The Study of the Smart City Concept Development, Based on Public Open Space Elements (case study: Kambang Iwak and Opi Jakabaring Lake)

F Amalia¹, M Hanum¹, R Drastiani¹ and M L Tondi²

¹ University of Sriwijaya, Indonesia
² UIN Raden Fatah Palembang, Indonesia
E-mail : Fujiamalia@ft.unsri.ac.id

Abstract. Currently, the concept of urban development is directed to the smart city concept. With this concept, it is expected that city dwellers will get decent, quality, and sustainable city services. Public open space in Palembang is one of the crucial elements in the urban system, which is part of public services. Public open-space has a role as one of the aspects of the concept's developer. This research aims to determine the character of green open space in Palembang to become one of the elements of developing smart city concepts. The method used in this research is descriptive qualitative. The results showed that green public open space has a role in the formation of a smart city. The idea of a smart city is not just about technology, but also how elements in open space act as solutions and improve the quality of the environment. The characteristics of the smart city concept can be developed according to the potential and problem of the city. The inherent characteristics of smart cities in public open spaces are smart living, smart environment, and smart infrastructure.

1. Introduction

At present, the increase in population is followed by the rapid development in urban areas. The rapid growth of the urban regions is sometimes not matched by the essential needs in urban planning and design, such as frequent changes in land use, resulting in a decrease in environmental quality. The concept of city development has move to the idea of a smart city. Several cities in Indonesia has established this concept to get a decent quality and sustainable city services for their population.

In city planning, public open space and green space are some of the essential elements. Public open space is a space that accommodates social activities that also affect the life of a city [1]. Public open space is also a space that provides services for the community. Palembang City is one of the fastest-growing cities. The development of infrastructure in the city of Palembang has not been matched by meeting the need for green open space. Based on statute number 26 of 2007 regarding spatial planning, each town or regency must have a minimum of 30 percent of green space from the total area. Palembang still lacks of green open space where there are currently only around 4000 hectares (Hairul Sobri, 2018). Lack of green open space dramatically affects the quality of the urban environment. Based on these problems, researchers researched to analyze the character of public open spaces that function as green open spaces in the city of Palembang as part of the elements of developing smart city concepts.

This research is expected to be one of the parameters in the planning and development of public open spaces as well as green open spaces in the development of the concept of smart city in the city of Palembang.
Shirvani’s theory [3] states that open space is one of the elements of a long-term planned city to optimize the potential of an area as a public space. Therefore, it is important to know the elements of public open space that will be analyzed to see the concept of smart city that can be developed in Palembang public open space, so that elements of public open space that can support the smart city concept.

2. Research method
The method used in this research is descriptive qualitative. This method is carried out to determine the condition of the existing public open spaces and green open spaces. Field observation surveys and interviews have been conducted to obtain the existing physical condition. Then the survey results will be compiled with a descriptive analysis of the character of the smart city concept by the SWOT analysis method.

The locus of this research was conducted at two locations where the public open spaces which are also functioned as green open spaces in Palembang, namely Kambang Iwak and Lake Opi Jakabaring. Both of these locations are also public open spaces that are functioned as water reservoirs as Environmental control in the city of Palembang. Kambang Iwak is located in Ilir Zone while Opi Lake is located in Ulu Zone.

3. Literature review
According to Shirvani [3] the physical characteristics of the city can be seen from the eight elements; besides, there are supporting characters and visitor characters. According to Nasution et al. (2011), factors that influence the community satisfaction with public space, namely: the distance from home, accessibility, the width of area of public space, facilities, the existence of the informal sector, vegetation, security, cleanliness, aesthetics, recreation function, social interaction function, and activities carried out there.

According to Hanny and Nahdi (2018) [4], green open space in city planning has strong potential as a shaping element of smart cities. If the green open space of a city has been well planned in terms of various facilities and is connected with a quality internet network, then the concept of the smart city will be more easily achieved.

According to Bolivar (2015) [5], a smart city is an effort to make every town smarter through technology and social means by increasing the comfort of cities, facilitating mobility, efficiency and saving energy, improving air and water quality, identifying problems and fixing them quickly and precisely, and collecting data to make a better decision.

Smart city has six characters in a city, Giffinger (2007) namely: Smart People (both individual and social), smart living (physical and social), smart environment, smart governance, smart economy, and smart mobility. All of these characters have their respective roles, and if it is considered more deeply, all aspects will be related to one another. A city can be said to lead to a smart city if several characters from the six characters have become the focus of the city [6].
4. Analysis and discussion

4.1. Analysis of public open space elements
At the initial stage, it is necessary to analyze the physical characteristics of the public open space. From the observations in the field, it can be seen the elements of open space in the Kambang Iwak and Opi Lake. The following table describes the variables and indicators when the survey is conducted; observations are made on the character of visitor activity, the physical integrity of open space, and the function of open space. The criteria and indicators show the condition of public open space in the Kambang Iwak and Lake Opi. The following table is the result of the field survey.

| Location | Character | Variable                      | Condition |
|----------|-----------|-------------------------------|-----------|
| **Kambang Iwak** | Physical Character of city element | Land use                      | Good      |
|          |           | Circulation and parking       | Enough    |
|          |           | Pedestrian ways               | Good      |
|          |           | Open space                    | Good      |
|          |           | Signage                       | Less      |
|          |           | Activity support              | Enough    |
|          | Physical Character of supporting element | Garbage box                  | Good      |
|          |           | Toilet                        | Less      |
|          |           | Mosque                        | Less      |
|          |           | Play ground                   | Enough    |
|          |           | Seating facilities            | Good      |
|          |           | Sport facility                | Good      |
|          |           | Lamp                          | Good      |
|          |           | Internet access               | Less      |
|          | Open Space Function | As a garden                   | Good      |
|          |           | As a water reservoir          | Good      |
|          |           | As a recreation area          | Good      |
|          |           | As the lung of city           | Good      |
| **Opi Lake** | Physical Character of city element | Land use                      | Good      |
|          |           | Circulation and parking       | Less      |
|          |           | Pedestrian ways               | Less      |
|          |           | Open pace                     | Enough    |
|          |           | Signage                       | Less      |
|          |           | Activity support              | Enough    |
|          | Physical Character of supporting element | Garbage box                  | Less      |
|          |           | Toilet                        | Less      |
|          |           | Mosque                        | Enough    |
|          |           | Play ground                   | Less      |
|          |           | Seating areas                 | Enough    |
|          |           | Sport facility                | Less      |
|          |           | Lamp                          | None      |
|          |           | Internet access               | None      |
|          | Open Space Function | As a garden                   | Less      |
|          |           | As a water reservoir          | Good      |
|          |           | As a recreation area          | Less      |
|          |           | As the lung of city           | None      |

Based on observations, it can be seen that the character of the open space in the Kambang Iwak is better than Opi Lake. There are many deficiencies in the elements of Opi Lake's public open space. It is contrast to the character of public open space in the Kambang Iwak, which currently has a role as
enhancing the quality of the city environment, although there are still a few things that need to be improved.

4.2. Analysis of smart city concept in public open spaces

From the results of the analysis of public open space characters, it can be categorized several problems that have existed in the concept of smart city will be applied. From the observations of the theory regarding the notions of the concept of smart city, the variables can be found in public open space elements that represent the concept of a smart city. The following table is described to analyze the concept of smart cities in public open spaces.

| Concept                  | Variable                                                                 |
|--------------------------|---------------------------------------------------------------------------|
| Smart people             | Activity character? What time is? How long is visiting duration? Do the visitor come alone or in group? |
| Smart living             | How is the access? How is the cleanliness? (garbage disposal system, cleaning team, garbage collection schedule, field conditions, final waste disposal system) How is the security? How is the circulation? how is the pedestrian ways? |
| Smart environment        | The existing land use, temperature in the area, pollution, green open spaces, vegetation, water/retention reservoir (area, purpose, activities) |
| Smart governance         | Regulations or policies applied                                            |
| Smart infrastructure     | The quality and quantity of parking, toilet, playground, sitting area, praying, internet access, night lamp |
| Smart economy            | The condition of street vendors and other buying and selling activities   |

The SWOT analysis is used to study the concept of smart cities in the open spaces of the Kambang Iwak and Opi Lake. The analysis of smart city studies was done by observing and understanding the character of open space elements that have been applied previously. This analysis was carried out to see the characteristics of a smart city that can be developed in the public open space of Kambang Iwak and Opi Lake.

| Internal | Strength | Weakness                                                                 |
|----------|----------|---------------------------------------------------------------------------|
| Smart people | • Many visitors come to Kambang Iwak to exercise  
• Visitors socialize in the square and linear area. |
| Smart living | • There are some garbage disposal facilities on each side  
• There are shade vegetables in the Kambang Iwak  
• It is availability of pedestrian paths with good material  
• There is existence of a good security system (CCTV and security post), so that visitors are comfortable |
| Smart environment | • Open space is green open space because there are some vegetation with shady trees  
• There is a water reservoir which is functioned as retention area  
• The temperature and pollution in the area can be controlled because there is a lot of vegetation there. |
| Smart governance | • There are some sign boards to provide information at the area. |
| Smart infrastructure | • There are lighting lamps as lights around Kambang Iwak |
| Smart infrastructure | • It is Lack of parking areas especially when visitors are crowded  
• It is Lack of attention to the function and cleanliness of public toilets  
• There are many children's games facilities which are damaged |
| Smart Economy | • There are many street vendors sell carelessly (not zones) |
• There are internet zones that cannot be used optimally
• Damaged facilities at the Children Playground
• There is a crossing bridge across the middle of the water reservoir
• On each side, there are several sitting areas for visitors to rest in each corner

Smart economic
• Commercial play zones are one of the attractions in the Kambang Iwak

External Opportunities Threat
Smart people
• It is Potential as a place for certain national events
• It is as a gathering place for certain sports communities
Smart living
• There is easy access to the location of the Kambang Iwak
Smart environment
• It Increase community awareness of the importance of vegetation in an area.
Smart governance
• It is as an information provider for the people of Palembang
Smart infrastructure
• It is potential as a photo spot
Smart economy
• There are street vendors and commercial activities that increase visitors to the Iwak Kambang
• Improving the community’s economy

Table 4. The SWOT analysis of lake toba

| Internal | Strength | Weakness |
|----------|----------|----------|
| Smart people | • Its potential to be a public open space as a place for socialization | Smart living | • It is easy to access but many damaged road conditions |
| Smart living | • It is located in a residential area that can be a public open space for residents around | • There are no pedestrian roads for pedestrians |
| Smart environment | • The location is easy to reach | • Environmental hygiene is poorly maintained |
| Smart environment | • It has water potential as a water tourism area | • Lake view is invisible, this is covered by non-permanent buildings of commercial function |
| Smart infrastructure | • Its retention is functioned as a water reservoir and family recreation | Smart environment | • It is Less green areas or parks |
| Smart infrastructure | • Open space surrounds water retention | • It is high temperature and high heat pollution |
| Smart economy | • Its street vendors attract visitors to the location | Smart infrastructure | • There is no parking lot |

| Smart governance | • There are no markers on the way to enter the area, no information is obtained from Lake Opi open space | Smart economy | • The Toilets are malfunctioning and dirty |
| Smart economy | • Many street vendors are not organized and build non-permanent buildings |
## 4. Analysis

| External Opportunities | Threat |
|-------------------------|--------|
| **Smart people**        |        |
| - It is potential for the development of water and culinary tourism | - It is a competition of destinations that have potential around the area |
| - The need for open space as a place for socializing and recreation |        |
| **Smart living**        |        |
| - There is easy access to locations | - Environmental pollution |
| - Smart environment | - Smart environment |
| - It is located near Opi Mall (shopping center) | - Pollution in the Lake Opi area |
| - Creating a green open space or park with vegetation in accordance with the character of the region | - Misuse of water reservoir functions |
| **Smart infrastructure**|        |
| - There are a water Park to be an attraction | - There is no awareness of the importance of green open space in an area |
| - It is potential for the development of children's recreation areas |        |
| **Smart governance**    |        |
| - There will be employment opportunity | - Smart infrastructure |
| - Foreign investors in regional development | - There is no access to public transportation |
| - As an information provider for the people of Palembang | - Smart governance |
| **Smart economy**       |        |
| - There are street vendors and commercial activities that attract visitors | - There are no clear regulations regarding buildings built on the lake shore |
| - Improving the community's economy | - Smart economy |

From the results of analysis, the public open space of the Kambang Iwak and Opi Lake have the components to form the Smart City concept. It also found that a smart city requirement is not solely about technology and the internet since the Visitors still has difficulty to access the connection there. The concept of a smart city in that area still fulfilled because it has provided comfort for the city and has improved the quality of environmental life.

## 5. Conclusion

The conclusions from the research on the development of the smart city concept in Palembang public open space are:

- From the results of the analysis of two public open spaces, that the physical characteristics of both the urban and supporting elements greatly influence the success of a public free space.
- The concept of smart city itself has six characteristics. But in developing the concept of smart city does not have to develop all the characters. Smart city development concept elements of Public open space both Kambang Iwak and Opi Lake as one of the city elements are namely: smart living, smart environment, and smart infrastructure.

The development of the concept of smart city in Kambang Iwak and Opi Lake is obtained from a SWOT analysis on the characteristics of the smart city concept.
Table 5. The strategy of smart city concepts development in Kambang Iwak based on swot analysis

| Strength-Opportunity | Opportunity – Weakness |
|-----------------------|------------------------|
| Kambang Iwak has become a green open space as a place for sports and recreation | Adding parking lots around the Kambang Iwak floating area |
| Maintain the beauty and uniqueness of the Kambang Iwak | Adding toilet facilities |
| Adding internet facilities in accordance with the capacity of visitors who come | The Development of children's play facilities |
| Kambang Iwak's open space provides information about the city of Palembang | Issued regulations on street vendors |
| Improving accessibility by maintaining road conditions and developing public transportation | Maintaining the uniqueness of the existing natural environment |
| Maintaining the quality of supporting facilities in the Kambang Iwak | Making rules or threats of punishment for littering |
| Improving the playground | The management of retention water reservoir into clean water to support open space in the Kambang Iwak |
| Creating photo spots according to regional character | |

| Strength- Threat | Weaknesses- Threat |
|------------------|--------------------|
| Maintaining the function of the area in accordance with existing land use | Providing information to the public about the threat of punishment for those who pollute the environment |
| Developing parking lots in the Kambang Iwak area | Creating various children's play facilities |
| Surveillance via CCTV for perpetrators of environmental pollution such as littering and smoking in open space areas | Improving the quality and quantity of public transportation |
| Making regulations for environmental polluters | Arranging the street vendors |
| Making regulations for street vendors who want to sell in the area of Kambang Iwak | Adding parking lots in Kambang Iwak area |

Table 6. The strategy of smart city concepts development in lake opi based on swot analysis

| Strength-Opportunity | Opportunity – Weakness |
|-----------------------|------------------------|
| The development of water attractions and recreation | The development of water tourism and recreation areas |
| Collaborate with investors in the development of water recreation tourism | Collaborate with investors in the development of water recreation tourism |
| Improving the quality of accessibility by maintaining road conditions and improving public transportation facilities | Improving road quality |
| The development of children's water recreation areas | Making pedestrian paths for pedestrians |
| Improving the economy of the local community | Make regulations prohibiting building on the shores of Lake Opi |
| The arrangement of street vendors | The development of area facilities such as toilets, bins, artificial lighting |
| | Add internet access facilities in the Lake Opi area |
| | Developing open spaces on the shores of the lake |
| | Creating a green open space with character |
| | Increasing promotion and marketing |
| | Arranging parking layout on Lake Opi |
| | Providing information for the community about the Lake Opi area |

| Strength- Threat | Weaknesses- Threat |
|------------------|--------------------|
| Improving water attractions and recreation that are unique and different from other places | Increasing varied and interesting recreational areas |
| Collaborate with investors for regional development | Improve the quality of roads and public transportation |
| | Creating a comfortable pedestrian that characterizes the region |
• Regulation of the threat of punishment for perpetrators of environmental pollution
• Developing both open square and linear green open roars
• Prohibit development that closes the Opi Lake view
• Arranging street vendors and other commercial functions

• Counseling to the community about the importance of cleanliness as an improvement in the quality of the environment
• Arrangement of vegetation as a green area and regional character
• Providing information to the public about the threat of punishment for those who pollute the environment
• Creating different children's play facilities
• Supervising environmental pollution actors
• Providing information to the public about the threat of punishment for those who pollute the environment
• Creating different children's play facilities
• Improve the quality and quantity of public transportation
• The Arrangement of street vendors
• Organizing parking lots area

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