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Digital Innovation as a Management Trend: A Case Study on the Adoption of Smart City Initiatives

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Abstract. A smart city is defined as the integration of digital technologies into the development of a city's infrastructure components and services. It is viewed as a form of digital innovation. Governments worldwide are recognizing the potential of digital technologies in establishing smart cities to enhance the quality of life and optimize their operational models and governmental functions. A central research question in the field of smart cities is: What motivates governments to adopt smart cities? The literature has proposed two primary reasons: performance and legitimacy. The performance perspective, rooted in an economic-rationalistic viewpoint, suggests that governments adopt smart cities to enhance performance. In contrast, the legitimacy perspective, grounded in an institutional viewpoint, argues that governments adopt smart cities to pursue legitimacy. Despite these discussions, the adoption of smart city initiatives cannot be fully explained by either economic performance or institutional forces. Instead, it appears to align more closely with a management trend in innovation. This research aims to delve into this matter. I focus on the characteristics of smart city initiatives through the lens of management fashion, utilizing a case study methodology as the research approach. This research's contribution to the literature is providing an in-depth understanding of the phenomena that transpire when governments adopt smart cities, not due to performance and legitimacy, but within the context of management fashions.

Keywords: Digital Innovation, Smart City, Management Fashion, Case Study, Smart City Initiative.

1 Introduction

A smart city is characterized by the incorporation of digital technologies into the development of urban infrastructure and services. This phenomenon is perceived as a manifestation of digital innovation, which can be categorized as a product, process, or business model. This innovation necessitates significant alterations by its adopters and is embedded within or facilitated by Information Technology (IT) [1, 2]. Therefore, smart cities have emerged as a topic of increasing interest for scholars and practitioners globally [3, 4]. For example, the number of research articles pertaining to smart cities has seen a substantial increase. According to the Scopus database, there was a rise from a relatively small number of publications in 2006 (approximately 100 articles) to a

remarkable tally by 2016 (around 2000 articles), representing a dramatic twenty-fold increase [5]. As of February 2024, the number of publications has further surged to over 48000¹, indicating the growing relevance and importance of this field.

Governments worldwide are adopting smart city initiatives (SCIs) to achieve a variety of objectives. These range from managing traffic, promoting sustainable development, enhancing cultural diversity, improving competitiveness, to enhancing the quality of life for urban populations. It is projected that by 2050, 66% of the global population will reside in cities. The majority of these SCIs are concentrated in developed countries [6], with fewer initiatives appearing in other regions. Vietnam embarked on its smart city journey over a decade ago. However, a significant increase in the number of SCIs occurred in 2017, with approximately 20 initiatives being implemented simultaneously within the country. The number of smart city initiatives has continued to grow steadily as the country shifts its focus towards digital transformation, with smart city development being a key component of this strategy.

A natural question arises as to why an array of SCIs are implemented simultaneously within a single country, and the motivations behind this. Governments may adopt these initiatives to enhance performance (from an economic-rationalistic viewpoint), pursue legitimacy (from an institutional viewpoint), or for other reasons. There is a paucity of studies on SCIs, particularly those focusing on less developed countries. Only a handful of studies place their emphasis on technology [7], framework [8], and conceptual aspects [4]. However, there is a gap in research that can shed light on the attributes of SCIs in the study context. Therefore, this research seeks to answer the following questions: How are smart city initiatives being adopted and what are their features?

In an attempt to address these questions, I employed a case study methodology as the research approach, using management fashion theory as a theoretical lens [9]. I particularly emphasized three main aspects of SCIs introduced by [10]: technology, policy, and organization. This research's contribution to the literature is providing an in-depth understanding of the phenomena that occur when governments adopt smart cities, not due to performance and legitimacy, but within the context of management fashions.

The chapter is organized as follows: The subsequent section discusses the study's background. This is followed by the section on research methods. Section four presents the within-case and cross-case findings. Subsequently, the chapter presents the discussion, followed by the conclusion, limitations, and suggestions for future research.

2 Background

2.1 Smart city initiative framework

¹ The author conducted the search using the terms “smart city” or “smart cities” in the Scopus database in February 2024.

There are no global agreements on smart city concepts [11]. The concept itself is understood in a variety of ways in terms of content, context, and meaning, ranging from the use of traditional IT to digital technologies (e.g., block chain, IoT, social media, and 5G) [11]. Table 1 shows two examples of smart city components.

Table 1. Example of smart city components

Smart city component	Ref.
“The constituents of a smart city encompass technology, individuals, and institutions.”	[12]
“The components of a smart city are multifaceted, including infrastructure, business-oriented urban development, social inclusion, advanced technology, and socio-environmental sustainability.”	[13]
“The components of a smart city extend to a smart economy, a smart environment, smart energy and mobility, and smart governance.”	[14]
“Smart city integrates the following elements: smart economy, smart people, smart governance, smart mobility, smart environment, smart living.”	[15]

The present chapter views the smart city concept as the integration of digital technologies into the development of a city’s infrastructure components and service collections. As depicted in Figure 1, these rational components can be structured into a framework.

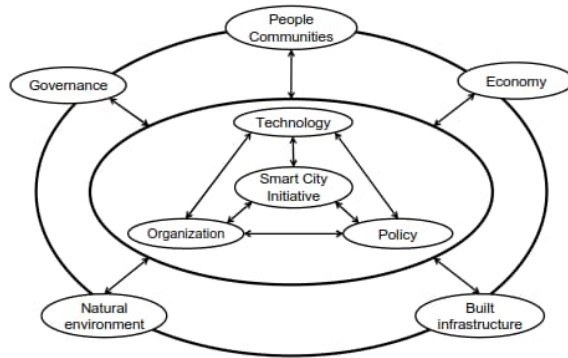


Fig. 1. The components of smart city, adapted from [10].

Although the framework encompasses numerous interconnected components, this research primarily concentrates on three fundamental elements: technology, policy, and organization. These elements are deemed integral to the internal structure of SCIs. The details of each component are outlined in Table 2.

Table 2. Technology, policy, and organization components of smart city

Components	Description
Technology Component	This refers to the technology that is either currently in use or planned for implementation in smart city initiatives. It encompasses the challenges associated with technology and the strategies to overcome them.
Policy Component	This component represents the policies that serve as a foundation for implementing smart city initiatives. It also includes the policy environments that are shaped by these initiatives.
Organization Component	This component pertains to the organizational structures and management strategies that are either currently employed or planned for future deployment in smart city

Components	Description
	initiatives. It encapsulates the challenges inherent to these management strategies and the solutions devised to surmount these obstacles.

First, technology is recognized as a fundamental factor in smart cities [13]. The spectrum of technology utilized depends upon the objectives of the SCIs. This spectrum spans from traditional IT to digital technologies (e.g., artificial intelligence, blockchain, and social media [16, 17]) that equip smart city systems with real-time insights into the physical world and sophisticated analytics [10]. Examples of technology encompass a wide range of domains, such as transformation (e.g., real-time vehicle information, smart ticketing, and smart transport systems), governance (e.g., smart urban operating systems, smart performance management systems, smart transactions), environment (e.g., sensors for flood management), and security (e.g., digital surveillance, predictive behaviors, and coordination of emergency response). Given the broad scope of technology, this research considers two primary issues: the application and planning of technologies for SCIs, and the challenges associated with these technologies, taking into account barriers, advantages, and legacy in different scenarios related to their initiative goals.

Second, the organization component encompasses both managerial and organizational perspectives. This component signifies the capacity and expertise required to set forth clear and pragmatic objectives for a SCI. It involves identifying relevant stakeholders and end users for the initiative and ensuring their active participation in the developmental process of the smart city. The organizational component thus delineates how organizations formulate initiatives that influence objectives, directions, and other aspects [15, 18]. Moreover, it offers a vision of how a SCI is executed upon receiving approval. In other words, this component is associated with strategic planning and financial resources necessary for the development of SCIs. In the present research, I employ the organization component to examine how the case studies tackle the issues associated with management and organization of SCIs in pursuit of their objectives, and the strategies implemented to surmount these challenges.

Third, the policy component provides an understanding of a smart city within its implementation context, which includes institutions, politics, rules, and regulations [13, 14]. Policies play a crucial role in the development process of a smart city life cycle. In this study, I examine the relationship between SCIs and their regulatory contexts, which may include legal documents and administrative decisions.

2.2 Innovations in Information Systems

Innovations in the field of information systems research can be classified into three distinct streams, as identified by Wang [1]: IS innovation (refer [19]), IT innovation (refer [20]), and digital innovation (refer [21]). In this context, smart city initiatives can be interpreted as digital innovations, defined as “the execution of novel combinations of digital and physical components to produce innovative products” [21].

During the process of digital innovations, literature suggests that the management fashion theory significantly influences the diffusion of popular innovations [1]. The management fashion theory [9] posits that firms’ imitation of innovative ideas is

influenced not only by rational efficiency logics but also by other factors, such as socio-technical factors. In other words, firms adopt an innovative idea due to the influence of fashion-setting organizations, such as gurus, consultants, and media [9, 22]. In the public sector, the management fashion theory could provide a compelling explanation for the adoption behavior of followers (state agencies) that mimic an initiative (e.g., smart city), which cannot be fully accounted for by a rational efficiency choice or institutional pressure.

3 Research Methods

3.1 Research Settings

To address the research questions, this study selected two cases at the provincial level within Vietnam. These are the provinces of Bac Ninh (hereafter referred to as BN) and Thanh Hoa (hereafter referred to as TH). The central government has accelerated the use of digital technologies in e-government and digital government processes. The aim is to utilize digital technologies (e.g., social media, blockchain, big data, 5G technologies, etc.) across both frontend and backend operations. The objective is to improve the quality of business services for customers (frontend) and to enhance the effectiveness, efficiency, and productivity of government operations (backend). Consequently, several digital transformation initiatives have been established at different levels of government, with SCIs being one of the key digital transformation strategies.

The two cases selected have diverse backgrounds, environments, capabilities, and experiences in IT application. These differences may provide insights into the phenomenon under study, thereby contributing to better theorization for broader settings [23]. Moreover, there is a common vision for the SCIs in both TH and BN cases, encompassing six main domains: smart economy, smart citizens, smart governance, smart transportation, smart environment, and smart living.

BN Case

BN, a local government located in the north of the country, has a population of approximately 1.4 million. The country's ICT index, administered by the Ministry of Information and Communications, ranks BN at a mid-level. This index ranks all local governments, ministries, and equivalent government agencies in the country based on their ICT infrastructure, services, capabilities, and policies. The SCIs in BN were launched in April 2017, primarily to leverage Information and Communication Technology (ICT) for boosting management skills and the productivity of socio-economic operations. These initiatives also strive to cultivate a harmonious environment and enhance the quality of life for citizens and businesses. The SCIs in BN encompass 41 projects, covering ICT infrastructures such as software, hardware, and database technologies, public sector like healthcare, training, and environmental protection, and management areas including efficient public services, enhanced security, and IS interoperability. The original plan was to implement the BN SCIs over a span of five years, from 2017 to 2022, while envisioning progress up to 2030 [24].

TH Case

TH has a population of approximately 3.6 million people. Compared to BN, TH has less experience with the ICT index. The primary goals are the promotion of ICT, automation, and AI applications across various sectors to improve work quality and citizens' well-being. The TH SCIs comprise 42 projects. These projects span a broad spectrum of areas, from ICT infrastructure for smart cities to software for smart city applications, such as environmental protection, training, and healthcare, to management tools for human resources. The TH's SCIs focus on six main areas, including smart training, smart health, smart environmental protection, smart transport, and smart safety. The original plan for the TH SCIs was a three-year period, from 2017 to 2020 [25].

3.2 The Methods

Data collection

The interpretive qualitative case study approach was chosen [26]. This paper utilized qualitative data as its primary source (Table 3). Semi-structured interviews were conducted, focusing on the ICT departments of two provinces (two interviews each), consultants (two interviews for TH, one interview for BN), and management (four interviews were conducted at the Ministry of Information and Communications (MIC), which is the ministry responsible for overseeing IT applications throughout the country, including the adoption of SCIs in the two cases under study). These interviews were conducted online via a telecommunications application (e.g., Zalo app), with notes taken during the interview. In addition to primary data, secondary data were also collected. These include policy documents, such as legal documents, resolutions, and decisions, as well as internal project documents, such as project meeting notes, memoranda, draft proposals, and plans.

Table 3. Summary of the data sources for the study

Data	Source	#
Interviews	Province's ICT Department (Deputy Head)	1 (TH), 1 (BN)
	IT Departments within the Province's ICT Department (Head and Deputy Head)	1 (TH), 1 (BN)
	Consultants	2 (TH), 1 (BN)
	National Digital Transformation Agency under the MIC (Heads and Deputy Heads of the Digital Policy, Digital Data and Platforms, Central for Digital Technology, and Digital Service Departments)	4
Secondary data	Internal project documents, policy documents	850+ pages

Data analysis

The data analysis were guided by the methodology proposed by Walsham (c.f. [26]). The data analysis is described as follows: First, in accordance with the guidance provided in references [26, 27], case descriptions were formulated during the analysis

process. A narrative for each case was developed to identify the key aspects of each case SCI. During this process, a table was established with the following columns: projects, aim, domain, technology, policy, management, and notes. This approach facilitated a deeper understanding of the SCIs in each case. Second, thematic coding was employed to identify key perspectives on smart cities in each case. These perspectives were grounded in the theoretical concepts presented in the background section. Third, a cross-case analysis was conducted to identify similarities and differences between the cases. An iterative process was utilized to identify characteristics that contribute to a broader theoretical understanding. Finally, a theoretical synthesis was performed, which involved iterative reflection on the results of the comparative analysis in the context of the existing literature. This process aimed to identify potential theoretical contributions. During this stage, different contexts were analyzed in relation to the findings, thereby enhancing the understanding of the results.

4 Findings

The BN SCIs have deployed a diverse array of 41 projects, each with its own scope, objectives, and outcomes. For the purposes of this research, these projects have been categorized into three groups that align with the theoretical framework: technology, organization, and policy. Similarly, a selection of the 42 projects under the SCIs of TH has been categorized into the same three categories. The details of these categories are presented as follows.

4.1 Within-Case Findings

4.1.1 Technology component in smart city initiatives

BN. A multitude of projects have been made in the realm of technology component of BN's SCI. For instance, there exist projects focused on the development of e-learning for BN, as well as projects are related to consolidating information systems in the educational sector, with the aim of connecting educational institutions at all levels, thereby supporting high-speed internet [24]. There are also projects aimed at establishing online training systems that provide comprehensive educational services for online learners within the BN province [24]. In addition, BN has plans to establish platforms for promoting start-up ideas within its citizenry and businesses. For example, the 'Nurturing/Incubating Start-ups' project, along with several other projects, are aimed at consulting and guiding citizens and businesses in the ICT sector to establish their services or materialize business ideas [24].

Interestingly, all projects within BN's SCI did not clearly indicate the technology component. Instead, these projects presented technology in general terms, focusing more on the aim of the projects within SCI. This could potentially lead to misunderstandings about the importance of technology. For instance, BN's SCIs indicate that "...smart city architecture model can use modern technologies for a smarter city, that

is, IoT, M2M, and Big Data” [24]. Consequently, it seems that the SCIs in BN lack detailed discussions on technology issues. In other words, the empirical data does not provide any indicators on the usage or future plans for technologies.

Back-end information systems were a part of the projects within BN’s SCI. Examples of these back-end systems include databases, and local area networks for the province, and hardware for personnel. For instance, BN had relatively robust back-end systems for their businesses (e.g., all state agencies have local area networks, Internet, and personnel have the necessary devices for their job duties). However, the projects within BN’s SCI lack information regarding how the current infrastructure, including ICT infrastructure, supports their SCI, or how they integrate the existing infrastructure with the new infrastructure for SCI’s projects. A deputy head at BN ICT department articulated, “Due to the division of the SCIs into individual projects, each individual project/s proposed by its respective department, there is a lack of interconnection and an overarching perspective that aligns with the true goal of a smart city”.

TH. The TH’s SCI implemented a variety of projects related to technology components, spanning software, hardware, and ICT infrastructure. Examples of these projects included data center for TH, e-government projects aiming in upgrading IS, IS applications for training and education at TH’s schools or universities (e.g., Hong Duc University). TH’s SCI indicated that “smart city technologies are based on IoT/M2M, and information systems (e.g., data center, WAN, and LAN) operate in a cloud computing environment with high security.” From the perspective of technological challenges related to SCIs, TH expressed concern about the rapid change of technologies in the digital era, as commented by the head of TH’s IT department: “An in-depth discussion of [digital] technology was not included [in the TH smart city initiatives] due to the rapid pace of [digital] technological change, which could lead to the technology becoming outdated over the duration of the initiatives. However, this presented a significant drawback as the lack of a clear definition of the technology made it challenging to deploy”.

4.1.2 Organization component in smart city initiatives

BN. The SCIs in the BN case outlined several aspects of the organizational component. However, these were stated in a very conceptual manner. In particular, BN issued a list of criteria that the SCIs aim to meet, the resources needed, and the schedules for achieving these aims. BN also delegated tasks for the implementation of their SCIs to various departments within BN. For instance, the BN’s ICT Department was tasked with executing projects related to “ICT infrastructure, cyber security, and privacy”. The Department of Education and Training was responsible for implementing projects related to education and training, such as “e-learning” and “smart schools” projects. The Department of Transportation was charged with transportation projects, such as smart transportation. In addition, the empirical data suggests that the collaboration between different departments or state agencies in implementing the initiatives was not clearly defined. For instance, BN identified forty-one projects as part of their SCI. However, these projects are relatively independent, with no information indicating any

interconnection among BN's SCI projects. In other words, they were presented as independent entities without detailed insights. The empirical data also reveals that BN acknowledged potential challenges that could arise during the implementation of these initiatives. For example, BN's SCI noted that a 'budget shortage could potentially delay projects or necessitate the redesign of their functions and objectives'[24].

TH. Overall, the approach adopted by TH was akin to that of BN. For example, projects within its SCI were assigned to its respective departments. The implementation of SCIs was more effective in TH than in BN. It was explicitly stated that the TH's ICT Department held the primary responsibility for executing the projects related to the initiatives, with other departments collaborating with the ICT Department for their implementation. However, in practice, the departments responsible for the projects had complete control over them in terms of finance, function, and objectives. This situation suggests that TH did not clearly articulate the challenges organizations might face in achieving their objectives in their SCIs. In other words, although it was stated that the ICT Department was in charge of implementing the SCIs, the actual implementation did not solely rest with the department. This situation arose because in neither case was an organization established to oversee their SCIs. Rather, responsibilities were distributed among various departments or institutions based on their roles. This, in turn, significantly affected the success of the SCIs, causing project delays and issues related to the integration and interoperability of the information systems.

4.1.3 Policy component in smart city initiatives

BN. The policy component encompasses the foundation for the implementation of SCIs and the environmental framework for smart city operation. While there are no direct policies related to SCIs in BN and the country in general, these initiatives have received strong support from the central government. This is due to the government's robust push for digital transformation to promote 'Industry 4.0' and use digital technologies as a catalyst for development. However, the lack of an official definition for SCIs in the case study has led to confusion in the implementation of the smart city. In addition, BN's SCIs did not discuss the policy environment for smart city operations, such as the implementation timeline, how the outcomes of each project within the initiatives are interconnected in terms of management, databases, information sharing, and resource management.

TH. TH encountered a situation similar to BN. There is no direct policy on SCIs. However, it is evident that TH's SCI was constructed based on several e-government or digital transformation policies (e.g., government decrees, resolutions, or decisions). Although TH shares policies with BN emanating from the central government, the TH case may differ from others in terms of local government policies. In particular, TH had no policy regarding how the SCIs could be implemented, nor were there explicit definitions or concepts of a smart city in any projects of their initiatives. This suggests that the adoption of SCIs was more passive, indicating a trend-following approach rather

than a proactive one. In addition, there were no suggestions on the operation of the smart city, such as agreements among pilot departments or institutions on data, technology, and infrastructure sharing.

4.2 Cross-Case Findings

In this section, findings from the two case studies are presented. These encompass various aspects, including technological components, organizational components, and policy-related components.

First, technology components in SCIs pertain to their current usage or planned implementation, as well as the challenges of technology and strategies to overcome them. Several projects within the SCIs of both cases fall under the technology category. For instance, there were projects related to building databases for state agencies, or projects related to procuring equipment for the central administrative services in the TH case. In the case of BN, smart projects were implemented with a focus on the enhancement of BN's higher education, transformations, and centralized operations. However, while these projects were proposed, there is no information presented in the SCIs of either case related to the technology being used or planned. In this sense, it can be observed that both cases did not sufficiently address the technological challenges, nor did they propose adequate strategies to tackle these obstacles in their SCIs. From the perspective of challenges related to SCIs, different cases have different opinions. For instance, BN indicates that "one of the most significant challenges of the SCIs is the rapid pace of technological change," while TH shares similar views about challenges related to technology.

Second, the components related to organization in SCIs offer a perspective on how organizational structure and management are employed or envisioned in the initiatives. They also shed light on the challenges associated with organization and management, along with the strategies devised to address these challenges. Both case studies overlooked this component. For example, the TH case discussed nine groups of solutions for implementing SCIs. However, the connection of these solutions to their 42 projects was difficult to discern. Similarly, BN's SCIs have proposed 41 projects aimed at fulfilling their sixteen goals across six domains, namely, intelligent economic development, educated community, efficient governance, advanced transportation systems, and enhanced quality of life. Nonetheless, there is no information discussing the management or organization of their SCIs.

Third, the policy component signifies the foundational elements for constructing SCIs and the legal frameworks within which these initiatives function. Despite the absence of explicit policies specifically related to smart cities, both cases possess robust e-government or digital government policies upon which they can depend. Yet, both TH and BN offer no insights into policies that govern the operation or formation of smart cities.

5 Discussion: Features of management fashion of smart city initiatives adoption

Based on the category of smart city framework [10], this study analyzed three main components of the framework, namely technology, organization, and policy, in two SCIs in TH and BN. The findings suggest that the adoption of smart city initiatives in the case study cannot be fully accounted for by economic performance or institutional forces. Instead, it appears to be more akin to a management trend in innovation.

First, the two case studies exhibit similar approaches to the adoption of their SCIs. These initiatives were a combination of various projects, subsequently labeled as a SCI. Yet, there was no clear information on how these SCI's projects were interconnected in terms of functions, databases, networks, and infrastructures. They originated from diverse services, departments, or institutions within the case. In this sense, they simply appended the term "smart" to their regular projects, transforming them into "smart initiatives" as a "fashion" [9, 22].

Second, in smart city initiatives adoption in two cases, it was assumed that all aspects related to e-government fall under SCIs, without clear concepts, scopes, and services. The norm was to divide SCIs into several independent projects. Consequently, they overlooked issues related to information systems such as how an SCI positions itself within the broader context of enterprise architecture [28], other initiatives (e.g., e-government [29], platform [30]), or management changes [31]. Moreover, in these two cases, the SCIs did not consider the interoperability of newly implemented systems with existing ones in terms of functions, data, security, and ICT infrastructures (e.g., software, hardware, network). This lack of attention could pose substantial obstacles for the successful execution of future SCI. Unlike the cases presented in this study, successful SCIs typically have clear scopes, applications, services, and concepts [32].

Third, a responsible agency overseeing the implementation of SCIs plays a crucial role [33]. Such an agency facilitates the resolution of challenging issues in terms of interoperability, resource sharing, and management. However, this issue was not considered in the SCIs of two cases. Moreover, digital technologies play pivotal roles in facilitating smooth operation of SCIs in terms of functions and management [34], thanks to the widespread use of mobile devices today. Mobile devices are considered the best means to communicate between state agencies and customers [35, 36]. Regrettably, the SCIs in the study cases focused more on the backend (the government) rather than on the frontend (customers).

6 Conclusion, Limitations and Future research

This study makes several contributions. It provides insights into the characteristics of digital innovation as a management trend through smart city initiative adoption. In the case study, technology was identified as the primary challenge in adopting SCIs, contrasting with other contexts where human resources and management are the main challenges [10, 18]. Interestingly, the management of SCIs did not emerge as a key issue in the case studies of this research. This is in contrast with the literature, which clearly

underscores the importance of management and organization in SCIs [10, 18]. The literature also discusses the crucial role of policies in the successful implementation of SCIs. These policies shape the smart city environment and are instrumental in creating the communities and applications that are essential for the fruitful realization of SCIs. Regrettably, such policies were absent in the case studies, suggesting that SCIs might be more of a management trend than a policy-driven endeavor.

Limitation and Future research. This study employed a qualitative case study approach, which may introduce certain biases. To mitigate this limitation, I have provided examples and quotations to substantiate these findings. In addition, I utilized a triangulation technique, collecting data from various sources to validate the results. Moreover, the case study was conducted in a specific country, which may limit the generalizability of the findings to other contexts. However, according to [23], such a case study can contribute to the theoretical generalization of findings.

Future research could consider exploring different contexts and countries. This would allow for a more comprehensive comparison, enhance understanding of the phenomena under study, and potentially improve the generalizability of the findings to other settings. In this study, I considered three components of the smart city framework, all of which pertain to an organization's internal environment. Future research could consider the impact of the external environment on the adoption of smart city initiatives. This could provide deeper insights into how smart city concepts are translated and adapted across different contexts, and what changes occur during the adoption process. Answering these questions could offer valuable lessons for practitioners looking to successfully implement smart city initiatives in their organizations.

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