Diagnosing the voids of knowledge in the transformation process in managing and standardizing smart city development: the case of the government of Indonesia

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Purpose: This study investigates smart city development projects implemented by the Government of Indonesia (GoI) from 2017 at the regional and municipal levels. Moreover, it provides a critical perspective on the lack of knowledge of the transformation process, substantive knowledge, and the wide-regime-shifting balance of knowledge required to accomplish smart city development. From the project scope perspective, this research elaborates on technical defaults of the regional and municipal GoI's initiating, constructing, and implementing smart cities.

Research methodology: The authors conducted semi-structured interviews to explore how these project doers operate in each stage of the smart city development, including initiation, work in progress, implementation, and reporting. In addition, the research questions of this semi-structured interview are derived from this study's critical perspective and the knowledge domains of smart city development.

Originality: First, this study sheds light on the development of 100 smart cities by the GoI, with 50 financed but unfinished projects since 2017, indicating design failure. Second, we argue that the blueprint designed by the GoI smart communities does not demonstrate comprehensive political will or the conducting of socio-cultural and technical analyses to encourage and support the development of smart cities. Third, this study uniquely highlights that the GoI wants to build smart cities using collective cognition or mutual understanding, but lacks knowledge of the transformation process and substantive knowledge for system analysis and design, development, and implementation, leading to uncertainty and non-uniform approaches to smart city developments across various regions and municipalities. Fourth, this research criticizes the misalignment and imbalance of knowledge between the GoI, the targeted regions and municipalities, and all agents involved in developing smart cities.

Findings: The authors find four unique theme formulations: the GoI's behaviors in equivalencing with regular procurement, the voids of knowledge in the transformation process, substantive knowledge boundaries, and letting these projects progress without accompanying committed knowledge boundaries and working for a future without a signifier. Finally, this study suggests that

the government should prioritize mastery of knowledge of the transformation processes in smart city development and implement agile strategies to ensure these projects' success and future benefits.

1 Introduction

The GoI planned to build 100 smart cities starting in 2017 and, as of 2022, has spent development funds on 50 related project activities. In this context, the authors define a smart city as a city which utilizes technology and data to enhance the quality of life of its residents, improve urban service efficiency, and enhance citizen participation in urban governance (Townsend, 2013). However, this study indicates that none of the 50 smart city development projects have materialized into an operational smart city as of 2022. It reveals that smart city projects fail to elevate residents' quality of life. An unrealized smart city project signals that the designer and developer of the smart city, which in a sense is the GoI, is experiencing technical failure. Indeed, while research on smart city development has surged in recent years, significant gaps remain in the literature. Much of the research thus far has concentrated on the application of smart city concepts, technological innovation and policies, and the implementation of smart cities at the community level as end-users (Guma and Monstadt, 2021; Ismagilova et al., 2022; Okafor et al., 2022). However, there is a lack of in-depth research concerning how a central government manages and standardizes the knowledge processes and boundaries for developing smart cities through having strong subject matter knowledge for system analysis and design, development, and implementation. Furthermore, this study investigates the GoI's technical failures in developing smart cities. However, the authors note that evaluation and analysis do not focus on the Internet of Things (IoT), information and communication technology (ICT), artificial intelligence (AI), and others. Instead, this study focuses on the adequacy of the substantive knowledge (Pratama and Imawan, 2019; Thollander et al., 2019) of the GoI and targeted regions to implement and realize smart city projects.

Furthermore, it analyzes in more depth the actions of the GoI that have matured themselves to ensure the success rate of smart city development, transforming its capacities through a wide-regime-shifting balance of knowledge (van Gerven et al., 2017; Nilsson et al., 2020). It means smart city development needs multi-stakeholder cooperation and continuous adjustment of knowledge and approaches to achieve success. Hence, this research infers whether the GoI has revealed its knowledge endowment, representing the provision of in-depth and comprehensive knowledge on aspects of smart city project development and implementation, including strategy, innovation, and the technical and social understanding required for the project's success (Morewedge and Giblin, 2015; Ribeiro and Nagano, 2021; Tan et al., 2022), and enhanced its knowledge through a wide-regime-shifting

balance, having concluded a highly successive probability of smart cities development.

This study demonstrates some critical reasons supporting its novelty. First, it showcases the phenomenon of the development of 100 smart cities by the GoI, which is currently developing 50 currently unfinished projects. It shows that the development of smart cities began in 2017, and there has been a 5-year process until now. Moreover, the central GoI report indicates that the completion of the smart city development project does not show a significant increase in progress. This research also considers several opinions regarding the GoI's unpreparedness, such as the assumption that it is like an ordinary ICT project, unclear budgeting, lack of commitment, and so on. Second, we argue that the blueprint designed by the GoI smart communities does not demonstrate comprehensive political will or the conducting of socio-cultural and technical analyses in promoting and assisting smart city development (Zhu et al., 2019; Yigitcanlar et al., 2021). We highlight the analysis showing the tendentious nature of only confirming governmental budgeting and accounting procedures, neglecting political, socio-cultural, and technical analyses. This imbalance affects the understanding and implementation of smart city projects as not all relevant aspects are adequately considered. Thus, we highlight the partiality of GoI's smart cities blueprint. Under these conditions, smart city developers would experience confusion and disorientation and be prone to inaccuracies and missed deadlines that affect the implementation of definite concepts and practices during development.

Third, this study uniquely highlights that the GoI wants to build smart cities in collective cognition, representing the coordination and synchronization between all parties involved in comprehensively understanding the project, which lacks substantive knowledge for system analysis and design, development, and implementation. It presents the argument that developing smart cities requires capabilities in the ICT field and knowledge domains that are utilized to sustain success (Rathore et al., 2016; Thollander et al., 2019; Shari and Malip, 2022). On the other hand, the authors explain that smart city development projects require exceptional incremental knowledge (Kummitha and Crutzen, 2017; Lim C. et al., 2021; Mu et al., 2022), unlike ICT application development projects. In this case, the knowledge includes concepts, innovations, and deep understanding that are not only incremental or gradual but also considered exceptional to achieve success in smart city development. Moreover, we reveal that the innovative city development project requires strong communication and coordination between the agents involved to ensure its usability (Praharaj et al., 2018; Broccardo et al., 2019; Tan et al., 2022). Usability is here defined as the interdependence of

data to be processed into useful information for users. Therefore, in the development process, each agent involved must always act to internalize, externalize, and combine the wide-scope domain and complex traits of a smart city's knowledge (Ribeiro and Nagano, 2021; Tan et al., 2022). Thus, we demonstrate the need for substantive knowledge and communication and coordination, including domain and detailed knowledge, because this would guarantee success in smart city developments.

Fourth, this research criticizes the misalignment and knowledge imbalance between the GoI, the targeted regions and municipalities, and all agents involved in developing smart cities. In essence, it is considered that the impact of the lack of knowledge about the development of smart cities is the delay in their successful implementation (Jiang et al., 2020; Nilsson et al., 2020; Lim C. et al., 2021; Tan et al., 2022). The authors reiterate that knowledge for smart city development should not focus on ICT, IoT, AI, or deep learning (DL). Instead, this study underlines the essential needs, especially endowment knowledge, to face all challenges involved in smart city development (Kummitha and Crutzen, 2017; Mu et al., 2022). In other words, this article explains the need for substantive knowledge that limits the creation of smart cities to their implementation (Ruhlandt, 2018; Vukić et al., 2020; Ribeiro and Nagano, 2021). Thus, the emphasis on developing smart cities does not focus on systems and information technology but on the need for endowment knowledge to innovate and control the development process.

This analytical and evaluative research contributes to four main perspectives: the GoI's awareness process for the importance of comprehensive and detailed knowledge endowment, accentuating knowledge over the legal (form), differential auditing and investigation, and outstanding strategic efforts and accomplishments. Then, we elaborate on each contribution. First, the importance of comprehensive and detailed knowledge endowment supports successful progress in developing smart cities. The authors argue that smart city development requires a broader knowledge domain than a typical Information Systems and Technology (IST) development project (Ribeiro and Nagano, 2021; Tan et al., 2022). This study argues that the GoI and targeted regions and municipalities should expand smart cities' knowledge regarding environment, organization, and strategy (Hecker, 2012; Lim S. B. et al., 2021), innovation to strengthen dexterity with multi-skill inducements (Praharaj et al., 2018; Caragliu and Del Bo, 2019; Jiang et al., 2020), and avoid the occurrence of the IST investment paradox (Farzaneh et al., 2020; Gebauer et al., 2020; Linde et al., 2020). Second, the GoI, using its power to establish regulations, must dare to declare "substance over the legal (form)'s accentuation." This would mean completing smart city projects through a long-term process (Brorström et al., 2018; Grossi et al., 2020; Repette et al., 2021), with multi-relationship agent involvements (Broccardo et al., 2019; Guay and Pradeu, 2020; Ribeiro and Nagano, 2021), and using the collective knowledge of the innovators and users, requiring substance to be placed as the primary goal (Farzaneh et al., 2020; Repette et al., 2021; Kim and Kim, 2022). Nevertheless, these smart city projects must follow public administration and budgeting regulations.

Third, this research fully contributes to the auditing conducted by GoI's auditors, which equalizes smart city development and

regular IST projects (Brorström et al., 2018; Jiang et al., 2020). Therefore, the GoI must establish new standards and procedures in differential auditing and investigation. Moreover, it has been stated that the characteristics of smart city development projects differ in all aspects of knowledge, implementation, and process accomplishment (Coyne et al., 2000; Farzaneh et al., 2020; Ribeiro and Nagano, 2021). Therefore, the GoI's auditors should change the auditing process by establishing management's capability and competence elements at the central and regional levels with adequate capacity. Fourth, the authors demonstrate the need for knowledge dissemination and sharing nationally to develop smart cities, especially those focusing on distinctive strategic efforts and accomplishments (Morewedge and Giblin, 2015; Tan et al., 2022). We understand that when there is no broad regime of fundamental knowledge for the nationwide design and development of smart cities, the probability of technical failure is high (van Gerven et al., 2017; Leydesdorff et al., 2019; Sahadewo et al., 2020). Moreover, the low level of fundamental knowledge further encourages the inability of the GoI and targeted regions and municipalities to transform conventional society into an intelligent one. Therefore, the GoI must combine two fundamental forms of knowledge to accelerate the successful development process of smart cities.

2 This study's critical perspective

2.1 The need for substantive knowledge

This study argues that the challenge to accomplishing or completing a project is the adequacy of fundamental knowledge, including various properties needed to form a unified vision (Bibri, 2018; Leydesdorff et al., 2019). Furthermore, there must be substantial knowledge on properties, states of affairs, and events, indicating a readiness to design, build, and realize (Hecker, 2012; Leydesdorff et al., 2019; Pratama and Imawan, 2019) the GoI's smart city projects. Thus, this study demonstrates the need for boundaries for accomplishing GoI's smart city projects, requiring four knowledge classes: all that is related to IST, collective cognition regarding the regime, transformation, and shifting balance. With these, various industries will be developed intelligently, and socio-cultural factors will affect the success. Moreover, the knowledge classes have been divided into properties; these properties could be theories, concepts, critical reasonings, etc. Then, each property in each knowledge class should have its state of affairs, meaning the relationships validated by events (Vukić et al., 2020; Yeo et al., 2021; Yigitcanlar et al., 2021). Finally, comprehending these knowledge classes, properties, states of affairs, and events construct the substance for accomplishing GoI's smart city projects. Hence, we analyze the need for the GoI to induce knowledge of the transformation process, substantive knowledge, and shifting balance of required knowledge.

However, this research indicates that the GoI and targeted regions and municipalities ignore substantive knowledge and all its detailed aspects, which negatively affects the completion of smart city projects (Leydesdorff et al., 2019; Burns and Andrucki, 2021; Repette et al., 2021). The GoI must build synergies between optimal substantive knowledge to achieve collective cognition.

Thus, developing smart cities in Indonesia becomes low-cost because of a comprehensive understanding without fallacy and over-generalization (Morewedge and Giblin, 2015; Lim C. et al., 2021; Yigitcanlar et al., 2021). Using substantive knowledge, the GoI carries out the smart city projects' subsequent efforts on smart city implementation. In a contradictory manner, the GoI stated that the performance evaluation of the flourishing smart city was not only to fulfill public administration. The evaluation should also examine what societies potentially get regarding enhanced welfare and social prosperities (Bibri, 2018; Grossi et al., 2020; Nilsson et al., 2020) due to capturing smart city properties and their state of affairs. In brief, this article demonstrates that successful smart city development is not about getting a legitimized public administration. Instead, it should be transformed into realizing a prosperous welfare society.

2.2 Wide-regime-shifting balance of the need for smart city knowledge

This study uses the work of Coyne et al. (2000), van Gerven et al. (2017), and Sahadewo et al. (2020) to combine the wide-regime concept and to shift balance theory toward critical reasoning in forming smart city knowledge. Along this line, establishing smart city knowledge should be anchored and broadened by the GoI and the regions, adapting to different urban problems in each region. Specifically, each agent, such as the regional leader, the director of the IST project, or the branch manager of a bank, concurrently discusses and evaluates the concept, innovation, and progress of the smart city project, reaching commensurate knowledge in succeeding smart city development due to its ongoing long-term project. Nevertheless, the study argues that not all agents have synchronized their knowledge yet, including at the region-central levels. Consequently, their cognitive roadmap of smart city realization (Behrens et al., 2018; Bibri, 2018; Brorström et al., 2018) is leading to haphazard principles and endless execution (Thollander et al., 2019; Zhu et al., 2019; Burns and Andrucki, 2021). Thus, the GoI should widely and continuously embrace all involved agents and apply adaptive and genuine solutions to significant urban problems. In conclusion, the GoI and targeted regions and municipalities could reach smart city project completion cognitively and realistically by simultaneously adapting the concept with a variety resources and obstacles.

Consequently, with the expansion of a regime-shifting-balance through the GoI's active involvement and various related entities to achieve knowledge alignment in the development of smart cities, ensuring the optimal balancing of resources and integrating ICT with good quality of life, and transforming the project into a national cognitive concept, the GoI could anchor smart city knowledge with all agents as well as lead to a high-transformation process jointly by transforming all available resources with the high-measure output into a new optimal balance of smart city implementation (Coyne et al., 2000; Brorström et al., 2018; Pratama and Imawan, 2019). Thus, the GoI could fulfill the fundamental objectives of a smart city, which is integrating ICT involvement with a decent quality of life for its citizens (Bamwesigye and Hlavackova, 2019; Kankanhalli et al., 2019). However, without the combined role of the wide regime and shifting balance,

smart city projects are restrained as public administration and budgeting legitimization rather than conceptualized as collective national cognition, referring to the coordination and shared understanding between the central GoI, local governments, and agents involved in smart city development at the national level. In this context, all parties must have equivalent knowledge and high coordination to achieve successful nationwide smart city development. Furthermore, a smart city project could never be evaluated because of the GoI's lack of substantive knowledge in all properties' levels of relationships (Hecker, 2012; Behrens et al., 2018; Santos et al., 2019). Thus, the GoI's smart city development could not achieve a prosperous society, conceding that it faces a misalignment of substantive knowledge (Thollander et al., 2019; Jiang et al., 2020; Yigitcanlar et al., 2021). Therefore, this study reveals that the benchmark of smart city success is not fundamentally the practical thinking of IST regular projects. Therefore, the main focus of the GoI is an obligation to enhance the maturity of the substantial knowledge of the GoI and the regions as the agents involved, and encompass all involved agents to increase their synchronization in terms of the knowledge endowment for smart city development and implementation. Finally, the authors argue that the GoI, regions, and GoI-related agents involved in smart city development projects should enhance their wide-regime-shifting balance to ascertain the future success model for smart city development.

3 Research method

3.1 Material sources and participants

In this study, we employed critical interpretive synthesis by condensing collected data to understand the required knowledge of the smart city projects' doers in Indonesia. We collected data by conducting semi-structured interviews to explore thematic topics. Participants were civil servants and business representatives selected based on their involvement in regional and municipal GoI smart city developments. These selection processes involved identifying potential participants and elucidating the research objectives and interview procedures. Thus, participants were chosen based on established interests and criteria. In addition, the interviews were conducted in person or via telephone or video calls, and their outcomes were transcribed for subsequent analysis by involving eight participants from various governmental institutions, six from the provinces and regencies, an auditor, and an executive officer of non-governmental organizations (NGOs). All interviews were recorded and all participants gave their informed consent. This study presents the participants in Table 1 and the resulting matrix coding in Table 2. Moreover, this research adjusted the questions to fit the participants' backgrounds. Therefore, the authors could achieve collected data content validity and credibility because of the relevant interviewees. We believe that the data collection design using random purposive sampling of the selected participants is sufficient to formulate this study's condensation of logical reasoning (Saunders et al., 2018) on the GoI's smart city developments, leading to technical failure. Additionally, this article presents the reporting of research results after reaching optimal saturation (Saunders et al., 2018;

TABLE 1 Participant data.

Respondents code	Institution	Echelon/level	Gender	Duration
R-01	ICT Corporation	Vice president	Male	03.21.50
R-02	Auditor	III	Male	02.17.26
R-03	Region ICT Department	III	Male	02.38.33
R-04	Region ICT Department	II	Male	03.40.13
R-05		III	Male	
R-06	Region ICT Department	II	Male	02.29.29
R-07		III	Male	
R-08		III	Female	
Total				18.23.31

TABLE 2 Matrix coding.

Name	R-01	R-02	R-03	R-04	R-05	R-06	R-07	R-08
Regions lack commitment to smart cities	0.00	0.00	2.86	1.82	0.00	2.75	0.00	0.00
GoI treats smart cities like ICT	1.39	1.78	0.00	0.43	0.00	0.43	0.00	0.00
GoI's lack of knowledge hinders development	0.00	0.00	1.61	0.00	6.44	4.37	0.00	4.16
A smart city is not prosperous without international standards.	0.00	0.00	0.85	0.00	0.00	0.77	0.64	1.63
The vital role of knowledge in smart city development.	1.20	2.96	0.00	0.00	9.91	0.00	0.00	4.49
Regional issues hinder the national smart city	0.23	0.00	1.39	6.58	3.97	2.61	0.00	0.00
GoI's commitment shapes smart city success.	0.00	0.00	1.84	0.00	0.00	0.00	2.11	1.63
A smart city aims for efficient governance and prosperity.	0.00	1.92	1.82	0.00	0.00	0.60	0.50	0.00
Smart city development enhances regional adaptation.	0.00	2.28	0.00	1.99	1.14	0.00	0.00	11.90
Building smart cities: prosperity through knowledge	2.09	0.00	1.32	0.00	1.92	1.66	0.00	0.00

Kee and Schrock, 2020), such that the logical construction of uniquely themed formulation from analysis and discussion comes from a triangulation perspective. Furthermore, we reviewed corroborative documents such as the smart city masterplan, progress report, and budgeting document to strengthen the analysis. We believe that these unique themes are constructively formed reasons.

4 Analysis and discussion

4.1 Behaviors in equivalencing with regular procurement

This study notes that the GoI considers smart city development equivalent to traditional procurement, such as physical asset purchasing (Peng et al., 2017; Rao and Prasad, 2018; Shin et al., 2021). Meanwhile, it highlights the different characteristics of intangible and physical asset purchases or developments. Hence, it supports the phenomenon as implied by the participants below.

Regions are trapped in regular routines; there is no budgetary program for the non-smart cities. Most regions' and cities' heads presume smart city projects to be regular

ICT, from initiating, developing, and rendering. Hence, the low commitment between the GoI and regions accomplishes the smart city projects while uncapitalized by comprehensive knowledge boundaries (R-03: 35′; R-06: 51′; R-04: 20′).

The GoI treated smart city development projects as an ICT procurement. Therefore, those project mechanisms should follow regular regulations for physical asset procurements (R-04; 54′; R-06; 60′; R-02; 3′).

This study indicates that the GoI handles smart city development as if it were procuring or purchasing ICT hardware (Peng et al., 2017; Shin et al., 2021). In addition, the GoI, through its Ministry of Information and Communication, only provides technical guidance to develop a master plan for the smart city. Thus, this infers that the development of smart cities in several regions and municipalities is not based on IT strategies, investment strategies, evaluation and measurement of project management, managing application acceptance, etc. Instead, the development is based on technical or task control or merely oriented toward finance and administration (Jamroga and Ågotnes, 2007; Hao et al., 2021). Likewise, the authors highlight that the GoI, mandating this development to regions and municipalities, does not seek to innovate smart city development disruptively, particularly

in the administrative reengineering process and to capture foresight orientations.

The researchers show that the development of smart cities in several regions and municipalities is unclear because of the absence of an ecosystem mindset. Another reason is that the GoI should act to use the collective cognition of citizens for the implementation of smart cities, for example, governmental administrative processing. In other words, the GoI should treat the community with a cognitive development approach, as a finished smart city is useful for processing activities at low costs (Morewedge and Giblin, 2015; Ning and Liu, 2015; Nikki Han and Kim, 2021). On the other hand, the GoI does not employ analysts and designers of smart cities who are developing smart cities in regencies or municipalities. This study assumes that knowledge is the most necessary quality for the success of smart city development (Peng et al., 2017; Ruhlandt, 2018; Ribeiro and Nagano, 2021). Therefore, developing smart cities in Indonesia cannot transform the existing equilibrium into a new balance.

4.2 The voids of required substantive knowledge boundaries

This study found that the GoI ordered smart cities to be built under complete technical guidance. Thus, it represents a Quo Vadis for information systems development. In contrast, information systems development must adhere to knowledge concentrating on the managerial field and an agreement on reference standards (Lytras et al., 2021; Mouazen and Hernández-Lara, 2021; Sharif and Pokharel, 2022). Therefore, the authors collected transcripts of the interviewed participants below.

> A development project would provide success if the GoI, as principal, determined the knowledge boundaries to accomplish stage-by-stage activities. Moreover, the GoI ordered regions and municipalities to develop smart cities without transferring knowledge comprehensively for managing and promoting standard uses of information system developments (R-05; 9′; R-03; 23′; R-08; 9′; R-06; 13′).
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> We work on smart city development with undefined standardized references internationally. So, for example, we are not required to refer to the denominator of software requirement systems from IEEE, ISO, etc. Thus, how can the performance of smart city development projects be acknowledged as successful? (R-07; 33′; R-03; 46′; R-08; 93′; R-06; 17′).
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> Knowledge endowments are the primary driver for problem-solving. In the context of smart city development, the GoI should have accommodated holistic knowledge used to transform society's social welfare process. Thus, social transformation requires integrative knowledge emphasizing the importance of intellectual and epistemic values (R-05; 42′; R-08; 17′; R-02; 12′).

This study shows that the development of intangible assets, such as smart cities, places knowledge supremacy over the development of physical assets. In other words, substance

knowledge occupies the fundamental strategy for completing the development project (Ng et al., 2022). The authors argue that intangible asset development requires cognitive development for the developer and potential users. The role of cognitive development is to unite all citizens' thoughts toward the missions and goals of regions' and municipalities' problem-solving. Furthermore, this research demonstrates the importance of substantive knowledge, which the GoI must transfer to regions and municipalities (Thollander et al., 2019; Tan and Taeihagh, 2020). Thus, knowledge can be used to produce smart city development that could transform society toward mutual prosperity. However, in a contradictory way, the voids of knowledge substance would produce highly deviant smart city products, further resulting in non-optimal and maladaptive uses for enhancing social welfare.

This study reveals that the smart city development in Indonesia highlights the vital role of knowledge, especially in managing and setting standards for creating information systems (Wanzenböck and Piribauer, 2016; Sharif and Pokharel, 2022). Furthermore, if the GoI commands the smart city development with complete substantive knowledge, regions and municipalities catch up with the ease of mechanistic constructivism and structuralism. In other words, the authors argue that there is a philosophical understanding of knowledge evolution to accommodate the knowledge needs of designers in developing smart city applications. Consequently, the end product of smart city projects is not in logical fallacies. Meanwhile, managerial certainty to implement smart cities in the future can probably harvest the community's welfare because regions and municipalities can transform the accommodated substantive knowledge into an automatic tool for achieving a new societal balance (van Gerven et al., 2017; Kankanhalli et al., 2019).

4.3 Letting development progress without commitment

This study highlights that the order to build intangible assets, such as smart cities, has a morally appropriate status when the principal, as the commander, has a reliable understanding of the substantive knowledge (Jameson et al., 2019; Ribeiro and Nagano, 2021). Thus, this commander acts with high commitment. Next, the authors use the interview transcripts below to diagnose the potential success of smart city development.

> We identified and internalized regional problems shifting to smart city development. However, we doubt that our problem identification and internalization are relevant for the GoI's facilitation of all regions and municipalities in Indonesia. Consequently, what we did to develop a smart city impacted the GoI's commitment to implementing this information system. Thus, we developed the smart city without giving it our all (R-04; 83′; R-06; 13′; R-03: 3′).
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> Whether the GoI shows total commitment, directs regions and municipalities to develop smart cities with definite missions and goals, and manages IT for enterprising regional administration, definitive information system standards for

the referenced development process determine social welfare to be achieved, and evaluation and measurement of regional development (R-07; 63′; R-08; 57′; R-03; 25′).

This research documents that the GoI, with its voids of substantive knowledge, are not fully committed to the smart city development conducted by regions and municipalities (Ardito et al., 2019). Meanwhile, regions and municipalities understand what they should do to develop smart ecosystems comprehensively. In short, the GoI should have supported regions and municipalities with comprehensive knowledge of smart city development (Vukić et al., 2020; Ribeiro and Nagano, 2021; Tan et al., 2022). However, this support has not been offered. Thus, this study infers that the GoI did not offer substantive knowledge to regions and municipalities' designers and developers of smart cities. Simultaneously, the GoI did not exert social influence on citizens within substantive knowledge to construct their cohesive mindset ecosystems. Finally, the authors reveal that the GoI's lack of knowledge support and social influence marks their low commitment.

The authors consider that the smart city can shift to a new balanced equilibrium. However, this shifting balance requires the GoI to understand smart city development well (Nilsson et al., 2020; Sahadewo et al., 2020). The GoI's orders for the regions and municipalities to develop smart cities were not accompanied by management and standardization of denominator knowledge for such development (Lytras et al., 2021; Sharif and Pokharel, 2022). Thus, this study infers that the GoI has a low commitment to the voids of substantive knowledge transferred to regions and municipalities. On the other hand, this study reveals that the GoI has low moral status due to the lack of comprehensive knowledge that smart city designers and developers must acquire in the regions and municipalities. Consequently, regions and municipalities have low commitment because of the incompleteness of their acquired substantive knowledge. Furthermore, regions and cities with acquired knowledge can transform the current balance of social welfare (Ismagilova et al., 2019; Mora et al., 2019; Löfgren and Webster, 2020). Finally, this study suggests that the GoI has low principled moralities in developing the smart city.

4.4 Working for a future without a signifier

This study noted that the GoI did not leverage the smart city development with a signifier of mindset ecosystems. It also considers that the GoI should have implanted these mindset ecosystems for regions' and municipalities' designers and developers of smart cities and for citizens, who are the potential users (Farzaneh et al., 2020; Repette et al., 2021; Mohanty et al., 2022). Thus, this study provides the following evidence from the interview transcripts:

A smart city should have improved local citizens' prosperity, but we only capture the GoI's orders as a service orientation for people. What we meant by smart city development is the defragmentation of the governmental administrative process to be more efficient as a signifier. Then,

regional residents could gain benefits. Thus, this signifier is not included in the GoI's orders to enhance social welfare (R-06: 22′; R-02: 36′; R-03: 3′).

The development of the smart city should improve regions' and municipalities' adaptation, including citizens' living. Meanwhile, adaptation needs identified signifiers to leverage the process of gaining prosperity. Thus, this smart city development is built correctly by its transformative power with the identified signifiers, not focused on service orientation (R-05; 42′; R-08; 17′; R-02; 12′).

While we work in regions and municipalities to build a smart city, we may occupy the expedient arena in increasing the local communities' prosperity. However, being unaccommodated with knowledge supremacy, these expedients probably build smart city information systems to be documented artifacts (R-06; 67′; R-05; 85′; R-03; 34′).

This study finds substantially different levels of benefit from developing smart cities. It indicates that the meaning of a smart city is fundamentally redesigned business or administrative processes that run in such a way as to increase the community's prosperity (Okafor et al., 2022; Shruti et al., 2022). However, the GoI emphasizes the only services to the public are more efficient, fast, convenient, and secure. Therefore, this study infers that these different conceptions continue the process of developing a smart city that is not equipped with substantive knowledge for managing the development and referenced standards needed for creating a smart city. Furthermore, the absence of substantive knowledge has voided a signifier in the smart city information system and its implementation, which is useful to increase people's prosperity (Jiang et al., 2020; Guma and Monstadt, 2021; Yigitcanlar et al., 2021).

From a foresight perspective, the authors showed that the development of smart cities requires inducing a signifier as a lever in its capacity as an information system in which the potential users can contribute to innovation for long-term benefits (Appio et al., 2019; Michalec et al., 2019; Israilidis et al., 2021). Thus, the leverage capacity of an information system depends on the intellectual content that catalyzes innovations toward a higher level of adaptability. Furthermore, this study underlines that this signifier is the substantive knowledge that underlies smart city development and further promises certainty for society's future prosperity. On the other hand, this study explains that the development of smart cities that the GoI initiates without hinting at an ontology of substantive knowledge and a signifier negatively impacts their moral status. Therefore, this study suggests that regions and municipalities that develop smart cities under the mandate of the GoI are in the highest convenience status, even if they are practically immoral or improper (Shamsuddin and Srinivasan, 2021; Anzel et al., 2022).

5 Findings and implications

This study finds that the smart city program was run simultaneously in 50 regions and municipalities but unaccompanied by efforts from the GoI to provide requisite knowledge to decision-makers. The impact is the development

of pseudo-smart cities that disintegrate between concepts and programs. The GoI did not offer regions and municipalities the knowledge necessary to finish the smart city project (Ismagilova et al., 2019; Löfgren and Webster, 2020; Guma and Monstadt, 2021). The first failure is that the smart city is not limited to only digital applications but is a new method to manage sectoral and environmental performances by combining information system applications. For example, a smart city integrates the properties and state of affairs for substantive knowledge in regions and municipalities. Regions and municipalities facilitate the changes for citizen's electric cars by switching the gasoline pumps to a centralized electric power supply. The second failure is the proposed values of smart city development, such as not installing modest devices such as the cloud. Smart city development is more comprehensive than that of infrastructures. The third failure is that the smart city is an information system program to change human behavior pervasively in disrupted activities. Finally, we summarize that these three failures impact the smart city brand failure, including its implementation (Rutter, 2002; Shamsuddin and Srinivasan, 2021). Hence, this study demonstrates that traumatic and conflicted risks will arise in the future; this smart city program should be improved according to the best practices worldwide.

Secondly, this research finds that 50 smart city projects in Indonesia have not been fully integrated, owing to poor learning outcomes among developers (Appio et al., 2019; Bloomfield, 2019; Armstrong and Manitsky, 2022). We explain that Central GoI's substantive knowledge does not enable positive outcomes of smart city projects. For example, nationally integrated data and information would probably be complex because each region or municipality did not support its development with dynamic interconnectivity, such as that facilitated by an application programming interface (API). Furthermore, the absence of genetic epistemology that the GoI should have conducted affects the region's or municipality's low-kinetic knowledge capabilities. On the other hand, this study notes the existing constraints in terms of a fiscal budget for smart city development, showing that the GoI does not compensate for the capitalization of intangible assets (Zhu et al., 2019; Fan et al., 2021; Gardner et al., 2021). Thus, this study concludes that it is no longer possible for the smart city project to be continued. Finally, we reveal that the voids of genetic epistemology from the GoI constructing adverse mindset ecosystems are the underlying problem in ascertaining gained social welfare.

Thirdly, this study found an imperfect knowledge transfer process between Central GoI and the regions. Due to these imperfections, regional actors of smart city development among regions and municipalities are not equally equipped with knowledge, impacting various emerging risks (Galdon-Clavell, 2013; Moustaka et al., 2019; Ismagilova et al., 2020). These risks become even more remarkable when the GoI does not conduct collective cognitive development for these smart city developers, such as regions and municipalities. Furthermore, this study identifies the emergence of continued problems. First, the regions and municipalities misunderstand smart cities' substantive knowledge, which they have slipped into digitization and digitalization. Second, the expected implementation of smart cities by regions and municipalities becomes abstract because of conceptually biased measurement standards. Furthermore, a smart

city risk is the end product of an application program that never produces an ideal and perfect achievement to shift an economic system, society, and life to be truly intelligent in the conditional states of innovative ecosystems and ecologies (Angelidou, 2015; Ika and Donnelly, 2017; Gonzalez Benson, 2020).

This study suggests two innovative policies. First, that the GoI conduct a zero-based review analysis for all current smart city developments in 50 regions and municipalities (Angelidou, 2015; Pawar et al., 2021). Moreover, it notifies that this massive development of smart cities produces many variant information systems, such as database management systems, interconnectivity, interoperability, security, and other layers. From a knowledge perspective, the authors demonstrate that the primary agenda in smart city development is genetic epistemology to facilitate collective cognition between regions, municipalities, and their residents. Moreover, it structuralizes regions, municipalities, and their netizens with a comprehensive mindset ecosystem of smart city development and implementation (Nilsson et al., 2020; Catalan-Matamoros and Peñafiel-Saiz, 2021). Finally, the zero-based review analysis should ascertain the gaining process to achieve a prosperous society, in which smart city development should be stopped before a new shifted balance is definitively achieved.

Secondly, this study's findings imply that the highest intellectual development should be rooted in redesigning the Nationally United Smart City. Then, we argue that smart city development should aim to develop regions and municipalities that are more adaptive in achieving mutual prosperity at the regional level (Kummitha and Crutzen, 2017; Burns and Andrucki, 2021; Mu et al., 2022). Therefore, the authors reveal that the massive production of smart cities does not ensure the formation of long-term marginal benefits for the GoI. Instead, the long-term marginal benefits are achieved when the GoI transforms the governmental administrative process through multiple avenues (Caragliu and Del Bo, 2019; Gonzalez Benson, 2020). Finally, we reveal that a dexterous axis strategy is the union of smart city development, constructing a cost reduction generic strategy. Therefore, the centralistic approach will reduce long-term marginal costs for these smart city developments. Hence, the GoI could carry out a nationally simultaneous deployment of this smart city information system for each region or municipality because all related supply chains have been arranged in a national unit-level analysis. Furthermore, the GoI is prohibited from forsaking the dynamic adaptive structuration proposed by regions or municipalities.

6 Concluding remarks

This study concludes that smart city developments in some Indonesian regions and municipalities are technical and knowledge failures. Moreover, it reveals that smart city developments are not accompanied by the following holdings: (1) knowledge of the transformation process, (2) the need for substantive knowledge, and (3) the shifting balance of required knowledge for information system analysts and developers. Moreover, the GoI did not construct the minimized requirements of knowledge boundaries and processes for project doers and citizens to align with the

GoI's mission and goal of smart city development, including their attitudes and behaviors. In other words, the GoI did not provide regional-municipal project doers and their societies with the knowledge processes and boundaries of the smart city developments. Furthermore, this study finds four-dimensional findings of abnormally collective cognitive states in smart city development within project developers and doers. The GoI treated smart city development like physical assets procurement, there were voids of knowledge in the transformation processes, there was a need for required substantive knowledge, development was allowed to progress without commitment, and work was continued without a signifier. Thus, we infer that smart city development is an intangible asset, requiring knowledge supremacy to be placed into the collective cognitions of the information system developers and doers. Finally, this research states that the GoI should conduct a zero-based review analysis and redesign the need for knowledge processes and boundaries, bringing the nationwide project developments into a united smart city.

The primary contributions of this research lie in providing a deeper understanding of how knowledge of the transformation process can be held and managed within the context of smart city development. Secondly, the authors demonstrate the need for a knowledge-shifting balance to finish smart city developments in Indonesian regions and municipalities. In other words, it explains an absolute need for a knowledge curriculum for structuring smart city developers and doers. Thirdly, the authors recommend substantive knowledge for smart city developers, doers, and bureaucratic staff to shift their knowledge capacities to accomplish smart city developments. For example, the knowledge capacities are architecture programming interface, extensive data analysis, deep learning, and artificial intelligence. Additionally, this research offers new insights into the challenges encountered in smart city development in Indonesia and how these challenges can be overcome through strategic-fit choices.

This study bears some limitations. Firstly, it focuses on smart city development in Indonesia, which may limit the generalizability of its findings to other country contexts. Indonesia is a developing country with high political pressures, low income per capita, and natural resources that can be exploited. Secondly, this study concentrates on knowledge of the transformation processes and boundaries, ignoring Indonesian societies' beliefs, attitudes, and behaviors that significantly affect the success of smart city developments. Finally, the authors explain that smart city developments should focus on socio-cultural and political outcomes and returns should not be calculated with a monetary focus. In other words, the GoI probably measures the smart city project developments by measuring profitability as they would

with businesses. Thus, this paper neglects the performance-based measurements of smart city development with political and socio-cultural approaches, opening the way for future research.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Author contributions

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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