Success Factors for Smart City in Urban Design Models: A Systematic Review

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Abstract

Sustainable urban development cannot be separated from the smart city concept which can solve the problems of urban areas in recent years. The purpose of this study is to review literature studies on creating Urban Design models that influence the successful implementation of Smart City in urban areas toward sustainable urban development. Sustainable urban development in the Smart City concept is not limited to solutions using IT-based technology but needs to pay attention to solutions to the physical condition of cities due to the increase and decrease in the number of residents in urban areas. From this context, this research agrees on models, concepts, and indicators to measure the success factors of smart cities in Indonesia. This research method was carried out by studying the literature used derived from various articles filtered into 40 articles about urban design in Smart City. The result of this study is a systematic literature review consisting of 3 domains, 8 aspects and 40 indicators of Urban Design influencing the success of Smart City in the local government. The results of this study can contribute to the implementation of the Urban Design model in sustainable urban development.

Keywords: Smart City, Success Factor, Urban Design, Smart Design and Architecture

Abstrak

Pembangunan perkotaan berkelanjutan tidak lepas dari konsep smart city yang mampu menyelesaikan permasalahan perkotaan beberapa tahun terakhir. Tujuan dari penelitian ini adalah mengkaji studi literatur mengenai pembuatan model Urban Design yang mempengaruhi keberhasilan implementasi Smart City di perkotaan menuju pembangunan perkotaan berkelanjutan. Pembangunan perkotaan berkelanjutan dalam konsep Smart City tidak hanya sebatas solusi dengan menggunakan teknologi berbasis IT saja, namun perlu memperhatikan solusi terhadap kondisi fisik kota akibat bertambahnya dan berkurangnya jumlah penduduk di perkotaan. Dari konteks tersebut, penelitian ini menyepakati model, konsep, dan indikator untuk mengukur faktor keberhasilan kota pintar di Indonesia. Metode penelitian ini dilakukan dengan mempelajari literatur yang digunakan yang berasal dari berbagai artikel yang disaring menjadi 40 artikel tentang desain perkotaan di Smart City. Hasil penelitian ini berupa tinjauan literatur sistematis yang terdiri dari 3 domain, 8 aspek dan 40 indikator Urban Design yang mempengaruhi keberhasilan Smart City pada pemerintah daerah. Hasil penelitian ini dapat memberikan kontribusi terhadap penerapan model Urban Design dalam pembangunan perkotaan berkelanjutan.

Kata Kunci: Smart City, Success Factor, Urban Design, Smart Design dan Architecture

I. Introduction

The modern world views the concept of urban design in smart cities as an ideal solution to overcome the challenges that arise due to drastic urbanization [1]. A smart city is a foundational concept of a developing city to achieve the target of existing cities to improve the quality of life, solve urban problems, and ensure competitiveness at the national level with advanced technology in various fields such as security, transportation and behavior [2]-[3] -[4]. The smart city was originally intended to address various urban problems due to rapid urbanization, such as energy shortages, congestion, and environmental pollution[5]. Urban design and smart city as a strategy is characterized by a focus on the technological aspects of the city combining urban science and design as an evaluation process of an integrated approach to citizens in urban planning [6]. The combination of two elements of smart city and urban design makes urban planning opportunities in the future to improve the welfare of citizens and the environment created from the integration of people, development and technology achieved [7].

The smart city concept in urban design in Indonesia is used as a basis for urban development efforts in districts, but a challenge faced by nearly 50% of the population lives in urban areas which results in overcrowding [8], scarcity of clean water, flooding, congestion, environmental pollution, unemployment [9], reduced economic growth in rural areas, lack of employment facilities, housing, food, water, electricity, and other services, reduced population in areas that are not densely populated and residential areas narrow and slums [10]. According to the World Bank in 2016, the percentage increase in the population in Indonesia experienced rapid urbanization of around 55% in cities with per capita income in Indonesia increasing by 4% compared to other countries in China by 10% and Vietnam by 8%.[11]. The urbanization of cities in Indonesia can be seen from the high population density in several big cities, especially in Java Island resulting in gaps between big cities and small cities [12]. The smart city concept in urban design is not fully implemented.

The government in Indonesia has begun to develop a strategic approach by launching a smart city program to solve urban problems. The emphasis on "Movement 100 towards smart city" is targeted from 2017 to 2019, but several cities have difficulty understanding the implementation of smart cities in their regions[13]. The number of people living in the capital city of Jakarta, Indonesia, is 10 million out of the 273 million total population living in urban areas in 2021[14]. This change in population dynamics from urban areas brings the important role of a city, not only as a center of population growth but also a challenge for sustainable urban development [15]. Based on efforts to develop the smart city concept in urban planning, some challenges still have to be faced with proper handling.

The idea of a smart city in Indonesia was started in 2017 through the "100 Movement towards smart city" to encourage the ability of regencies or cities in Indonesia to be able to develop a smart city master plan for a sustainable city index[16]. In planning the master plan, there is no smart model that describes how urban design can be implemented optimally. The dimensions of the Smart City concept in Indonesia are smart governance, smart branding, smart economy, smart environment, smart society and smart living[17]. The next step, this research aims to develop an Urban Design model to understand the success factors of sustainable urban development.

Several research studies in South Korea discuss concepts or models of approaches for smart cities to urban design that offer solutions and no alternative success factors. Previous literature studies were limited to discussing Smart City gendering governance policies in urban areas showing the process of obtaining feedback on the performance of buildings used after they were built and occupied, including the planning stage design stage for gendering city locations by the Sejong government in 2017, implementation stage recommendations for city facilities by the government of Sejong 2020 and the post occupancy evaluations (POE) approach to realizing inclusive cities by Rieh in 2020. However, at least future studies determine important aspects of factors in implementing occupant perceptions in a particular physical environment to help alternative smart city success factors in sustainable urban development[19].

The result of this research is a development literature study on indicators of success factors from the urban design model of smart which can provide recommendations on the implementation of Smart City in urban areas to be effective in determining sustainable city development. This research can provide significant benefits in

increasing urban sustainability, reducing population density, and making city life livable and balanced for future generations. This article can contribute to understanding the success factors of the two elements of urban design and smart city as a solid foundation of knowledge to achieve sustainable urban development efforts.

II. LITERATURE REVIEW

Several big cities in Indonesia have tried to apply the smart city concept to develop sustainable cities, including the city governments of Jakarta and Surabaya. The Surabaya city government received the Smart City award in 2011, for being able to carry out the principles of a smart city by using indicators of smart governance, environment and smart living [18]. The application of Smart city evaluation has been carried out within the government and outside the government, but this research has no official standard size that contains indicators to measure the success factors of Urban Design and the Smart City concept from the differences in the development potential of each urban area, both differences in source factors. natural resources and technology.

Critical Success Factor is the limited number of results in the field, if the implementation is satisfactory and guarantees competitiveness in an organization. Critical success factors need indicators in measuring the process and performance of an activity carried out so as to help the organization achieve its goals [22]. Although several studies have discussed the concepts of smart city and urban design, to achieve success factors in the current urban design model, a set of measuring tools is needed including indicators used to analyze the application of urban design in implementing Smart City based on existing practices, so this study aims to identify appropriate indicators of success factors in the relevant literature and provide a deeper understanding of best practice in urban design and smart cities.

An indicator is a tool for measuring changes in the time of a variable to produce information about a condition so that it allows changes from time [23]. Indicators in the implementation of governance evaluation play an important role for measuring responsiveness, effectiveness, accuracy and efficiency [24]. Previous research has developed a model approach for smart cities towards urban design with the practice of developing conceptual models [21]. This article's literature study is limited in reference to the use of literature studies on indicators of success of the urban design model in the smart city concept. Therefore, this study intends to provide a stronger and better understanding of knowledge, policymakers, and researchers that determine success factors in urban design development. This research is used as a research gap analysis to review previous literature reviews by identifying good practices to achieve the goals of sustainable urban design and smart city success factors.

Other research mentions extensively urban design in the implementation of smart cities in Saudi Arabia, namely the process of monitoring the sustainability of city projects, there are obstacles because not all cities have IT infrastructure and there are new projects in a city, there are gaps in adopting practices from city development initiatives in implementing smart city, the context of development assessment to achieve success and the need for more resources [20]. Previous research suggested that most of the smart city development models for city information and knowledge developed are still smart city exploration based on city needs, local characteristics, city priorities and available technology. This makes it more difficult to design a smart city that simply connects smart urban design technology. The successful implementation of an integrated smart city system based on new technology, social systems, and the resulting city development model proposals are effectively used for planning, managing and developing important cities to maintain the desired smart city results [21]. This study analyzes the factors that influence success in developing urban design models for smart cities regarding urban development, design of energy and environmental development as well as sustainable public facilities.

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III. Research Method

The systematic literature review (SLR) research method in this study was used to review the problem literature review in the exploratory research process and provide an overview of the clues about the gaps in previous research peril completed based on the study of the research topic. According to Facchineti [25], there are four stages in writing a systematic literature review starting from the research question, the literature search process, filtering process of literature, and data extraction analysis.

A. Research Question

This literature review aims to identify research studies used in good practice applied to the success factors of urban design and smart cities to clarify the focus of the research direction. To answer the purpose of this literature review, it is important to formulate a problem or research question (RQ), including:

1) RQ1: What are the components used by the urban design model to influence smart city implementation?
2) RQ2: What good practice factors influence the success of smart city to urban design models?

B. Literature Search Strategy

The literature search strategy for this research begins with collecting relevant literature according to the research objectives originating from various online database journal repository sources in the form of titles, abstracts, and keywords determined by the research topic presented in Table 1. The second search strategy is to express research questions by describing keywords into population, intervention, comparison, outcomes, and context (PICOC) strategy. The population section knows something like "urban design" within the scope of "Smart City, City Design, Urban Planning, Smart Sustainable Cities, Neighborhood Development, Urban Development, Urban Infrastructure City". The intervention section produces information about urban design, such as sustainable urban design development, realignment, and regional development The keywords used for the literature review search strategy on population and intervention use a combination of AND and OR operators [26], namely "Urban Design" AND ("Smart City" OR "City Design" OR "Urban Planning" OR "Smart Sustainable Cities" OR "Neighborhood Development "OR "Urban Development" OR "Urban Infrastructure City").

Criteria determine journals generated and collected from a literature search according to research topics relevant to online database sources. Table 1 shows the literature criteria selection for online database sources resulting from conference and journal papers found in literature searches, and manual searches are not required. Table 2 shows the search results obtained using keywords for each literature source.

TABLE I
LITERATURE CRITERIA SELECTION

Inclusion Criteria	
Science Direct	sciencedirect.com
Emerald	emeraldinsight.com
IEEE Xplore	ieeexplore.ieee.org
Google Scholar	scholar.google.com
Springer	springer.com
Wiley Online Library	onlinelibrary.wiley.com
Exclusion Criteria	
Non-English Journal	Other literature, such as e-books

TABLE 2
SEARCHES ARE OBTAINED USING KEYWORDS

Resource	URL	Literature Search
Science Direct	sciencedirect.com	4737

Emerald	emeraldinsight.com	3063
IEEE Xplore	ieeexplore.ieee.org	1351
Google Scholar	scholar.google.com	17300
Springer	springer.com	6728
Wiley Online Library	onlinelibrary.wiley.com	3655

Based on what was said by W. Mengist, et. al (2020), the separation of journal search results is carried out by filtering titles and abstracts of literature by filtering search results according to criteria determined to be relevant to the research topic using inclusion and exclusion criteria. Inclusion criteria were based on search results from an online database written in English [27]. The resulting literature search in the form of the latest journals and conference papers meets the criteria within the last ten years for the 2013 to 2023 period regarding the determination of urban design and smart cities in the form of titles, abstracts, or keyword search terms. The publication goes through a peer-review process. Execution criteria use non-English research, books, theses, journals or conferences published not including the last ten years. The publication has not undergone a peer-review process regarding references in smart cities to urban design [27]. Based on the inclusion and exclusion criteria results, only 57 articles were selected which were used as references for this literature review.

C. *Filtering Process of Literature*

The selection of literature resulted from an analysis of the title and a complete summary of the literature to check the relevance with the specified criteria. The next step is to select literature documents based on inclusion and exclusion criteria. The results of the document search are shown in Table 3.

TABLE 3
SEARCHES ARE OBTAINED USING KEYWORDS

Resource	Found	Candidates	Selected
Science Direct	290	18	16
Emerald	49	4	1
IEEE Xplore	103	8	5
Google Scholar	1200	17	15
Springer	173	7	2
Wiley Online Library	76	3	1
Total	1891	57	40

The literature review is carried out in accordance with the research topic, title, summary, conclusion, and digitization of each online database as a whole to ensure that the selected articles are of high quality and relevant to the research topic. Articles carried out a review process with a selection found 40 articles derived from the total number of articles contained in online database journals. Google Scholar articles are added manually because they cannot extract documents simultaneously. The selection of articles taken is checked repeatedly to avoid errors and ensure that the selected articles are in accordance with the research topic. The findings from the research literature result from the analysis stages obtained will be extracted data presented in the data extraction analysis section.

D. *Data Extraction Analysis*

The data analysis from the literature filtering process found 40 urban design literature from various literary perspectives that were used to determine the factors that influence the success of smart cities. This section identifies the factor domains by providing a friendly development of sustainable development, an in-depth analysis of the research topic concept, and future research potential for understanding urban design concept research. The findings of this analysis support validation in research, showing that articles on the topic of urban design selected from the last ten years are relevant and of good quality to the research topic in Figure 1.
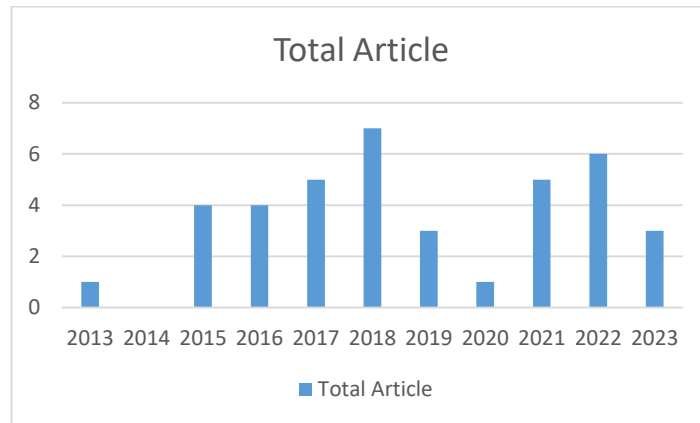
Fig. 1. Total Journal Articles Published by Year

IV. RESULTS AND DISCUSSION

In this section, the results and discussion will be presented from 40 publications selected according to the filter in Table 3. The results of the analysis examine the literature from components to good practices and success factors for smart cities in adopting urban design. The results of good practice and indicator of success factors for smart cities in urban design are shown in Figure 2 and Table 8.

A. Components of the Urban Design Model

Based on previous literature analysis, urban design components are divided into 3 domains and 8 aspects described in Table 4. The results of the systematic review present and highlight the application of urban design aspects consisting of 3 suggested domains: Smart Sustainable Cities, Leadership in Energy and Environmental Design for Neighborhood Development (LEED-ND) and Public Facilities [20][19][28]. Researchers have completed the identification of sustainable development that is relevant for urban design development in this category.

TABLE 4
URBAN DESIGN COMPONENTS

Domain	Aspect	Description	Reference
Smart Sustainable Cities	Geographical level	The smart city project level is carried out by the government and local authorities	[20]
	Urban Development Stage	Stages of development of new cities and sustainable cities	[20],[29]
	Reference Area	Reference to the development sector of the economic area and geographic area	[20]
Leadership in Energy and Environmental Design for Neighbourhood Development (LEED-ND)	Smart Location and Linkage	Smart location search interlinked with a central location	[28]
	Neighbourhood Pattern and Design	City environment shape building city facility design	[28],[30]
	Green Infrastructure and Buildings	Infrastructure and buildings are green	[28],[31]
Public Facilities	Urban Planning	Urban planning that is convenient and provides safety	[19],[32]

	Urban Infrastructure	Urban infrastructure with urban road management and urban monitoring application services	[19],[33]

Urban development in Indonesia is very dependent on how to use the Smart Sustainable Cities model [16]. Domain Smart Sustainable Cities has three aspects, namely Geographical level factor [20], Urban Development Stage Factor [29] and Reference Area Factor [20]. In urban design, Leadership in Energy and Environmental Design for Neighborhood Development (LEED-ND) plays an important role in the sustainability of urban development[34]. Domain Leadership in Energy and Environmental Design for Neighborhood Development (LEED-ND) has three aspects, namely Smart Location and Linkage Factor[28], Neighborhood Pattern and Design Factor[30],[28] and Green Infrastructure and Buildings Factor[31] , [28]. Urban design must determine which urban space zones are considered to be safe or dangerous for residents living[19]. Domain Public Facilities has two aspects, namely Urban Planning Factor [32] [19] and Urban Infrastructure Factor [33][19].

B. Good Practice for Smart City Success Factors in Urban Design

Urban development based on technological innovation and an advanced population environment creates opportunities for the successful aim of the urban design concept with the implementation of smart cities to develop effective, efficient and sustainable urban development solutions. This research is in the context of developing new urban areas such as economic sector-based [35],[20],exiting cities[20],[36],brownfield redevelopment [28],[37], building energy efficiency and safety in urban design as a role important in urban planning, management and development. Acceptance of city development innovations that are right on target urban design and smart city can improve the welfare of urban residents and the urban environment created to maintain sustainability and managed development achieved efficiently and realize the quality of life of city residents and the surrounding environment. The urban design indicators for implementing smart cities in good practice are explained in Table 5, Table 6 and Table 7. The components produced by the urban design model are shown in Figure 2.
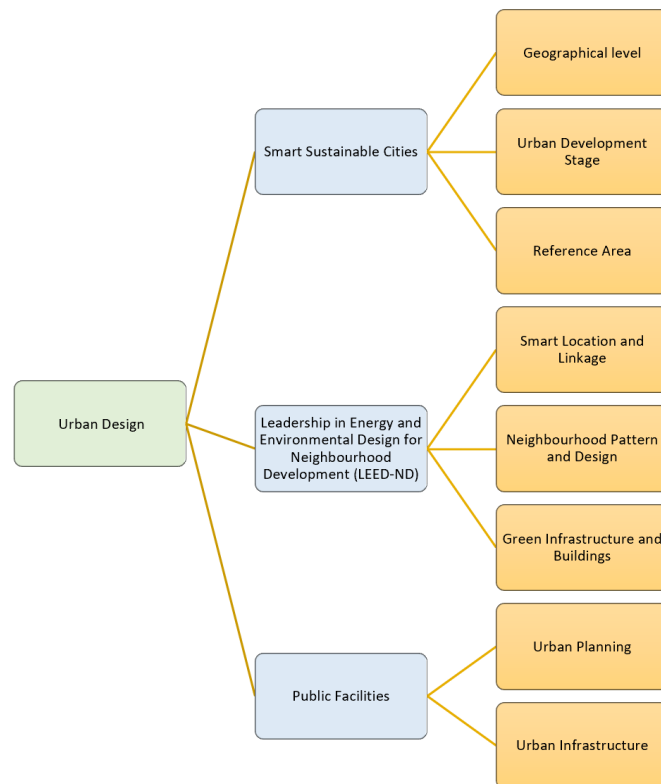

Fig 2. Urban Design Model Based on Component Results

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Figure 2 shows the results of the urban design model components based on the journal selection perspective that has been carried out. This model shows that there are limitations on the aspects of city needs and available technology. The smart city aspect is focused on city information and knowledge on IT infrastructure and there are new projects in a city based on city needs, local characteristics, city environmental priorities and available technology [20], [28]. Success in applying technology is not only good practice, but the success factor as a determinant of efforts to utilize resource use facilities in urban development is important for moving cities sustainably. [21]. Rapidly developing technology will help urban development managers in the process of future urban development needs [6].

C. Smart Sustainable Cities

Based on the journal analysis that has been done, the domain of smart sustainable cities is important to run in developing sustainable smart cities [20]. There are geographical level aspects found in two indicators, namely the national level and local level. National level is related to the ability of smart city development projects implemented by the government [20], [38]. Meanwhile, there are two types of indicators from the urban development stage aspect, namely new cities and exiting cities[20],[36],[29]. Exiting cities are monitoring and ensuring cities in improving the quality of life index of residents [20],[36]. Meanwhile, aspects of the city reference area in efforts to develop smart cities include geographically based and economic sector-based indicators[35][20][39]. Economic sector-based is to promote balanced regional development to achieve economic diversification and create jobs for young people and increase competitiveness [35][20].

Several programs are used to develop urban design and direct the implementation of the smart city concept by city government and urban development authorities at several city levels, such as the metro project, a rail service connecting places that are densely populated by visitors[20],[38]. In addition, cities from the economic sector promote balanced regional development to achieve economic diversification, create jobs for young residents and increase competitiveness such as public private partnerships (PPP) [35]-[20]. City sustainability projects are carried out to improve public services, traffic management, security and communication with the community through environmental monitoring and e-Health application access control, home automation, traffic control, digital signs, digital addresses [20],[36]. Table 5 describes program issues and good practices for smart sustainable cities from the scope of cities in a country.

TABLE 5
PROGRAM ISSUES AND GOOD PRACTICES FOR SMART SUSTAINABLE CITIES

Issue Program	Good Practice	Scope	Reference
Application of smart city city government and urban development authority at several city levels	Rail service Metro Project	Riyadh, Jeddah, Dammam, Makkah, dan Madinah, Saudi Arabia	[20],[38]
The urban economic sector promotes balanced regional development	Public private partnership (PPP)	Kota Ekonomi Raja Abdullah, Saudi Arabia	[35][20]
Public service projects, traffic management, security and communication with the community	eHealth apps, home automation, traffic control, digital signs, digital addresses	Yanbu, Saudi Arabia	[20],[36]

City development challenges in implementing smart sustainable cities are traffic congestion, greenhouse gas emissions, youth unemployment, unbalanced urban growth, flooding, and environmental pollution [20]. Some gaps in urban implementation problems related to the smart economy include innovation competitiveness and the ability to change the urban economy, smart mobility, no clear procedures, integrated ICT and sustainable transportation, transparency in governance, smart governance in the form of public participation, service

delivery and e-governance. Smart environmental management of sustainable resources and the development of human and social capital have not been managed completely well. The project could have been carried out better because there were no success factors in implementing smart cities. Additionally, projects are delayed or scaled back due to funding [20]. Based on the results of the analysis of these challenges, the initiative for determining factors that have been successfully addressed to support city sustainability efforts can be implemented by outlining factors including national level, local level, new cities, exiting cities, economic sector-based and geographically based indicators that are important for sustainable urban development [20], [38], [29], [35], [36], [38], [39]. Implementing these success factors can increase the sustainability of influential smart cities by improving the city economy, green urban areas, adequate transportation, flood monitoring, and influencing human resource development.

Applying these success factors can increase smart cities' desirability, which impacts improving the city's economy, green urban areas, transportation capabilities, flood monitoring, and influencing human resource development. At the national level, the city economy is to improve and transition, and the formation of urban knowledge is planned to promote balanced regional development, achieve economic diversification, create jobs for young people, and increase power through public-private partnerships (PPP) [35] [20]. Green urban areas were initiated to improve energy efficiency, environmental protection, solar water heating, and sustainable tourism, including waterfronts with green areas [39]. Human-centered approaches and context-dependent policies are essential in managing green infrastructure and energy consumption patterns[38]. Adequate transportation GIS-based transportation systems with their mobile applications are used to manage by providing real-time information showing traffic jams and colored maps to drivers to avoid collisions and collisions [36]. Flood monitoring can be provided through social media channels for feedback and anticipation of some smart and LEED-certified public buildings[39]. Human resource development influences ensuring improvements in quality of life indices by establishing knowledge-based clusters and incubation centers [29].

D. *Leadership in Energy and Environmental Design for Neighborhood Development (LEED-ND)*

In achieving urban design success in smart cities, the Leadership in Energy and Environmental Design for Neighborhood Development (LEED-ND) domain is important for making efforts to design urban sustainability at the environmental level [28]. The Smart Location and Linkage aspect consists of five kinds of indicators, one of which is the Brownfield Redevelopment indicator, namely the development of locations that have inappropriate sites and reduce the environmental impact that occurs on sites to reduce the existing pressure on undeveloped land[28][37]. There are eleven aspects of the Neighborhood Pattern and Design Factor, one of which is the Walkable Streets indicator which measures the level of pedestrian experience at the street level by providing buildings, windows at ground level, parking, ground floor units and a minimum of sidewalk access[40][28] . Aspects of Green Infrastructure and Buildings there are eleven kinds of indicators. One of them is Building Energy Efficiency, which is to provide energy efficient and superior building projects to reduce water, air, soil pollution and adverse environmental impacts on energy consumption and production[41],[28],[42].

The downtown development was carried out under a new local mixed-use planning program, considered the largest multi-purpose development project ever constructed strategically located in the center of the city's major commercial, financial, public, tourist and medical institutions[28]. Housing and work proximity projects provide an affordable housing component, as well as fostering a balanced community with diversity of uses and employment opportunities[28]. Walkable streets projects include building facades facing public spaces, walkways in retail or mixed-use blocks and all other blocks, and restricted garage entries[28],[40]. Energy and water efficiency building projects include the construction of energy-efficient buildings that reduce water, air, and soil pollution and the adverse environmental impacts of energy consumption and production and provide superior water-efficiency buildings [28], [41]. Table 6 describes program issues and good practice Leadership in Energy and Environmental Design for Neighborhood Development (LEED-ND).

TABLE 6
PROGRAM ISSUES AND GOOD PRACTICES FOR LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN FOR NEIGHBORHOOD
DEVELOPMENT (LEED-ND)

Issue Program	Good Practice	Scope	Reference
The affordable housing component, in addition to promoting a balanced community and employment opportunities	Housing and work proximity project	Distrik Abdali, Yordania	[28]
Building facades facing public spaces, sidewalks in retail blocks or mixed use blocks	Walkable streets project	Amman, Yordania	[40],[28],[41],[42]
Construction of energy and water efficient buildings in buildings	Building energy and water efficiency projects		

One of the challenges faced in implementing Leadership in Energy and Environmental Design for Environmental Development (LEED-ND) is the increasing population due to demands and migration trends to cities [28]. The problem faced by the implementation challenge is that the indicators used previously addressed social and environmental problems without considering economic and governance problems that needed to be adequately implemented. No application provides solutions to the main problems of overcoming the obstacles faced by development projects. Many problems in considering the local community's views on urban project design still need to be resolved due to the dissimilarity in the existing rules and regulations regarding land use. A sustainable high-density mixed-use development area in a high-density residential area.

Therefore, it is necessary to coordinate efforts to design urban building facilities in a new field of activity based on the principles of sustainable urban design in the success of Leadership in Energy and Environmental Design for Neighborhood Development (LEED-ND) using several factors that need to be taken into account for their performance. For its implementation to successfully overcome the challenges of the Leadership in Energy and Environmental Design for Environmental Development (LEED-ND) aspect, factors from indicators such as access to civic and public spaces, walkable streets, and energy and air efficiency in important buildings need to be determined. The success of urban development from an environmental point of view [40],[28],[41],[42].

These factors can be applied to overcome the problems of sustainable urban development at the environmental level by applying the principles of sustainable urban design in the government's master plan. Access to Civic and Public Space refers to walking distance from residents and nearby commercial rentals by providing squares, parks, and plazas as open space facilities, civic buildings, and community centers built to meet community, cultural, physical, and spiritual needs. And social residing in environmental design[54]. Location The choice of urban development projects develops sites that are easily accessible and connected in the vicinity of others to reduce adverse impacts on public health and the environment related to the size of the development area [28]. Energy efficiency is achieved by providing energy-efficient consumption and production in buildings to reduce air, air pollution, soil, and negative environmental impacts [41]. Water efficiency supports the sustainable use of water in buildings and locations to maximize air efficiency through reducing drinking water as air consumption to reduce urban water loads with the impact of natural water resources on supply and wastewater systems. This action is achieved with toilet equipment and gray water treatment systems that use less water than the primary building water usage [42].

E. Public Facilities

Public Facilities are very important in urban design in smart cities because they are designed for security, accessibility, convenience, and comfort. Facilities provided by the public with daily life (shopping centers, schools, parks, etc.) are placed closest to the house, and the distance between public transportation and bus stops[19]. There are three kinds of indicators in the urban planning aspect. One of the indicators of Safety in Urban Design is safety facilities in urban design carried out security, natural surveillance systems, spatial connections and open space facilities and prevention of crime blind spots on the main entrance road[43][19].

Aspects of Urban Infrastructure four kinds of indicators. One indicator is Illumination around the pedestrian crossing which requires more lighting around pedestrian crossings [44][19].

The urban design perspective of public facilities in smart cities such as 'Safe Street' is made in a special design zone for female pedestrians [19]. This zone provides a safer walking environment after dark for women with smart solutions [43],[19]. LED lighting was increased in open public spaces including parks, and lights under pedestrian and pedestrian bridges were installed. LED lighting was increased in open public spaces including parks, and lights under pedestrian and pedestrian bridges were installed[44],[19]. Table 7 describes program issues and good practice public facilities.

TABLE 7
PROGRAM ISSUES AND GOOD PRACTICES FOR PUBLIC FACILITIES

Issue Program	Good Practice	Scope	Reference
The 'Safe Street' Area Zone is created in a specially designed female pedestrian environment	LED lighting in open public spaces	Sejong, Korea Selatan	[44],[19], [43]

This study identified several challenges faced in implementing public facilities, namely these principles should have been addressed when the building was built. What is concerning is that there is no synergy effect on smart cities and unique women's areas because there is no integrated approach[19]. The infrastructure provision for maintaining one-stop protection facilities has yet to be achieved. Most facility management processes need to be distributed appropriately to local governments. Problems arise in post-housing management in the late stages of new town development due to the shifting of responsibilities among agencies that are not responsible for defining the purpose for which the facility was built strictly according to the original plan. Public developments by the government, such as welfare, cultural, and childcare facilities, are installed facing the road. This convenience has much empty land on the side of the road[19]. In recent years, the quality of life of women who live in them has generally been neglected in the built environment because urban centers are designed for men with a concentration of professions with masculine cities and women's suburbs. Women have limited mobility in caring for children who cannot afford it, lack childcare services, and fear of crime and exposure in public spaces. Even policies on urban planning that are more gender-sensitive are currently experiencing more remarkable technological change in the masculine domain, with fewer women than men working in the fields of technology, science, engineering, and mathematics [19].

Several studies have revealed that the success factor in overcoming challenges in the aspect of public facilities requires factors such as a Comfortable Pedestrian Environment, Safety in Urban Design, Road-Centered Liaison Functions, Lighting around pedestrian crossings, Formation of blind spot prevention with road facilities and trees, facility crime prevention and transportation management, indoor navigation, urban crowds and networked government service portal applications [67], [43], [19], [44], [68], [69], [70]. The analysis of this research is in the form of essential research factors that are used, especially public facilities around pedestrian crossings, which are essential for determining the success of urban development from a security perspective [44], [19], [43]. This success factor can be used in planning special zones for women to walk safely in daily life and providing close facilities to achieve natural monitoring [44], [69]. This Formation of blind spot prevention with road facilities and trees provides a safer pedestrian environment after dark for women with brighter lighting than neighboring districts [68].

TABLE 8
DOMAIN, ASPECT AND INDICATOR URBAN DESIGN SUCCESS

Domain	Aspect	Indicator	Reference
Smart Sustainable Cities	Geographical level factor	National Level	[20]
		Local Level	[38]
	Urban Development Stage Factor	New cities	[29]
		Exiting Cities	[36]
		Economic sector-based	[35]

	Reference Area Factor	Geographically based	[39]
Leadership in Energy and Environmental Design for Neighbourhood Development (LEED-ND)	Smart Location and Linkage Factor	Preferred Locations	[28]
		Brownfield Redevelopment	[37]
		Locations with Reduced Automobile Dependence	[45]
		Bicycle Network and Storage	[46]
		Housing and Jobs Proximity	[47]
	Neighbourhood Pattern and Design Factor	Walk able Streets	[40]
		Compact Development	[48]
		Mixed-Use Neighborhood Centers	[49]
		Reduced Parking Footprint	[50]
		Street Network	[51]
		Transit Facilities	[52]
		Access to Civic and Public Space	[53]
		Access to Recreation Facilities	[54]
		Visibility dan Universal Design	[55]
		Community Outreach and Involvement	[56]
		Tree-Lined and Shaded Streets	[57]
	Green Infrastructure and Buildings Factor	Building Energy Efficiency	[41]
		Building Water Efficiency	[42]
		Wastewater Management	[58]
		Water – Efficient Landscaping	[59]
		Strom water Management	[60]
		Heat Island Reduction	[61]
		Solar Orientation	[62]
		On-Site Renewable Energy Sources	[63]
		District Heating and Cooling	[64][28]
		Infrastructure Energy Efficiency	[65]
		Light Pollution Reduction	[66]
Public Facilities	Urban Planning Factor	Convenient Pedestrian Environment	[67]
		Safety in Urban Design	[43]
		Linking Functions Centered on Streets	[19]
	Urban Infrastructure Factor	Illumination around the pedestrian crossing	[44]
		Blind spot prevention formation with road facilities and trees	[68]
		Crime prevention facilities	[69]
		Transport management, indoor navigation, urban crowds and networked government service portal applications	[70]

The actions taken by this research can provide concrete recommendations for city planners, policymakers, and stakeholders based on the success factors urban design that have been identified in the results of the discussion, namely the development of a smart city urban design implementation framework using standards and regulations in the framework, related work urban design planning for urban areas, development of sustainable development programs in project implementation, implementation centered on people and stakeholder vision. This research provides guidelines for responsible urban planning for sustainable development. Consideration of indicators of success factors for implementing urban design provides urban planners with the opportunity to inform the development of future master plans.

These recommendations can become a framework by providing guidelines by which the implementation of sustainable urban design principles can develop rapidly. Urban planning is not only concerned with urban spatial policies but also touches on policies related to employment, transportation, and urban infrastructure, recognizing that policies impact women and men differently with gender-first principles adopted at the policy level to achieve gender equality in the city. Further studies require more detailed influencing factors on differences between genders. More sophisticated intelligent solution plans are needed that take gender differences into account to create a gender-safe and inclusive pedestrian environment.

V. CONCLUSION

This research provides an understanding of the success of urban design in implementing Smart City. The results of this study cover 3 domains, 8 aspects and 40 indicators of urban design success factors from smart city implementation. The results of this study are known to identify success factors and good practices influencing the urban design of smart city implementation using 40 indicators derived from previous literature. The components resulting from the first Smart Sustainable Cities urban design model consist of geographical level, urban development stage and reference area aspects. Success factors such as national level, economic sector-based and exiting cities. Good practices of Smart Sustainable Cities are Rail service metro Projects, Public private partnership (PPP) and eHealth Applications, home automation, traffic control, digital signage, digital addresses.

Second, the Leadership in Energy and Environmental Design for Neighborhood Development (LEED-ND) domain consists of aspects of Smart Location and Linkage, Neighborhood Pattern and Design and Green Infrastructure. Success factors such as indicators of access to civic and public space, walkable streets and energy and water efficiency of buildings. Good practices such as Residential and employment proximity Projects, Walkable streets Projects and Building energy and water efficiency Projects. Third, Public Facilities consist of Urban Planning and Urban Infrastructure. Success factors such as indicators of Safety in Urban Design and Illumination around the pedestrian crossing are important in an urban development from a security perspective. The best practice of Public Facilities is LED lighting in open public spaces. Further studies suggest include measurement analysis or evaluation, in-depth literature reviews, interviews, surveys and case studies with the application of these success factors. The next recommendation is to look for indicators of other urban design factors that affect smart city as the next urban design development. Recommendations for city planners, policymakers, and stakeholders based on the success factors urban, namely the development of a smart city urban design implementation framework using standards and regulations in the framework, related work urban design planning for urban areas in project implementation and implementation urban design centered on people and stakeholder vision.

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