Smart City Assessment for Sustainable City Development on Smart Governance: A Systematic Literature Review

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***Abstract*— smart city is a concept in the sustainable development of cities. Smart city assessment measures smartness based on various smart city indicators. One of the indicators in a smart city is smart governance which aims to provide public services through ICT support. Various phenomena and issues in smart city assessment (smart governance) are crucial for exploration, especially in indicators, capabilities, stakeholders, weaknesses, and factors influencing smart governance. A literature review is an analysis model used for exploring smart city assessment. The phases performed consist of three main steps. The first phase of preparation consists of identifying requirements and developing a review protocol. The second implementation phase consists of searching, selecting, and extracting materials. The third phase is reporting (dissemination of results). This study reviews the SCA to answer various phenomena, especially indicators, capabilities, stakeholders, weaknesses, and smart governance factors. The review results show various issues and phenomena in the smart city assessment. The issue in the indicator aspect is the first step that needs to be fixed. The issue in the capability aspect lies in the characteristics of the city to be measured. The stakeholder aspect has a problem in involving various stakeholders to get the assessment results from multiple points of view. At the same time, the issue on the weakness aspect is paying attention to smart city goals and world standards. Stakeholders require more pay attention to the issue of smart city assessment. Therefore, the process and implementation adhere to the smart city's standards and its objectives. Influences have been identified, namely policy domain, Trust, political & institutional environment, internet reach and use, and spatial characteristics.**

Keywords—smart city, smart city assessment, smart governance

I. INTRODUCTION

Smart city has become a trend in various cities in the last decade because the smart city is part of urban planning [1]. Smart city provide city authorities opportunities to improve city services to citizens [2]. The focus of smart cities is the use of technology, smart devices, and infrastructure to improve citizens' lives [3]. A smart city has various indicators used to measure the "smartness" of a municipality with predetermined indicators through smart city assessment (SCA). The smart city project team, international organizations, and researchers determine city "smartness" indicators.

Smart city is a city development concept based on society, economy, people, life, environment, transportation, government, and other indicators. Sustainability is an approach used for urban development for current and future generations [4]. Sustainability and smart city are concepts that can overcome urban problems. One of the Sustainability and smart cities concepts that need to explore is its indicators. SCA mapping is a form of Sustainability and smart city implementation used to measure the "smartness" of a city. SCA was category into two aspects, namely non-technological and technological. Non-technological aspects mapped by [4], source mapping based on OECD and Smart City Index Master indicators. The OECD has several indicators categorized based on four pillars: social, environmental, economic, and institutional, covering 15 themes and 38 indicators [4]. Smart City Index Master has 18 indicators and 46 sub-indicators based on six categories. The mapping produces society, economy, people, living, environment, transportation, and government [4].

The technological aspect has developed to assess smart city projects as integral to smart city implementation. The technological aspect mapped by [5] is based on 34 existing SCA. The indicators generated from the mapping consist of economy, people, governance, environment, living, mobility, and data. Economic has ten sub-indicators, people have three sub-indicators, and governance has six sub-indicators. Therefore, the environment has eight sub-indicators, living has seven indicators, mobility has five indicators, and data has five [6]. However, the indicators from this mapping have several issues, including (1) the distribution of indicators (sub-indicators) is less balanced, (2) most of the assessment model does not involve stakeholders in the development and implementation process, (3) most of the assessment model does not fit with specific conditions of the local government, (4) most of the assessment model does not have feasibility aspect, and (5) most of SCA does not provide recommendations for city development plan [7].

International standards for SCA have been developed, such as ISO 37120, ISO 37122, ETSI indicators, ITU 4901, ITU 4902, ITU 4903, and UN SDG 11+ indicators. ISO 37120, ISO 37122, ETSI indicators, ITU 4901, ITU 4902, ITU 4903, and UN SDG 11+ indicators have several issues. Issues include the imbalance between sustainability and smartness indicators, but ISO, ETSI, and Sustainable Development Goal 11 is good documentation. At the same time, ITU has briefly described indicators. ITU issues will affect one city's assessment results and others [8]. However, ISO 37120, ISO 37122, ETSI indicators, ITU 4901, ITU 4902, ITU 4903, and UN SDG 11+ indicators have the same issue, and they do not provide city development recommendations to local governments [7].

Several assessment models have developed in the context of smart governance, such as those carried out by [9] related to public administration services accessed through a city's website (electronic platforms). The assessment model was developed by [10] in smart governance related to public services, bureaucracy, and public policy focus on government services through electronic platforms. However, smart governance is an indicator that almost always exists in every SCA, and smart governance subjectively provides public services to citizens [11].

Smart governance has several achievable outcomes. The outcomes include performance (economy, ecological), citizen-centric services, social exclusion, public interaction, city branding, efficient government, educated citizens, and readiness. The outcome categories are organizational change, government position, and urban development or improvement [12]. So that SCA positions itself in the second category, namely urban development or improvement. Meanwhile, in the aspect of smart governance platform data, it can be categorized into several types, such as Data showcases, Data Repositories, data marketplaces, and CityScores. Data types related to assessment exist in CityScores [12]. So, identifying factors that influence outcomes is a process to achieve smart governance. Therefore, according to the data described, there are issues or phenomena with SCA and smart governance outcomes. Thus, a systematic overview is essential for exploring smart governance indicators and factors that influence achieving the outcome. Furthermore, this study aims to review the SCA to answer various phenomena, especially related to the following research questions in Table 1.

TABLE I. RESEARCH QUESTION

No	*Question*
RQ1	What are the indicators for each SCA, especially in the smart governance context?
RQ2	Can SCA be used to assess the "smartness" of all types of cities?
RQ3	What are the benefits of SCA to the stakeholder, and which is the stakeholder involved in SCA?
RQ4	What are the weaknesses and issues of the existing SCA?
RQ5	What factors influence the achievement of smart governance outcomes?

II. MATERIAL AND METHOD

A. Material

This study used conferences and journal articles as study material. The data sources used were ScienceDirect, Scopus, IEEE Explore, and Emerald. The search keyword was smart city assessment, and the publication started from 2017 to 2021. The limitation of keywords and years is due to studies related to smart cities, which have a wide area. The search process is also filtered to get good results. The search filter itself is different for each data source. Searching filters for ScienceDirect are articles, review articles, and subject area computer science found 544 articles. Searching filters for Scopus are journal, conference, and English found 113 articles. Searching filters for IEEE Explore are journal, conference, and topic: smart city found 20 articles. Meanwhile, the Searching filter for Emerald are articles, and open access found 101 articles. The total search results with the keyword smart city assessment contained 787 articles, such as systematic review protocols in Table 2.

TABLE II. SYSTEMATIC REVIEW PROTOCOLS

Database	*Filter*	*Result*	*Screening Title & Abstract*	*Screening Full Text*
ScienceDirect	research articles, review articles, subject area: computer science	544	27	13
Scopus	Journal, conference, English	113	16	11
IEEE Explore	Journal, conference, topic: smart city	20	12	5
Emerald	Articles, open access	101	13	1
Total		**787**	**68**	**31**

As shown in Table 2, screening the title and abstract found sixty-eight (68) articles. Thirty-one articles fit the topic, and exploration was done by screening full text. The exploration results there are thirty-one (31) SCA as the materials for this study, as shown in Table 3.

TABLE III. SMART CITY ASSESSMENT

No	*SCA*	*Reference*
SCA1	Smart City Index Master	[4]
SCA2	Sustainable Development Indicators	[4]
SCA3	Smart Sustainable City Indicators	[4]
SCA4	The City Intelligence Quotient (City IQ)	[13]
SCA5	Smart Sustainable Cities	[14]
SCA6	CITY keys indicator framework	[15]
SCA7	Dimensions of the smart city Vienna UT	[16]
SCA8	Sustainability Perspectives Indicators	[17]
SCA9	Characteristics Smart City	[18]
SCA10	Criteria set for evaluating smart cities	[19]
SCA11	Assess effectiveness of the smart transport	[20]
SCA12	Smart and sustainable city assessment	[21]
SCA13	Lisbon ranking for smart sustainable cities	[21]
SCA14	IESE Cities in Motion Index 2018	[22]
SCA15	Smart mobility service	[23]
SCA16	Smart city service portfolio smart	[24]
SCA17	China smart city performance	[25]
SCA18	Global Power City Index 2018	[26]
SCA19	Juniper Research smart city frameworks	[27]
SCA 20	Sustainable development of communities	[27]
SCA21	ETSI TS 103 463	[8], [28]
SCA22	ISO 37122:2019	[8], [29]
SCA23	ITU-T Y.4901/L.1601	[30], [7], [8]
SCA24	ITU-T Y.4902/L.1602	[31], [8], [7]
SCA25	ITU-T Y.4903/L.1603	[32], [8]
SCA26	Smart City Components Indicator	[33]

No	SCA	Reference
SCA27	Smart City Dimension	[34]
SCA28	Smart development levels	[35]
SCA29	Smart city performance index	[36]
SCA30	Smart governance performance	[10]
SCA31	Municipal eGov Platform Assessment Model (MEPA)	[9]

B. Method

A systematic literature review identifies, assesses, and interprets research results to answer research questions [37]. The review process has systematic steps to get maximum results [38]. The phase of this literature review begins with planning, conducting, and reporting. The planning phase identifies the need for an SCA literature review and develops systematic review protocols. The identification of the need for a literature review has been described in the introduction, while the development of a systematic review has been made, as shown in Table 2. The conducting phase consists of finding, selecting, and extracting materials. The search, selection, and extraction of materials used the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) method, as shown in Figure 1. Material searched on predetermined databases, namely ScienceDirect, Scopus, IEEE Explore, and Emerald. The search results get a total of 787 articles. The 787 articles screened for titles and abstracts got 68 articles.

Furthermore, full-text screening was processed to obtain data related to SCA. The results of the full-text screening contained 31 articles that matched and contained SCA, as shown in Table 3. Another condition in the full-text screening process is that articles can only be downloaded or open access from conference and journal articles, not books. The last stage is reporting; this stage contains results and discussion to answer research questions. The research questions in this literature review have been present in the introduction.

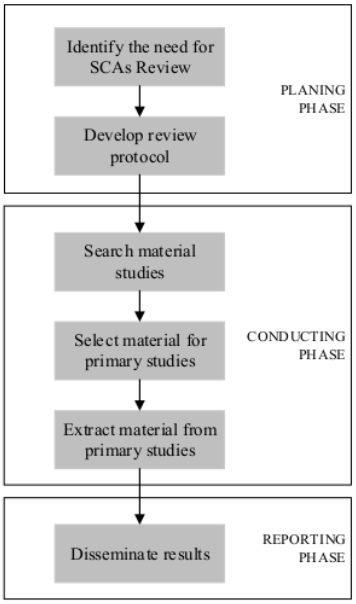

Fig. 1. Literature Review Phases

III. Result and Discussion

A) SCA Indicators for Smart Governance (RQ1)

SCA has various indicators for measuring smart cities. The smart governance indicator is one of the essential indicators in SCA. This fact shows that governance indicators are always present in every assessment model [11]. Smart governance is defined as collaboration between citizens and local governments through technology to advance sustainable development [39]. Therefore, it is necessary to know what indicators (sub-indicators) exist in smart cities in the context of smart governance based on the SCA in Table 3. Based on the results of data exploration, there are nineteen indicators (19) in smart governance, and ten (10) of them come from more than three sources of SCA. There are six (6) dominant indicators in smart governance originating from more than five (5) sources, namely public services, infrastructure (IT) and building, open (transparent) government (data), disaster/emergency preparedness, disaster/emergency preparedness, multi -level governance (e-government), and involvement (innovation) in decision making. The results of the exploration of smart governance indicators are as shown in Table 4.

TABLE IV. Smart Governance Indicators

No	Indicator	SCA	Source
1	Public services	SCA1, SCA3, SCA7, SCA10, SCA16, SCA19, SCA22, SCA25, SCA26, SCA27, SCA30, SCA31,	[4], [40], [8], [9], [10],[16], [19], [24], [27], [29], [33], [34],
2	Infrastructure (IT) and Building	SCA1, SCA10, SCA14, SCA22, SCA23, SCA24, SCA26	[4], [40], [8], [19], [22], [29], [33]
3	Open (Transparent) government (data)	SCA1, SCA3, SCA7, SCA9, SCA10, SCA14, SCA19, SCA22, SCA26, SCA27, SCA28	[4], [40], [8], [16], [18], [19], [22], [27], [29], [33], [34], [35],
4	Real-time data monitoring	SCA3, SCA16	[4], [24]
5	Internet and Wi-Fi coverage	SCA3, SCA16, SCA29	[4], [24], [36]
6	Disaster/Emergency preparedness	SCA1, SCA3,SCA4, SCA16, SCA22	[4], [8], [13], [24], [29]
7	Public transport	SCA3, SCA4, SCA16	[4], [13], [24]
8	Multi-level governance (E-government)	SCA4, SCA14, SCA17, SCA19, SCA21, SCA22, SCA23, SCA24, SCA25, SCA26	[8], [13], [15], [18], [22], [25], [27], [28], [33]
9	health care	SCA4, SCA16	[13], [24]
10	Organization	SCA6, SCA21	[8], [15], [28]
11	Involvement (innovation) in decision making	SCA6, SCA7, SCA9, SCA10, SCA19, SCA21, SCA26, SCA27, SCA28	[8], [15], [16], [18], [19], [27], [28], [33], [34], [35]
12	Political strategies and Corruption perspectives	SCA7, SCA14, SCA27	[16], [22], [34]

No	Indicator	SCA	Source
13	Strength of legal rights	SCA14	[22]
14	Research/Conference centers	SCA14, SCA16	[22], [24]
15	Reserves	SCA14	[22]
16	Citizen Participation	SCA17, SCA19	[25], [27]
17	Efficiency in municipal management (policies)	SCA19, SCA28	[27], [35]
18	Local government	SCA29, SCA30	[10], [36]
19	Smart city policies	SCA29, SCA30	[10], [36]

As in Table 4, smart governance indicators are combined or grouped to simplify similar indicators. This grouped aims to produce a more straightforward tentative framework. For this reason, the results of grouping these indicators are shown in Table 5.

TABLE V. SMART GOVERNANCE INDICATORS

No	Tentative Framework	Indicator
1	Public Policies	1. Political strategies and Corruption perspectives 2. Efficiency in municipal management (policies) 3. Smart city policies 4. Strength of legal rights 5. Reserves
2	Public Services	1. Public services 2. Local government 3. Real-time data monitoring
3	Public Infrastructure	1. Research/Conference centres 2. Public transport 3. Disaster/Emergency preparedness 4. Internet and Wi-Fi coverage 5. Infrastructure (IT) and Building 6. health care
4	Public Engagement	1. Citizen Participation 2. Involvement (innovation) in decision making 3. Organization
5	Public Bureaucracy	1. Multi-level governance (E-government) 2. Open (Transparent) government (data)

B) The capability of SCA (RQ2)

SCA conduct based on city characteristics, i.e., technological [4] and non-technological [5]. The characteristics of SCA follow city objectives and assessment indicators. Based on Table 3, two (2) groups for measuring cities are smart governance and non-smart governance. The smart governance group has governance indicators, while the non-smart governance group does not have governance indicators. The mapping results show that fifteen (15) have smart governance indicators and two (2) without smart governance indicators with technological characteristics.

Meanwhile, for non-smart governance, there are ten (10) with non-technological characteristics and two (2) with technological characteristics. Based on the mapping results, city assessment for smart governance must view technologically while assessing non-smart governance views non-technologically. The data from the SCA mapping is as shown in Table 6.

TABLE VI. CAPABILITY OF SCA

Indicator	*Technological*	*Non-Technological*
Smart Governance	SCA1, SCA3, SCA4, SCA6, SCA9, SCA10, SCA14, SCA16, SCA17, SCA22, SCA26, SCA27, SCA28, SCA29, SCA30, SCA31	SCA7, SCA19, SCA21
Non Smart Governance	SCA5, SCA23	SCA2, SCA8, SCA11, SCA12, SCA13, SCA15, SCA18, SCA20, SCA24, SCA25

C) Stakeholder of SCA (RQ3)

Stakeholders are all parties involved and benefiting from SCA. SCA has several stakeholders, including cities and city authorities, investors and funding agencies, researchers, and citizens [7]. Cities and city authorities get benefits such as (1) identification of strengths and weaknesses in smart city development planning [41], (2) understanding the technical requirement of a smart city [42], (3) enhancing city transparency [43]. Investors and funding agencies get benefits such as (1) enhanced capacity in determining investment [44], (2) identifying and exploiting new business opportunities [45], and (3) scientific evidence in determining funding allocation [46]. Researchers get benefits such as (1) developing new strategies to improve smart city performance [46], and (2) simplifying smart city complexity [47]. Meanwhile, citizens get benefits such as (1) increasing awareness regarding smart cities [46], (2) the ability to make decisions in investing [45], dan (3) involvement in smart city development to communicate wishes to city authorities [42].

Stakeholder identifies based on indicator items from SCA in Table 2. As shown in Table 7, the identification results show that the most dominant stakeholders are city authorities. Meanwhile, other stakeholders have low involvement, such as founders (founding agencies), researchers, and citizens.

TABLE VII. STAKEHOLDER OF SCA

Stakeholder	*SCA Indicator*
City authorities	SCA1, SCA2, SCA3, SCA5, SCA6, SCA7, SCA8, SCA9, SCA10, SCA11, SCA12, SCA13, SCA14, SCA15, SCA16, SCA17, SCA18, SCA19, SCA20, SCA21, SCA22, SCA23, SCA24, SCA25, SCA26, SCA27, SCA28, SCA29, SCA30
Funder	-
Researchers	SCA11, SCA18
Citizens	SCA4, SCA31

D) Weakness of SCA (RQ4)

Weaknesses of SCA distinguish from various aspects such as distribution of indicators, stakeholder involvement, local

government needs, feasibility, and recommendations. The weakness of the indicator aspect is in the unbalanced distribution of indicators (sub-indicators) [5]. This condition can cause biased assessment results between one indicator and another. In addition, the data requirements in the assessment process will be different due to the need to prove the assessment. The unbalanced distribution of indicators also occurs in the context of smart governance. For example, Smart governance performance has three indicators: public services, bureaucracy, and public policy [10]. Three indicators in Smart governance performance have a different number of items, public services have ten (10) items, bureaucracy has twelve (12) items, and public policy has five (5) items.

The weakness of SCA on the stakeholder aspect is involvement in the process and implementation. Most SCA has not involved all smart city stakeholders [5]. The dominant stakeholder involved in the process and implementation is city authorities, as shown in Table 7. Meanwhile, other stakeholders such as founders, researchers, and citizens are less involved in implementation. Lack of involvement of various stakeholders will lead to one-sided assessment results, namely city authorities. Meanwhile, the implementation of smart cities is related to city authorities as service providers and service users, especially citizens. Citizen participation in smart cities, primarily, can provide useful feedback for city authorities to arrive at better policy decisions. [48]. This condition aligns with the smart city concept, responding to challenges smartly for citizens' better quality of life [49].

Aspects of local government needs have weaknesses in measurement objects. The object of measurement only looks at the output of smart city implementation and does not measure the impact (outcome) of local government needs [7]. Meanwhile, smart cities do provide not only services (output) but also have an impact (outcomes) on citizens [50]. The feasibility aspect has a weakness: SCA does not measure implementation feasibility. At the same time, the recommendation aspect has a weakness in providing recommendations from the assessment results for smart city development planning [5], [7]. However, from the various weaknesses stated, SCA has fundamental weaknesses as shown in Table 2; namely, SCA ignores the Sustainable Development Goals (SDGs) of the United Nations or other world targets/targets [7].

E) Factors Influence of Smart Governance (RQ5)

Smart governance defines as the capacity to use activities and actions intelligently and adaptively to make decisions [51]. Smart governance is also defined as activities in the coordination mechanism to achieve goals utilizing collaboration [52]. Another opinion said smart governance is the government's ability to make better decisions through a combination of ICT-based tools and collaborative governance. In other words, smart governance uses data, people, and other resources to improve decision-making and deliver results that meet citizens' needs [53]. The conclusion of smart governance above is the smart activity of the government in making decisions through ICT-based coordination mechanisms in the form of data, people, and other resources to meet the needs of the citizen.

Smart Governance must have a clear outcome in the process and implementation. Smart governance has several outcomes that can be achieved, including performance (economy, ecological), citizen-centric services, social exclusion, public interaction, city branding, efficient government, educated citizens, and readiness [14]. However, some factors influence the achievement of smart governance outcomes. These factors are policy domain, Trust, political & institutional environment, internet reach and use, and spatial characteristics. [48]. For this reason, the following is an explanation of why these factors can affect smart governance in achieving outcomes:

- *Policy domain,* The fundamental problem in determining policies, especially in smart governance and citizens, is the improvement and sustainable development of cities [54]. In other words, urgency, socio-politics, the sensitivity of policy topics will affect the commitment of the government and citizens [55]. The policy domain is influences service policies primarily online, and citizen is required to have more knowledge that influences citizen engagement [56]. Meanwhile, the success of a smart city, especially in the context of smart governance, is citizen participation. There are three ways citizens can be involved in smart governance: democracy, co-creators of smart cities, and users of ICT-based services [57].
- *Trust,* Trust is related to citizens' views of government based on policies, what they get, and their influence on ICT use [58]. The citizen who trusts the government will provide time and knowledge as a form of cooperation and support related to government policies in ICT implementation [56]. However, some citizens who believe in government policies tend to be less involved and participate in smart governance because they lack motivation. This condition occurs because the citizens trust the government [48]. Fairness in technology-facilitated government service procedures will affect public Trust or distrust [59]. Meanwhile, political and community elements do not affect citizens' willingness to participate in smart governance [60].
- *Political & Institutional Environment,* Political and institutional environments play an important role in smart governance, especially democratic governance. Democratic government produces accommodated citizen involvement through ICT and encourages top-down citizen participation [61]. The country's government system and political traditions will influence the implementation of smart governance to achieve outcomes [62]. Another factor influencing smart governance is an organizational culture rooted in political traditions and community value orientations. Therefore, a very centralized hierarchy and public administration will hinder community involvement even if using ICT or face-to-face [61], [63]. Meanwhile, external factors influence customs, traditions, religion, and confident citizens or communities [48].
- *Internet Reach and Use,* There is a correlation between ICT, open-source technology, and citizens' engagement. People expect changes in government

actions through the internet and ICT use, especially in smart governance [64]. With the internet, the community can play a role and participate in decision-making as a cumulative effect of smart governance and ICT [48]. This condition encourages various parties, the government, and the citizens, to exchange information, implement sustainable policies, and involve multiple stakeholders in policymaking [65]. However, problems will arise related to internet reach and use in underdeveloped areas, especially in developing countries [58]. In addition, economic disparities will hinder the implementation of smart governance and cooperation between the community and the government as part of sustainable planning [54].

- *Spatial Characteristics,* City spatial can affect the implementation of smart governance. These effects are related to disasters such as floods and earthquakes. The threat of disaster will disrupt smart governance practices supported through information and communication technology [65]. In addition, the size and shape of the city are one of the obstacles in providing services even though the government has many employees [48]. The size of the area can motivate the government and society to use technology in online services [66]. However, the practice in smart cities does not directly correlate with the city's geography but with population density [67]. Urban development planning and smart governance must consider the different community contexts for each region [68].

Various factors that influence smart governance, such as policy domain, Trust, political & institutional environment, internet reach & use, and spatial characteristics, are all related to citizens. This condition aligns with smart governance based on citizens [69], where smart governance consists of government, citizens, and technology [48]. Citizens can be involved in various important aspects, especially in the decision-making process to obtain public values. The smart city strategy includes the development of textual conditions, governance models, and public values [69]. Citizen engagement aims to see their point of view both through traditional and modern approaches [70].

In SCA, Citizen engagement is necessary to see a city's smartness from various perspectives. So far, the assessment only involves city authorities as data providers (Data as shown in Table 7). Meanwhile, citizens as components of smart cities, especially smart governance, have not been fully involved. Citizen involvement is limited to providing input in decision-making regarding policies or public values. Monitoring government policies in smart governance can involve various parties, especially citizens. One form of monitoring can be an assessment involving government (city authorities) and service users (citizens). Active community involvement in the process and implementation of SCA will increase motivation and a sense of belonging to a city.

The association between SCA and sustainable city development lie in measuring smart cities based on their characteristics. Smart city characteristics consist of Sustainability (infrastructure, energy, climate change, pollution, waste, social, economic, and health problems), urbanization (technology, infrastructure, governance, and employment), quality of life (emotional and financial well-being of the community), and smartness (smart environments, living, mobility, governance, people, and economy) [71], as shown in Figure 2. So, measuring smart cities in terms of Sustainability can involve other aspects, such as urbanization, quality of life, and smartness. However, the smart city assessment can conduct independently following the smart city aspect.

In addition to the linkage of SCA in smart city characteristics, sustainable city development contributes based on smart city challenges. The mapping of smart city challenges carried out by [72] has twelve challenges as shown in Figure 3, namely: (1) resources, (2) awareness among citizens of smart cities, (3) social acceptability, (4) institutional ability to supply technology, (5) smart city operational framework, (6) disagreement on standardizing the smart city model, (7) strategic technique for smart city transformation, (8) overreaching organization to create a governance structure, (9) device integration, (10) need to force in the direction of content material development, (11) sustainable cantered strategies, and (12) mapping demanding situations to sustainability dimensions. As mapped by [74], smart city challenges have mentioned various solutions. However, SCA can be an additional solution in citizens' awareness of smart cities and operational frameworks. Citizens' involvement will increase public awareness and the smart city operational framework, which will measure smart city performance achievements.

Fig. 2. Smart city characteristics [73], [71]

Citizens' awareness in smart cities is a driving factor for smart city development. According to [74], eight factors are drivers of smart city development. One of them is active citizen engagement and participation. Citizen engagement and participation build a sense of ownership inter-sectoral relationships and provide feedback at the policy stage [75], [76]. During the process and development of a smart city,

citizen needs to realize the benefits of development both in terms of developing smart city tools and other aspects; the role of the citizen is to provide feedback on the development done by the government. [76]. Smart cities also have various barriers factor in the development and implementation process. According to [74], there are various barriers to smart city development, including the lack of citizens participation. Therefore, involving citizens in SCA become drivers factor for smart city development. Thus, citizens get their position for providing feedback on the smart city implementation.

Therefore, SCA can support sustainable city development in the form of assessment results of smart city implementation that are useful for city development. In addition, the community can be a supporting factor for sustainable city development as users of smart city services. Community support in the form of involvement to assess the implementation of smart cities. In the context of smart governance, the community has been proven to assess the implementation of smart governance as one of the smart city stakeholders. Community involvement in smart city assessment as carried out by [9], the community is directly involved in filling out a survey to determine the maturity level of e-government implementation. Community involvement can also be in giving opinions through social media related to the implementation of smart cities. The opinion data can be used as a reference in assessing smart cities, as was done by [13].

Fig. 3. Smart City Challenges [72]

IV. Conclusion and Future Work

Based on the on research questions of systematic literature review related to SCA and smart governance, it can conclude as follows:

RQ1: There are nineteen smart city assessment indicators in the context of smart governance, and six of them are dominant indicators. The six indicators are source from more than five (5) SCA, consisting of public services, infrastructure (IT) and building, open (transparent) government (data),

disaster/emergency preparedness, disaster/emergency preparedness, multi-level governance (e-government), and involvement (innovation) in decision making.

RQ2: Most SCA measure "smartness" in the technological aspect, especially in smart governance. Meanwhile, measurement on non-technological aspects is SCA that does not have smart governance indicators.

RQ3: There are four types of stakeholders, namely city and city authorities, investors and funding agencies, researchers, and citizens. Stakeholder involvement will get benefits according to its category. However, city authorities are the dominant participation of stakeholders in the process and implementation. This condition will affect the assessment results, while smart cities are related to cities and city authorities as service providers and users (citizens).

RQ4: The weaknesses consist of various aspects, namely the distribution of indicators is not balanced, stakeholder involvement in the process and implementation, the need for local governments in indicators, smart city feasibility, and recommendations for sustainable city development. However, the fundamental weakness of most SCA is that the measurement only emphasizes service delivery (output) and not on the impact (outcome) and attention to smart city achievement standards.

RQ5: Various factors influence smart governance, such as policy domain, Trust, political & institutional environment, internet reach and use, and spatial characteristics, all of which are related to the citizen. Policy domain factors must pay attention to urgency, socio-politics, and the sensitivity of policy topics that will affect the government and citizens' commitment to smart governance. The thrust factor relates to citizens' perceptions of government based on policies, their get, and their influence on ICT use. Equality in technology-facilitated government service procedures will affect public Trust or distrust. Political & institutional environment factors related to democratic governance will accommodate citizen involvement through ICT and encourage top-down citizen participation. An organizational culture rooted in political traditions and community value orientation will affect smart governance. The internet reach and use factor lies in citizens' expectations of government actions through the internet and ICT use. Economic inequality will affect this factor. Spatial characteristics factors are related to disasters such as floods and earthquakes. The threat of disaster will disrupt smart governance practices supported through information and communication technology. Population density will affect the implementation of smart governance, while the shape of the area is less influential.

The contribution of this study is to identify indicators, capabilities, stakeholders, weaknesses, and factors that influence smart governance. Based on the results of identifying citizens who play an essential role in smart governance. Citizens play a role in providing input for policymaking and decision-making. In addition, citizens can play a role in the monitoring process through smart city assessments so that there is another point of view on the smartness of a city. The primary thing that needs to be pointed out is that citizens are crucial actors to make smart governance successful, especially in smart cities.

However, the identification has made and found some issues as mentioned in conclusion. We recommend using other literature review approaches such as narrative review to strengthen the SCA indicators, smart governances' context, and other study findings in future works for more detail and complexity exploration issues.

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