living environments for citizens. In the broader sense, the smart economy represents an economic relationship system reliant on modern smart technologies. It applies sustainability principles and social responsibility to create a welcoming and secure living environment for people. Key processes within the smart economy include intellectualization, digitalization, greening, socialization, institutionalization, and urbanization (Kalenyuk et al., 2021; Kalenyuk & Uninets, 2020).

Guidelines for developing the smart economy from the study found that it focuses on digital infrastructure, technology and innovation, public-private collaboration, challenges and regulations, and workforce development and quality of life. In terms of digital infrastructure, according to a study by Jo et al. (2021), a case study of the Republic of Korea has heavily invested in the development of smart cities, specifically focusing on the integration of ICT into various development areas. This promotes the development of digital infrastructure such as 5G networks and data centres, which is part of the announcement of the Digital New Deal (Ministry of Science and ICT, 2021). Similarly, in Thailand, the Master Plan for Promoting the Digital Economy 2023–2027 (Digital Economy Promotion Agency [DEPA], 2023) has been announced, which includes a strategy to increase the efficiency of digital infrastructure to cover the needs of citizens' services through the development of smart cities. In addition, technology and innovation play an important role in supporting city development to achieve its goals, with digital technology being the main driver. It is essential for cities and communities (International Telecommunication Union [ITU], n.d.) as it can help cities become places where people want to live, attracting more people and businesses, investment, and job creation. Allam and Newman (2023) include the IoT, Big Data and Data Analytics, cloud processing, and AI as key technologies. These technologies use data and technology to create innovations that improve the efficiency and livability of urban areas (Herath et al., 2022; Sarker, 2022; Visvizi & Hoyo, 2021; Adiyarta et al., 2020; European Parliament, 2020; Perboli & Rosano, 2020; Allam & Dhunny, 2019; Habibzadeh et al., 2019). For public-private collaboration, PPPs help fund smart city projects, which may be too costly for the government alone to finance. These partnerships combine government support with private-sector innovation and efficiency. PPPs spread out the risks and rewards, facilitating the undertaking of large-scale projects that enhance cities' intelligence and quality of life for their residents (Almarri & Boussabaine, 2023). Collaborations ensure that technology in smart cities benefits everyone and does not exclude certain groups. Partnerships bring together various stakeholders such as government, businesses, and the community to work towards making cities smarter and more inclusive. By collaborating, governments and businesses can ensure that the benefits of smart cities are accessible to all, not just a select few (Gracias et al., 2023; Voorwinden, 2023). Citizen participation is also crucial and should be tailored to the context of each city (Chang & Smith, 2023). Regarding, challenges and regulations, several prominent challenges in smart city development have been highlighted, including the lack of supportive regulations (Chang & Smith, 2023). People value their privacy because it allows them to be themselves without being watched or unfairly influenced. In smart cities, protecting privacy helps maintain this freedom (Fabrègue & Bogoni, 2023). Additionally, a study by Balfaqih and Alharbi (2022) stated that citizens are concerned about information security risks, fearing their personal data could be stolen or misused. Privacy violations are another concern, with worries about unauthorized tracking and invasion of privacy. Moreover, the incompatibility of different technology systems creates challenges in user experience. Finally, the digital skill gap poses a hurdle, especially for older individuals or those with less education, who may struggle to learn and use these new technologies effectively. These concerns and limitations need to be addressed to ensure the successful and widespread adoption of smart city solutions. In respect of workforce development and quality of life, the workforce is crucial for the development and implementation of smart cities. As technology continues to evolve rapidly, there is a need for training and reskilling to bridge the skill gaps (Ercan & Kutay, 2022; Pahuja, 2022). The existing workforce in cities may not have the necessary skills to meet the demands of smart cities, so it is important to train them in basic technologies and adapt them to new technologies (Iatrellis et al., 2021). Quality of life, a vital issue, has gained attention in recent years. It is about feeling good and living in a place that is healthy and happy. Ensuring that everyone has a good quality of life helps the whole world because it means we are living in a way that is good for the planet (Chen, 2023). Improving the quality of life is a key goal of sustainable smart cities, which aim to use technology to make life better for everyone (Berawi et al., 2023).

The justification for this research stems from the escalating significance of smart economies and smart cities, which underscores the critical need for a comprehensive understanding of their interconnection. Although extensive studies exist on both smart economies and smart cities independently, there remains a notable gap in the literature that explores the specific processes and ramifications associated with the establishment of a smart economy in smart cities. This gap represents a significant lacuna in the scholarly discourse, highlighting the necessity for further investigation. Furthermore, the existing body of research in Thailand predominantly focuses on individual cities, such as Phuket and Khon Kaen, rather than taking a holistic approach to understanding the broader national landscape. As evidenced by studies conducted by Jumnong and Lowatcharin (2022) and Seng et al. (2022), this city-centric perspective fails to capture the comprehensive picture necessary for informing policy and practice at the national level. Therefore, addressing this gap through comprehensive research is imperative to advance our understanding of the intricate dynamics between smart economies and smart cities, particularly within the context of Thailand.

3. RESEARCH METHODOLOGY

This study adopted a qualitative research strategy to explore the underlying reasons for certain phenomena by examining the decision-making processes and behaviours of individuals or groups. According to Taherdoost (2022), this approach seeks to provide a deeper understanding through contextual exploration. The research encompassed four main phases: research design, data collection,

data analysis, and report writing (Phuangsuwan et al., 2024). Notably, in-depth interviews facilitated detailed insights into specific topics, enhancing the precision of the information gathered to meet the study's goals. Additionally, this method encourages dynamic two-way communication, enabling the acquisition of supplementary data. While primarily focusing on semi-structured interviews, this research also integrated other methods, such as participant observation, surveys, and experiments, to enrich the data and insights obtained. To gather the primary data, the researchers utilized the documentary method, which entailed an examination of secondary data from prior studies to pinpoint pertinent key survey questions. Furthermore, the interview questions were carefully crafted to extract detailed and enlightening viewpoints. Please refer to the appendix for the list of interview questions.

The study employed an interview protocol designed for two experts, three workers, and three other stakeholders in private sector entrepreneurs and smart city implementers in Thailand. The protocol comprised a comprehensive set of in-depth questions in five domains (digital infrastructure, technology and innovation, public-private collaboration, challenge and regulatory, and workforce and quality of life), enabling participants to provide detailed and nuanced feedback on relevant subjects. Interviews were conducted either in person or remotely, based on the preferences of the participants, and audio recordings were made for subsequent analysis.

A pilot test was conducted to ensure the clarity and effectiveness of the questions. Before commencing the interviews', informed consent was obtained from all participants, and the interviews were conducted in comfortable settings, taking into account each participant's preferences. Detailed notes or recordings were taken with their consent, and subsequently, the recorded interviews were transcribed for analysis, following the recommendation by Thetlek et al. (2024). Regarding the sampling technique, purposive sampling, a commonly employed method in qualitative research where researchers use their expertise to select the most relevant sample, was employed. The aim of this sampling technique is to gain a comprehensive understanding of a particular phenomenon or population. In a recent qualitative study, Limna (2023) recommended conducting a minimum of six interviews to achieve data saturation in qualitative research. Therefore, this study included experts, workers, and other stakeholders in smart cities, all aged 18 or older, and all residing in Thailand. The interviews were conducted in November 2023.

For data analysis, content analysis is a qualitative method that systematically and objectively describes and quantifies specific phenomena by drawing valid inferences from verbal, visual, or written data (Limna, 2023). Additionally, Kraiwanit et al. (2023) emphasize the value of NVivo as a tool to enhance the depth and breadth of analysis. Consequently, both content analysis and NVivo software were employed to analyze the qualitative data obtained from in-depth interviews.

4. RESULTS

The study discerned several key themes concerning the influence of the smart economy on smart cities in Thailand from participants' feedback, encompassing the development of digital infrastructure, advancements in technology and innovation, the significance of public-private cooperation, strategies for addressing challenges and regulations, and the pivotal role of workforce development and improving the quality of life. The analysis of interviews was conducted through content analysis aided by NVivo software. To enhance the clarity of the results, a word frequency query was employed, and the frequently used terms by interviewees were represented visually in a word cloud (Figure 1).

Figure 1. World cloud

4.1. Digital infrastructure development

The expansion and enhancement of digital infrastructure, including high-speed Internet networks, wireless networks, and cloud computing, are vital for the success of smart cities in Thailand. Ensuring uniform access to digital resources across all areas of the country is a critical goal.

R1: *"With high-speed Internet, businesses can operate more efficiently, education can be more accessible, and healthcare services can be more effective. Moreover, the integration of cloud computing will enable data sharing and storage like never before"* (personal communication, November 20, 2023).

R2: *"The Thai government recognizes that true progress must be inclusive. They aim to bridge the digital divide between urban and rural areas. This will empower people in remote communities with the same opportunities that city dwellers have enjoyed for years"* (personal communication, November 20, 2023).

R3: *"With uniform access to digital resources, people in rural areas can access online education, telemedicine, and even participate in the digital job market. This not only improves their livelihoods but*

also creates a more skilled and competitive workforce" (personal communication, November 20, 2023).

R4: *"I suppose these investments will likely attract more businesses and talent to smart cities, thus boosting economic development. When businesses see that a region has advanced digital infrastructure, they're more likely to set up shop there. This, in turn, will create job opportunities and stimulate economic growth"* (personal communication, November 20, 2023).

4.2. Technology and innovation

Embracing technology and innovation, including Big Data Analytics, AI, and the IoT, is essential for improving production and service delivery within smart cities. Encouraging technological advancements and their integration into various sectors is critical.

R2: *"Big Data Analytics, AI, and the IoT are playing pivotal roles as these technologies are transforming how cities function. Big Data Analytics, for instance, allows for data-driven decision-making, optimizing resource allocation and enhancing city services"* (personal communication, November 20, 2023).

R5: *"AI is making cities smarter by automating processes, predicting trends, and improving the overall efficiency of various services. For instance, smart traffic management systems that use AI and IoT sensors are reducing congestion and improving traffic flow in many smart cities. It is not just about convenience but also sustainability. Efficient transportation means less pollution and a greener environment"* (personal communication, November 21, 2023).

R6: *"The integration of IoT in various sectors, like healthcare and waste management, allows for real-time monitoring and proactive problem-solving. I think encouraging these technological advancements and their integration into various sectors is crucial. Governments and city planners must actively promote and support innovation to keep smart cities at the forefront of technological progress"* (personal communication, November 21, 2023).

4.3. Public-private collaboration

Collaboration between the private sector and the government is pivotal for smart city development. The private sector should leverage technology for business efficiency and new opportunities, while the government should create supportive policies and regulations, including investment incentives and workforce development programs.

R2: *"The collaboration between the private sector and the government in smart city development is a key factor in the success of these initiatives. The private sector and the government each bring unique strengths to the table. The private sector can leverage technology for business efficiency and innovation. Their resources and expertise can drive the development of smart solutions. The government plays a crucial role in creating an enabling environment. They need to provide supportive policies and regulations to foster innovation"* (personal communication, November 20, 2023).

R3: *"Policies that encourage investment in smart city projects are essential. Without them, the private sector might be hesitant to invest. Additionally, workforce development programs are crucial. They ensure that there's a skilled workforce ready to drive these technological advancements"* (personal communication, November 20, 2023).

R7: *"Public-private partnerships can lead to better infrastructure development. It's a win-win situation. The private sector can invest in infrastructure projects, while the government can ensure they align with the city's long-term goals"* (personal communication, November 21, 2023).

4.4. Addressing challenges and regulatory

Overcoming challenges related to digital infrastructure disparities, the shortage of skilled digital personnel, cybersecurity concerns, and regulatory adaptability is crucial. The government needs to take proactive measures to address these issues and create a conducive environment for smart economic development.

R1: *"Addressing the challenges facing smart cities, particularly concerning digital infrastructure and skilled personnel, is indeed crucial for their sustainable development. Disparities in digital infrastructure, especially between urban and rural areas, need to be mitigated to ensure inclusive growth. Providing uniform access to technology is essential to ensure that all citizens can benefit from the opportunities presented by smart economic development"* (personal communication, November 20, 2023).

R6: *"The rapid advancement of technology underscores the importance of having a skilled workforce capable of leveraging these innovations effectively. Investment in education and training programs is essential to bridge the skills gap and ensure that the workforce is equipped to thrive in the digital economy. Furthermore, as smart city infrastructure becomes increasingly interconnected, cybersecurity measures become paramount. Governments must prioritize cybersecurity to protect against potential cyber threats and ensure the integrity and security of smart city systems"* (personal communication, November 21, 2023).

R7: *"Regulatory adaptability is also crucial in fostering innovation and supporting smart economic development. Regulations need to evolve alongside technological advancements to create an enabling environment for innovation to flourish. Proactive regulatory frameworks can facilitate the adoption of new technologies and promote sustainable development in smart cities"* (personal communication, November 21, 2023).

4.5. Workforce development and quality of life

Smart economic development not only enhances the economy but also has the potential to improve the quality of life. Focusing on digital skills development, providing digital education and training, and offering scholarships for digital education are important themes to ensure that the workforce is prepared for the demands of a smart economy.

R4: *"Indeed, smart economic development holds the promise of not only driving economic growth but also improving overall quality of life. A skilled workforce is essential to realizing the full potential of*

a smart economy, as highlighted by the need for individuals to possess the necessary digital skills" (personal communication, November 20, 2023).

R6: *"Investing in digital skills development is paramount to ensure that people can actively participate in the digital transformation. This includes providing digital education and training programs that cater to both the current workforce and the next generation"* (personal communication, November 20, 2023).

R7: *"Moreover, scholarships for digital education can play a crucial role in making these programs accessible to a wider range of individuals, thereby removing barriers to entry and fostering inclusivity in the smart economy"* (personal communication, November 21, 2023).

R8: *"A well-prepared and skilled workforce serves as the foundation of a prosperous smart economy, were talent and potential drive innovation and growth. By making strategic investments in digital skills and education, societies can pave the way for a brighter future for all citizens"* (personal communication, November 21, 2023).

5. DISCUSSION

The findings of this study underscore the multifaceted impact of the smart economy on smart cities in Thailand, shedding light on several key themes including digital infrastructure development, technology and innovation, public-private collaboration, addressing challenges and regulatory issues, and workforce development and quality of life. These themes collectively illuminate the intricate dynamics shaping the evolution of urban living in Thailand, emphasizing the pivotal role of digital infrastructure, innovation-driven approaches, collaborative partnerships, proactive problem-solving, and the cultivation of a skilled workforce in driving sustainable and inclusive urban development.

Thailand's strategic emphasis on expanding and enhancing digital infrastructure within its smart cities is poised to catalyze comprehensive advancements that enhance the well-being of its citizens and stimulate economic growth nationwide. The government's commitment to ensuring equitable access to digital resources reflects its dedication to fostering inclusive development. The study's findings, in alignment with Putri et al. (2023), underscore the positive impact of the digital economy on both Thailand's economy and society, highlighting the importance of continued investment and support from the government. By adhering to best practices such as fortifying digital infrastructure, nurturing an environment conducive to innovation, promoting digital literacy and skill development, driving widespread digital adoption, and establishing a robust regulatory framework, Thailand can effectively navigate the digital economy landscape. This success has the potential to significantly propel the country's overall development trajectory.

The integration of technologies such as Big Data Analytics, AI, and the IoT plays a pivotal role in continuously enhancing production processes and service delivery within smart cities. These innovations not only optimize efficiency but also contribute to sustainability and an enhanced quality of life for residents. Moreover, fostering and promoting technological advancements across various sectors are crucial for the sustained success of smart cities. In line with the findings of Limna et al. (2021), it was demonstrated that coffee shop owners recognize the significance of Big Data Analytics and AI for their businesses. The adoption of these new technologies and the transformation of coffee shops into digital enterprises are key contributors to their success. Additionally, as highlighted by Jangjarat and Jewjinda (2023), there are ample opportunities for small and medium enterprises (SMEs) to leverage digital technologies and innovation in the post-pandemic era. SMEs have increasingly incorporated digital technologies and innovation into their services and operations to achieve long-term growth, given the substantial advantages offered by these advancements.

The collaboration between the private sector and the government is indeed crucial for the successful development of smart cities. By leveraging technology for efficiency and innovation, the private sector can contribute significantly to smart city initiatives. Meanwhile, the government plays a pivotal role in providing supportive policies, regulations, and workforce development programs that facilitate the implementation of smart city projects. As highlighted by Siokas et al. (2022), partnerships with both private and public entities can assist public authorities in achieving their objectives for smart city development. Collaborations between the private sector and various public entities help address cognitive gaps and ensure that smart city projects progress smoothly. These partnerships serve as valuable means to attain desired outcomes and lead to the successful implementation of smart city initiatives. Furthermore, as emphasized by Razmjoo et al. (2021), overcoming barriers in smart city development requires the implementation of policies aimed at enhancing private-public participation. By fostering an environment conducive to collaboration between the private sector and the government, barriers can be effectively addressed, leading to the successful advancement of smart city projects.

Addressing challenges related to digital infrastructure disparities, the shortage of skilled digital personnel, cybersecurity concerns, and regulatory adaptability is indeed crucial for the success of smart economic development in smart cities. As highlighted by Balfaqih and Alharbi (2022), these challenges pose significant hurdles to the advancement of smart cities and must be addressed effectively through proactive measures. To tackle these challenges, the government must create a conducive environment that fosters innovation and inclusivity in smart cities. This involves implementing cybersecurity strategies and recovery plans to mitigate cybersecurity risks, regulating public data collection and usage to protect privacy, developing open standards for system integration to address compatibility issues, and providing financial assistance, educational programs, and training initiatives to bridge digital skill gaps. By taking proactive measures to address these challenges, governments can create an enabling environment for smart economic development in smart cities, ensuring that technological

advancements benefit society as a whole while safeguarding privacy, security, and inclusivity.

Smart economy development indeed holds the potential to not only enhance the economy but also improve the overall quality of life for individuals and society as a whole. Investing in digital skills development, digital education, and training programs, along with offering scholarships for digital education, are crucial strategies to ensure that the workforce is well-prepared and empowered to thrive in a smart economy. The findings align with the insights of Doungpitak et al. (2023), emphasizing the critical role of technology in modern daily life and the necessity for individuals to adapt to the digital age. To effectively address the challenges of global digitalization, Thailand must prioritize preparing its citizens for these transformative changes. Proficiency in digital technology skills is increasingly essential in today's digital age, making it imperative for the government and relevant sectors to offer tailored training programs across all age groups. Integration of digital skills into school curriculums for children aged 6–18 years old and the availability of free digital training and short courses for adults and older individuals are essential steps toward ensuring that all segments of society are equipped with the necessary digital competencies to participate meaningfully in the smart economy. By investing in digital skills development initiatives, Thailand can empower its workforce, foster inclusive economic growth, and enhance overall societal well-being in the digital era.

6. CONCLUSION

Thailand's transformation into a thriving landscape of smart cities hinges on a well-coordinated strategy encompassing several critical pillars. Equitable access to digital infrastructure, achieved through investments in high-speed Internet and cloud computing, forms the bedrock of this strategy. By bridging the digital divide, it empowers all citizens, regardless of location, to participate in the digital economy and reap its benefits. Furthermore, embracing technological advancements like Big Data, AI, and the IoT is crucial. These technologies play a pivotal role in optimizing efficiency, improving decision-making, and ultimately enhancing the overall quality of life for urban residents. For example, smart traffic management systems using AI and IoT sensors to alleviate congestion and pollution, while real-time monitoring through IoT integration in healthcare and waste management enables proactive problem-solving, creating a more sustainable and efficient urban environment. Achieving Thailand's smart city vision necessitates fostering collaboration between the private and public sectors. The private sector brings its expertise and resources for technology deployment, while the government creates an enabling environment through supportive policies, regulations, and investment incentives. This public-private partnership fosters innovation, facilitates infrastructure development, and ensures that technological advancements benefit the broader community. However, navigating this ambitious journey requires addressing existing challenges. Proactive measures are needed to bridge the digital skills gap, ensuring the workforce possesses the necessary competencies to thrive in the digital age. Additionally, enhancing cybersecurity safeguards critical infrastructure and citizen data from potential threats. Furthermore, regulatory frameworks must adapt to keep pace with technological advancements, ensuring they support, rather than hinder, innovation. Finally, mitigating disparities in digital infrastructure across urban and rural areas is crucial for inclusive growth, ensuring all communities benefit from the opportunities presented by a smart economy. Prioritizing digital skills development through education and training programs is paramount. This equips the workforce with the necessary competencies to not only contribute effectively but also thrive in the digital economy. This not only benefits individuals by enhancing their employability and career prospects but also lays the foundation for a future-proof, skilled workforce that can drive innovation and growth within Thailand's smart cities.

By effectively addressing these interconnected elements, Thailand can unlock the full potential of its smart economy and pave the way for a sustainable, prosperous, and inclusive future for all its citizens. This research delves into the complexities of smart city development in Thailand, offering valuable insights that can inform both policy and academic discussions, ultimately guiding the nation towards a brighter, digitally empowered future.

The qualitative study on the impact of the smart economy on Thai smart cities has shed light on important themes, yet it encounters certain limitations. The small sample size of eight respondents may restrict the broader applicability of the findings, underscoring the need for a larger and more diverse sample to obtain comprehensive insights. Moreover, the qualitative nature of the study, devoid of quantitative data, limits the scope for statistical analysis, emphasizing the necessity of integrating quantitative methods for methodological rigour. Additionally, the cross-sectional design of the study provides only a snapshot of the current situation, indicating the importance of longitudinal research to capture evolving trends over time. Despite these limitations, future research endeavours should prioritize larger samples, mixed-methods approaches, longitudinal designs, and comparative analyses to deepen understanding and inform robust policy development for sustainable urban growth in the digital era.

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APPENDIX. QUESTIONNAIRE

The questions used in the interviews are listed below:

1. How do you perceive the current state of digital infrastructure in Thailand's emerging smart cities, and what improvements are necessary?
2. In what ways do you think high-speed Internet and wireless networks contribute to the efficiency of businesses, education, and healthcare services in smart cities?
3. How is the Thai government addressing the digital divide between urban and rural areas to ensure uniform access to digital resources?
4. What impacts have you observed from the integration of cloud computing in smart cities, especially regarding data sharing and storage?
5. How do you believe uniform access to digital resources can transform livelihoods in rural areas?
6. Can you provide examples of how Big Data Analytics, AI, and IoT are transforming city functions and improving production and service delivery in smart cities?
7. How does smart traffic management utilizing AI and IoT contribute to sustainability and environmental health in smart cities?
8. In your opinion, what are the key factors for fostering successful public-private collaboration in smart city development?
9. How can the government and private sector effectively balance their roles to drive the development of smart solutions?
10. What policies do you believe are essential to encourage private sector investment in smart city projects?
11. How is the challenge of digital infrastructure disparities being addressed to ensure inclusive growth in smart cities?
12. What strategies are being implemented to bridge the skills gap and prepare the workforce for the demands of a smart economy?
13. How important is cybersecurity in the development of smart cities, and what measures should be taken to enhance it?
14. In what ways do regulatory frameworks need to evolve to support innovation and smart economic development in smart cities?
15. How can investments in digital skills development and education improve the quality of life and economic growth in smart cities?

Note: Within the framework of this survey, it is pertinent to acknowledge that not every question is directed towards each participant. A deliberate exclusion of certain queries is executed to guarantee their applicability to particular respondents, thereby ensuring the relevance of the survey content to individual participants' experiences and contexts.