

Research Article

Strategic Planning on Smart Mobility Development

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Abstract

The increase in population and in vehicles has generated a challenge in urban transportation. Simultaneously, Intelligent Transport System (ITS) technology development has provided urban areas with an opportunity to address transportation challenges. Therefore, a concept of smart mobility is developed, which is derived from smart city concept using ITS development. The objective of research is to organize a Strategic Planning of Smart Mobility. This research used the qualitative descriptive approach. Its data were collected from the city of Surakarta as an implementer of Smart Mobility through in-depth interviewing and content analysis. Data analysis in the first stage was carried out by using the SWOT analysis method to determine strategic issues. The second stage of analysis was aimed to evaluate the strategy by using the litmus test. The results of this research based on the two stages show that strategic plan could be observed from the development of Smart Mobility in Surakarta City and several strategies could be offered and formulated as follows: 1) strategy of developing and improving cooperation with stakeholders; 2) strategy of improving and intensifying the application of e-Gov through ITS application and development; 3) strategy of reinforcing inter-mode integration; and 4) strategy of developing the synchronization of public policy to restrict the number of private vehicles.

Keywords: *Smart Mobility, Smart City, Intelligent Transport System, Strategic Planning, Surakarta City*

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INTRODUCTION

The increase in urban population leads to more complex necessity and problems. The problems are related to the availability of settlement, job opportunity, security, traffic congestion economic facilities, and public services. It is estimated that by 2030, 60% of the world's population will live in cities (Mckensey in Prasetyono, 2017). The challenges and opportunities to provide safe, clean, and inclusive smart mobility in big cities are quite relevant. One of the impacts of the total population of vehicles in urban areas is to provide urban transportation challenges. The main challenges with smart mobility are the presence of high traffic congestion during peak hours, poor intermodal connectivity, poor access to public transport, and increased private transport. The development of information and communication technology produces positive benefits for human life and provides many conveniences (Herawati, 2014). To realize innovative sustainable development through improving the quality of public services, the concept of "Smart City" is a strategy to improve the quality of life in urban spaces (Poernomo, 2015).

One of the dimensions of Smart City is Smart Mobility. The Smart Mobility concept has been developed as one of the derivatives of the Smart City concept by using the development (Intelligent Transport System), a system that can provide opportunities for optimizing and increasing the efficiency of the urban transportation system. According to Nam and Pardo (2011), smart mobility is an important dimension in a smart city in optimizing a fairly good transportation infrastructure.

One of the regions in Indonesia that is regionally a metropolitan city is the city of Surakarta. This is because the city of Surakarta is supported by 6 hinterland areas that are agglomerations with the SUBOSUKAWONOSRATEN areas (Surakarta, Boyolali, Sukoharjo, Wonogiri, Sragen, and Klaten). Surakarta only has an area of 44.04 km² with a population of 575,230 people in 2019 with a population growth rate per years 2018-2019 of 0.97 (BPS Kota Surakarta, 2019). The total population is not that many when compared to other cities in Indonesia. However, if you look at it during the day, the population can exceed the original population of Surakarta. According to interview from the Research and Development Sector of the Regional Development Planning Agency (BAPPEDA) of Surakarta City, during the day the population can reach 2,000,000 people while the population at night is around 560,000.

With the large population of Surakarta City, it is not surprising that this is followed by a growth in the number of vehicles. The interview with the Transportation Sector of the Surakarta City Transportation Service shows that the number of vehicles with the Solo AD plate was 747,695 units based on the data from the Surakarta One-stop administration system (SAMSAT) while in 2018 the number of vehicles was only 500,000 units. This means that there has been an increase of 200,000 more vehicles in Surakarta this year. On the other hand, the road capacity is fixed. The growth in the number of vehicles is mostly dominated by private vehicles. Motorbikes are in the first place, followed by private cars, not to mention online transportation.

To address this problem, the application of technology in the transportation sector is the first step in e-transportation solution, which is in line with smart mobility so that the city of Surakarta becomes a pioneer in the use of a technology called the Intelligent Transport System (ITS). However, the problem encountered by the city of Surakarta is the inadequate infrastructure supported by information technology to make Surakarta a city with smart mobility. The existing conditions of transportation in the city of Surakarta have not been integrated, especially between feeder transportation and Batik Solo Trans (BST). Currently, the feeders are operating on the BST line and feeders transporting passengers from outside areas that are quite far from the city center (Perdana, 2020). For this reason, there is a need for strategic planning related to smart mobility and what kind of transportation infrastructure is needed and which will be developed in the future.

Smart City concept is defined by Caragliu et al., (2011) as follows “*We believe a city to be smart when investments in human and social capital and traditional (transport) and modern (ICT) communications infrastructure fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance.*” It is confirmed by Giffinger et al., (2007), Caragliu et al., (2009), Su, Li, & Fu, (2011), Dameri (2013), Cocchia (2014), and Supangkat (2015).

The concept of Smart Mobility, according to Benevola, et al., (2016), is “a city development concept as a part of Smart City concept that will expectedly provide easy, safe, comfortable, and affordable transportation with fast service to the public through information technology.” It is confirmed by Nam and Pardo (2011), Arena et al., (2013), Keong and Ong (2015), and Elisa Alberti (2011) in Muliarto (2015).

Meanwhile Cohen (2011) stated that Smart Mobility is a movement system allowing the fulfillment of need with as minimally and rapidly as possible movement. The indicator of Smart Mobility, according to Boyd Cohen, consists of five aspects: local accessibility, multi-mode access, international accessibility, information and communication technology infrastructure supporting mobility, and sustainable and safe transportation. It is in line with Giffinger, R., et al., (2007) stating that *“The Smart Mobility (SM) policies focus on local and international accessibility as well as the availability of information and communication technologies and modern and sustainable systems.”* The application of technology in transportation area is in line with the principle of smart mobility dimension in smart city concept, concerning smart city transportation system connected by inter-mode information and communication technology (Nurmandi, 2014, Yue et al., 2014). Furthermore, Papa & Lauwers (2015) suggested three important factors in Smart Mobility: (1) physical and digital integration; (2) focus on local context; and (3) “citizen” centrality.

To bring Smart Mobility into reality, strategic, creative, and innovative thinking is required through the planning in final decision-making (Nugraha, 2014). For that reason, a strategic management framework is used in developing Smart Mobility. According to Nugraha (2014), Suyanto (2007), Hunger & Wheelen (2003), a series of managerial decisions and measures (actions) determines the long term performance of organization involving environmental observation, strategic formulation, strategic implementation, and evaluation as well as control.

The strategic management of Smart City, according to Poernomo (2015), is a very important concept because it can provide a clear guideline about what should be done by a designer of Smart City or a future dream city, referring to the strategic measures.

The most important stage in strategic management process is the strategic planning or called strategic formulation stage, constituting a series of planned actions and fundamental activities developed by top management to be implemented by all levels of an organization in the attempt of achieving the objective of organization.

As aforementioned, to develop Smart City, a strategic, creative, and innovative thinking is required. The word strategic is defined as being conducted as planned for the sake of future (Nugraha, 2014). The word creative means an ability of producing a new useful work. The word innovative is defined as the practical implementation of an idea becoming a new tool or process

useful to individual, organization, and community, constituting an element of strategic management (Fontana, 2011).

One of the stages in strategic management is strategic formulation or strategic planning. Planning is thought and formulation that include ways of behaving, goals, and alternatives to behave or act, the optimal choices that are owned, and the establishment of instructions to realize rationally (Turtiantoro, 2015). Strategic plan, according to Rangkuti (2008), Allison and Kaye (2013), and Olsen and Eadie in Bryson (2004), is defined as an attempt of making decision and taking important action in discipline manner, creating, and guiding how to be an organization (or another entity), what an organization (or another entity) does, and why an organization (another entity) does so.

Bryson (2004) defines strategic issues as conflicts of one kind or another. Conflicts can occur in the direction of goals, methods, principles, location, time, and groups that benefit or suffer losses due to the impact or results of solving the issue. Identifying strategic issues facing the organization aims to identify basic policy questions, i.e. the strategic issue agenda faced by the organization. Strategic issues are fundamental policy questions or critical challenges that affect the mandate, mission, and values. The strategic issue statement must contain three elements. First, strategic issues must be clearly stated. Second, various factors (opportunities and threats, organizational strengths, and weaknesses) that make the issue a fundamental challenge must be listed. Third, a statement on strategic issues must be made. By knowing the strategic/central issues of the organization, it will make it easier for the organization to determine the next steps in choosing strategic options that will be carried out later.

According to Bryson (2004), public sector organizations emphasize the importance of a strategic planning process consisting of interactive steps, including: 1) Initiating and agreeing on a strategic planning process; 2) Identifying the organizational mandate; 3) Clarifying the mission and values of the organization; 4) Assessing the external environment; opportunities and threats; 5) Assessing the Internal environment: strengths and weaknesses; 6) Identifying strategic issues facing the organization; 7) Formulating strategies for managing issues; and 8) Creating an effective organizational vision for the future. The benefits obtained by implementing strategic planning in public sector organizations include: 1) Helping public organizations think strategically; 2) Clarifying future directions; 3) Solving organizational problems; 4) Improving performance;

5) Relating effectively to a changing environment; 6) Building work teams and expertise; and 7) Facilitating the political administration interface through building cooperative relationships between elected officials and public managers. Thus, strategic planning contains elements, among others: the vision and mission of the organization, the goals and objectives to be achieved, environmental assessment, future orientation, strategy formulation and selection, and strategy implementation and strategic control.

Meanwhile, Rahmoona (2015) stated that in a strategic planning, internal factor can optimize the strength to minimize the weakness, and external factor can maximize any opportunity in order to deal with the threat inhibiting. An organization cannot be separated from its environment, either internally or externally. The organizational environment, both internal and external, can be a supporting factor for an organization and also be a hindering factor for an organization. The purpose of strategic environmental analysis according to Tangkilisan (2005: 258) is to investigate the key influences and to choose what strategies are appropriate to the challenges that come from the environment. Analysis of the internal and external environment can be done with a SWOT analysis. According to David (2009): SWOT (Strengths - Weakness - Opportunities - Threats) analysis is an important matching tool that helps leaders to develop four types of strategies, namely: SO Strategy, WO Strategy, ST Strategy, and WT Strategy. The use of SWOT analysis will help find an appropriate strategy. SWOT analysis is a strategic planning method used to evaluate the strengths, weaknesses, opportunities, and threats in a project. This process involves determining the specific goals of the project and identifying the internal and external factors that support and do not achieve these goals. SWOT analysis is a tool that helps to determine and develop the right strategy in dealing with a condition. However, it should be noted that the goal in determining the strategy used from the SWOT results is basically to produce a viable alternative strategy, not to determine the best strategy. So it can be judged that not all strategies in SWOT are chosen to be developed.

The development of smart mobility requires specific and contextual policies that address the needs and interests of the many stakeholders involved. As these policy developments are challenging, there is a need to learn from the experiences of many cities around the world that offer smart mobility services that are efficient and are successfully adopted. However, in practice, the information provided about the initiative is superficial and unstructured and does not

suit local implementation.

Previous research with topics related to this research has been carried out. Pratiwi et al., 2015 conducted a study on the availability of smart mobility in the city of Surakarta, which shows the results that the city of Surakarta is still classified as a conditionally ready category, meaning that it can be prepared to implement smart mobility with provisions for improvements and additions in several aspects to support smart mobility. Pongsapan et al., (2014) researched the Smart City information architecture and communication technology network design in the city of Manado, and they found that the selection of device specifications used must be to produce the expected network quality in the application of Smart City in the city of Manado. Sunardi et al., (2019) conducted the research on measuring the readiness of smart mobility in the city of Banjarmasin, and they found that that the city of Banjarmasin is ready to implement smart mobility, but the conditions for improvement and procurement in several aspects of smart mobility need to be met.

Research by Cledou et al., (2018) formulated planning in smart mobility using taxonomy, with the results of the taxonomy consisting of eight dimensions: types of services, levels of maturity, types of users, applied technology, delivery channels, benefits, beneficiaries, and general functions. For each dimension, we bring together general concepts, provide definitions, and illustrate them with identified services. Meanwhile, Luque-Vega et al., (2020) formulated a smart city using the Smart Cities Oriented Project Planning and Evaluation (SCOPPE) Methodology which combines citizen participation and the creation of Minimum Viable Products through adaptive project management. Research from Ghasemi & Saberi (2020) pointed to the key factors in the transformation of the city of Birjand into a smart city by focusing on Intelligent Transport Systems (ITS) and smart government. The results of this study indicated that by focusing on strategy, decisions are made, taking into account the factors that can help improve transportation in this area. It seems that moving towards implementing a strategy can solve many of the transportation problems in cities. Research by Vrščaj et al., (2020) was related to changes and use of technology over time, such as the use of technology in the transportation sector. The research of Warren et al., (2015) identified possible and various long-term strategies for equitable and sustainable mobility for Havana with a SWOT analysis. This study formulates strategic planning in smart mobility using SWOT analysis and the Litmus test.

The novelty in this study emphasizes the strategies that need to be done by the city of Surakarta in dealing with transportation problems, especially in rural areas. In addition, this study focuses on smart mobility considering that the application of technology can be the first step in solving transportation problems where smart mobility is part of the smart city concept applied in Surakarta. In developing a smart mobility the right strategy is a determined strategy that must be based on the opportunities, threats, strengths, and weaknesses faced and owned by the organization. This study tries to analyze the government's strategic planning in running the smart mobility in the City of Surakarta. Information from the results of the study will assist the government in formulating an appropriate strategy to deal with challenges related to the smart mobility.

RESEARCH METHODS

This study used the descriptive qualitative research intended to explore in-depth the topic studied. Techniques of collecting data used were interview and documentation. The documentation used the smart mobility Strategic Plan (Renstra) and the Surakarta smart city master plan document. The informants in this study were officials of the government agencies that oversee the issue of smart mobility, namely the subdivision and the division of the transportation department, the informatics division of the communication and information agency, and the research and development division of regional planning agency. Meanwhile, the informant for strategy evaluation was Head of the Surakarta Transportation Agency as the authority as the decision maker to determine the priority of the strategy taken. Furthermore, the informants in this study are as follows:

- a) Head of the Surakarta Transportation Agency (Informant 1), interviewed on July 18, 2019.
- b) Head of the Transportation Department of the Surakarta Transportation Agency (Informant 2), interviewed on July 10, 2019.
- c) Head of the Transportation Section of the Surakarta Transportation Agency (Informant 3), interviewed on July 10, 2019.
- d) Head of the Research and Development Sector of the Surakarta Regional Development Planning Agency (Informant 4), interviewed on July 16, 2019.

- e) Head of the Application Section of the Surakarta Communication and Information Service (Informant 5), interviewed on July 16, 2019.
- f) Head of the Surakarta Technical Implementation Transportation Unit (Informant 6), interviewed on July 11, 2019.

The data were collected in the city of Surakarta, which is a city that implements smart mobility. They were analyzed by using the SWOT analysis to obtain strategic issue (Hunger and Wheelen, 2003). This process involves determining the specific goals of the project and identifying the internal and external factors that support and do not achieve these goals. Strength (S) is an internal condition that supports an organization to achieve the desired objectives. Weakness (W) is an internal condition that prevents an organization from achieving its desired objectives. Opportunity (O) is an external condition that supports an organization to achieve its objectives. Threat (T) is an external condition that prevents an organization from achieving its objectives.

Furthermore, the evaluation was conducted on Strategic issue by using Litmus test (Bryson, 2004). The Litmus test was used to screen strategic issues and develop several measures of how strategic an issue is. The steps are as follows: a) Identification of problems; b) Analysis of the external environment: opportunities and threats; c) Internal environmental analysis: strengths and weaknesses; d) Identification of strategic issues at hand; e) Formulation of a strategy to manage issues.

Overall, the steps to identify strategic issues (Bryson, 2004: 173), include: (1) Review the mandate, mission, strengths, weaknesses, opportunities, and threats including key organizational indicators; (2) Choose an approach appropriate (direct approach, indirect approach, target approach, or a vision of success approach) to identify strategic issues by organizational conditions; (3) sort the strategic issues according to the order of priority, logical or temporal; (4) Use the Litmus Test to measure the strategic level of the existing issues by answering questions; (5) Discuss and revise the existing issues if necessary; (6) Give attention and different treatment as well to different strategic issues; and (7) Reach and make agreement among decision-makers to identify and resolve or solve the strategic issues.

Table 1 shows a list of questions from the litmus test along with the answers from the respondents mentioned earlier.

Table 1. List of Questions used in Litmus Test

No	Questions	(1)	(2)	(3)
1.	When do threats or opportunities of strategic issues appear before you?	Now	Next year	Next two or more years
2.	How broadly will the issue affect your office?	Single unit/division	Some divisions	All departments
3.	How big is your organization's financial risk or opportunity?	Small (10% of budget)	Medium (10% - 25% of budget)	Large (more than 25% of the budget)
4.	Will an issue resolving strategy need:			
	a. The development of new service target and program?	No		Yes
	b. Is the change of tax subject or amount significant?	No		Yes
	c. Is the change of federal or state stipulation or regulation significant?	No		Yes
	d. Is it addition or modification of main facilities?	No		Yes
	e. Is the increase of staff number significant?	No		Yes
5.	What is the best approach to resolve the issue?	Clear, ready to implement	Broad, slightly detailed parameter	Opened broadly
6.	Which lowest management can decide how to cope with this?	Line staff personnel	Head of division	Head of department
7.	What are consequences likely to occur if this issue is not solved?	Inefficiency interference	disorganization, service, lost fund source	Long term/big disorganization

No	Questions	(1)	(2)	(3)
8.	How many other departments are affected by this issue and should be involved in the resolution?	None	One-to-three	Four or more

Source: Bryson (2004)

Head of the research and development division of the Surakarta City Planning Agency (BAPPEDA) was interviewed to dig up data on the Smart City of Surakarta. The informatics division, especially the Head of the Application Section of the Surakarta City Communication and Information Service (DISKOMINFO) was interviewed to explore Smart City. Head of the Transportation Division and Head of the Transportation Sub-division of the Surakarta City Office of Transportation (DISHUB) were interviewed to investigate the weaknesses and strengths as well as the opportunities and threats of DISHUB. Head of DISHUB Surakarta as the authority as the decision-maker was interviewed about strategy evaluation based on the litmus test to determine the priority of the strategy taken.

Table 1 shows that several questions are used to assess the strategic level of an issue that has been identified. A score of 1 indicates that the issues produced are operational, meaning that the issues are less strategic. A score of 2 indicates that the issues generated are strategic. Meanwhile, a score of 3 indicates that the issues generated are very strategic. If the score is multiplied by the number of questions, it will produce a total score to find out the strategy of an issue which is divided into 3 categories. To find out the strategic level, considering the result of evaluation, the strategic issue is divided into 3 categories:

- Score 13 – 21 => for operational / less strategic issue.
- Score 22 – 30 => for fairly strategic issue
- Score 31 – 39 => for very strategic issue.

Furthermore, to find out the strategy to be prioritized, the strategic quadrant is used as shown below in Figure 1.

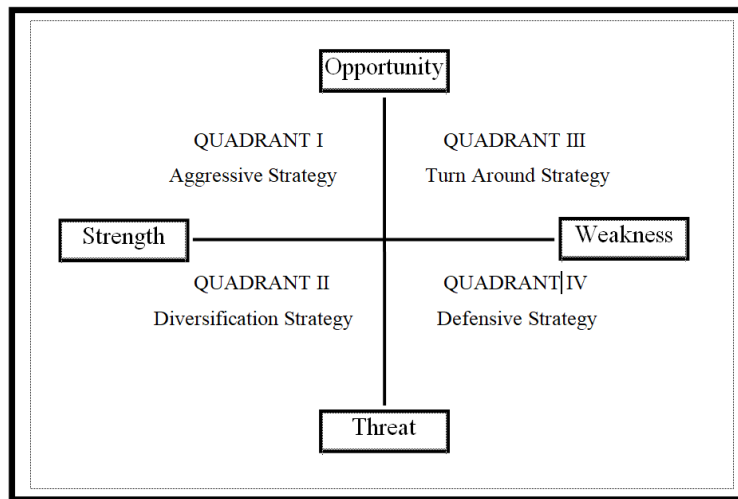


Figure 1. Strategic Quadrant

Source: Rangkuti, 1997

Figure 1 depicts the quadrant of the SWOT analysis strategy. Quadrant I SO Strategy is a situation where the organization is in an advantageous position because the organization has the strengths and opportunities that encourage seizing existing opportunities. The most popular strategy is "Aggressive Comparative Advantage" or a strategy to achieve growth. The aggressive strategy is carried out by creating programs and arranging steps or actions (actions) that are breaking (barriers, challenges, threats) to achieve the targeted excellence/achievement.

Quadrant II ST Strategy is a situation or condition of a strong organization/strong condition, but unfavorable environmental conditions (faced with threats and obstacles). The most appropriate strategy is "Diversification and Mobilization", which is to utilize/develop existing strengths to move into the future. In other words, the programs and actions are different from what has been done or different from other organizations in providing public services and implementing development.

Quadrant III WO strategy is a condition where the organization is faced with internal shortcomings, but must seize considerable opportunities. So, the strategy that must be taken is the "Turn-around Investment or Orientation" strategy in the sense of how to improve existing weaknesses to take advantage of opportunities by adapting to other organizations and to the rules and implementation guideline.

Quadrant IV of WT strategy is the worst condition, where the organization faces internal weaknesses as well as faces external threats/challenges. In this situation, the strategy that must be taken is the "Defensive and Damage Control" Strategy. Defensive and Damage Control includes surviving or controlling losses, conducting mergers, savings or liquidation. In other words, the Defensive Strategy (Defensive strategy), is made by creating programs and arranging steps to maintain the excellence of the achievements that have been achieved.

RESULT AND DISCUSSION

This section identifies the internal factors and external factors. Internal factors consist of: 1) Implementation of E-Government; 2) Implementation of Solo Smart City Master Plan; 3) Regulatory Authority; 4) Resource Availability Owned Corridor; and 5) Bus Rapid Batik Solo Trans (BST) and Feeder Transport. While external factors include: 1) Development of Technology and Information (ICT); 2) Hinterland Position of Surakarta City and Population; 3) Increasing Number of Private Vehicles and the Presence of Online Transportation; and 4) Cooperation with Central Government and Stakeholders. After that SWOT analysis is carried out this is then discussed further.

A. Internal Factors

The internal environment consists of components or variables coming from within the organization. Internal environmental conditions often referred to as "Organizational Capability", refer to the organization's internal environment consisting of two strategic factors, namely: *Strength and Weakness*.

1. Implementation of E-Government

To realize the application of e-government since 2016, the city of Surakarta has applied the concept of smart city. Based on the results of an interview with Informant 4 as Head of the Research and Development Sector of the Surakarta Regional Development Planning Agency, Surakarta has entered the era of digitization, especially in public services. The application of e-government for all Regional Device Organizations in the Government of Surakarta city has been developed through the concept of smart

city. The concept of smart city is a concept based on the vision and mission that has been arranged in the 2016 -2021 Surakarta City RPJMD (Regional Medium Term Development Plan).

In order to realize the vision and associated with the e-government development, the Surakarta City Transportation Agency has also developed and applied Information and Communication Technology (ICT) to transportation services better known as *Intelligent Transportation System* (ITS). Based on the results of an interview with Informant 2 as Head of the Transportation Department of the Surakarta Transportation Agency (2019), ITS application in Surakarta includes; a) *Area Traffic Control System* (ATCS) that serves to regulate traffic lights especially in the event of congestion; b) *Advanced Traffic Management System* provides real time information to road users; c) *Traffic information system* (ITS) that is electronic information in the form of messages, pictures, symbols, or writings that are dynamic for road users; and d) *Bus Priority*, priority bus is just one form of giving "a little" priority bus at the mouth of the intersection with traffic lights. This is supported by the statement of Informant 1 as the Head of the Surakarta Transportation Agency that the application of e-government is considered very strategic as a program that must be prioritized; the Surakarta Transportation Agency has its devices that are quite reliable.

In addition, the use of e-tickets, *or electronic payments*, provides services in payment for continuous travel. At the beginning of the operation of Batik Solo Trans (BST) has been introduced with e-ticket through BRIZZI card, namely Bank BRI debit card. Due to the lack of public awareness of BST users, e-tickets can no longer be used because they only use one type of card. The card can only be accessed from Bank BRI, and in the end the use of e-tickets is not optimal.

2. Implementation of Solo Smart City *Master Plan*

In order to realize the vision and mission of the Government of Surakarta city contained in the RPJMD, the smart city master plan of Surakarta has been developed. One of the dimensions of smart city of Surakarta is smart living in which there is a field of transportation that will be developed as smart mobility. The smart city

dimension of Surakarta city is not the one as stated by Giffinger. Based on the results of an interview with Informant 5 as the Head of the Application Section of the Surakarta Communication and Information Service (2019), smart city in Surakarta City did not develop the concept of smart mobility. The definition of smart mobility is included in smart living which regulates the field of transportation or transportation. Technical objectives in smart living include: a) the realization of an orderly society in effective and efficient traffic; and b) the availability of information technology devices capable of supporting the use of convenient and integrated transportation.

3. Regulatory Authority

Based on Central Java Governor Regulation Number 69 of 2016 concerning Organization and Working Procedures of the Central Java Provincial Transportation Office, the Transportation Agency is the implementation element of government affairs in the Field of Transportation that becomes the regional authority. The main task is to help the Governor carry out government affairs in the field of transportation that becomes the regional authority and assistance duties assigned to the region. Its function is to formulate and implement policies in the field of road traffic, road transport, transportation and railway networks, and shipping. Thus the Department of Transportation has authority in the manufacture of regulations in the field of transportation.

4. Resource Availability

Based on data from Secretariat Department of the Surakarta Transportation Agency (2019), in term of human resource quantity, the number of employees of the Surakarta City Transportation Agency is quite adequate, namely as many as 86 Civil Servants and some contract employees, approximately 10% of the employees graduated from the College of Land Transportation.

As for the source of funds for its routine operational activities, the Transportation Agency uses APBD while its special budget of public transportation development is still subsidized by the Central Government. Based on the results of the interview with Informant 3 as Head of the Transportation Section of the Surakarta Transportation Agency (2019), the budget of the Transportation Agency is limited to the APBD of Surakarta City, its nature for routine budgets and operations. As for the development

operation of BST, the Department of Transportation budget is still small so that subsidies from the central government are needed. This is also reinforced by the statement of Informant 6 as Head of the Surakarta Technical Implementation Transportation Unit (2019), that the budget for BST operations is still very small so that it has not been able to provide BST services with a single trip model and is still manual (not using e-ticketing). BST still uses a manual system of one-ticket one trip because the limited budget of BST cannot serve e-ticketing with one ticket for multi trip. Therefore, this year (2019) subsidies are being submitted to the central and provincial governments.

5. Owned Corridor, Bus Rapid Batik Solo Trans (BST), and Feeder Transport

Since 2010 the Department of Transportation has been assisted by foreign consultants from Germany i.e. GIZ-SUTIP (*Deutsche Gesellschaft für Internationale Zusammenarbeit-Sustainable Urban Transport Improvement Project*), and CDIA (*Cities Development Initiative for Asia*) since 2011. They have conducted prefeasibility study analysis and recommended several things related to handling transportation or improving public transportation services, namely: a) the replacement of city buses with *Bus Rapid Transit* (BST = Batik Solo Trans); b) the revitalization of 16 routes of city buses to 15 BST corridors; c) the integration with railway station, Tirtonadi bus station, and Adi Sumarmo Airport.

As of 2010, the mass public transportation bus Batik Solo Trans (BST) has operated in Surakarta City. Batik Solo Trans is a Solo Busway or local BRT (Bus Rapid Transit). Its MoU operation in collaboration with Perum DAMRI was signed by Mayor of Surakarta City and Director of Perum with the help of the central government (Director General of Land Transportation) with 15 units of BRT. The next step is the formation of PT Consortium. BST (Bengawan Solo Trans) which incorporates the old PO Bus.

Furthermore, according to Informant 2 as Head of the Transportation Department of Surakarta Transportation Agency, in order to improve the affordability and accessibility of BST in 2018, the number of feeders was increased by 30 units, and this year (2019), 20 more units would be procured, which is funded by the APBD of Surakarta City.

B. External Factors

In planning the development of smart mobility in Surakarta, the External Environment of the Transportation Agency determines the following:

1. Development of Technology and Information (ICT)

Globalization demands that public servants must be responsive to all changes. The Technology and Information Service develops incredibly fast. This is an opportunity for the improvement of public transportation services in the digital age. Smart mobility is a smart movement that utilizes technology. In other words, smart mobility is a derivative concept of smart city that uses the development of *Intellegent Transport System* (ITS). The advancement of ITS technology greatly changes the public's perception of its ability to utilize ITS to overcome transportation challenges.

2. Position of Surakarta City towards Hinterland Regions and Population

Regionally Surakarta City is a metropolitan city supported by six hinterland regions, which is an agglomeration of the SUBOSUKAWONOSRATEN regions (Surakarta, Boyolali, Sukoharjo, Wonogiri, and Sragen). Based on the results of an interview with Informant 4 as Head of the Research and Development Sector of the Surakarta Regional Development Planning Agency (2019), Surakarta City is the center of agglomeration of surrounding cities. Surakarta city area is only 44 km square meters with the population of 560,000 at night and 2,000,000 during the day.

3. Increasing Number of Private Vehicles and the Presence of Online Transportation

As the center of economic, social and other activities with the population of 2,000,000 people during the day, Solo no wonder, undergoes the growth of vehicle number. Based on the results of an interview with Informant 2 as Head of the Transportation Department of the Surakarta Transportation Agency (2019), the number of vehicles with Solo AD vehicle registration plate is 747,695 units based on the data from SAMSAT Surakarta. In the previous year, it was only 500,000 units, meaning that there is an increase of 200,000 more vehicles in Solo so far this year. Meanwhile, the road capacity remains constant. The growth in the number of vehicles is mostly dominated by private vehicles. Motorcycles ranks first followed by private cars not to mention

added with online transportation. This makes it a challenge for the Department of Transportation to be able to realize smart mobility.

4. Cooperation with Central Government and Stakeholders

Since the beginning, the development of urban public transportation services has received assistance from the central government, i.e. the Ministry of Transportation by providing fleet assistance and as for the traditional by cooperating with various stakeholders. Based on the results of an interview with Informant 6 as Head of the Surakarta Technical Implementation Transportation Unit (2019), given the budget constraints and to optimize BST and feeder operations to improve accessibility, then the steps taken by the Government of Surakarta city are to build partnerships with the third parties and various stakeholders, namely with PT. Bengawan Solo Trans, Trans Roda True Service Cooperative, and One Purpose Joint Service Cooperative.

Based on the results of interviews and review of several documents, the internal factors consisting of Strength (S) and Weakness (W) and the external environmental factors consisting of Opportunity (O) and Threat (T) are identified. The following table is the identification of the SWOT matrix.

Table 2. Characteristics of Respondents

	STRENGTH	WEAKNESS
INTERNAL FACTOR	<ol style="list-style-type: none"> 1. E-Government application (Informants 1, 4 and 2). 2. Authority of Legislator (Central Java Governor Regulation Number 69/2016). 3. Strategic Plan of Office (Renstra Dishub and master plan smart city). 4. Adequate HR (Data Secretariat Dept. of Dishub). 5. HR quality (Data Secretariat Dept. of Dishub). 	<ol style="list-style-type: none"> 1. Limited budget fund source (Informants 3 and 6). 2. Limited number of BST fleets (Informant 2). 3. Less Maximum Operation of BST (Informant 2). 4. Limited number of feeders (Informants 2 and 6).
EXTERNAL FACTOR	<ol style="list-style-type: none"> 6. Masterplan of Smart City Application (Informant 5 and RPJMD). 7. BST Corridor and Route (Informant 6). 8. Complete ITS (Informants 1 and 2). 	<ol style="list-style-type: none"> 5. Less maximum operation of ICT (Informant 2). 6. Ineffective E-ticketing (Informant 6).

OPPORTUNITY		
<ol style="list-style-type: none"> 1. The presence of transportation mode (Informants 2 and 6). 2. ITS Development (Informants 1 and 2). 3. Cooperation between Stakeholders (Informant 6). 4. Central and Provincial Government's Support (Informants 3 and 6). 	SO Strategic Issue	WO Strategic Issue
THREAT		
<ol style="list-style-type: none"> 1. Population migration from surrounding city/regency (Informant 4). 2. The position of Surakarta City towards Hinterland Regions (Informant 2). 3. The increasing number of private vehicles (Informant 2). 4. The presence of online transportation (Informant 2). 5. People's low consciousness of using public transportation (Informant 2). 	ST Strategic Issue	WT Strategic Issue

Source: *Processed primary data, 2020*

Table 2 shows the results of the SWOT identification, which found 4 major strategies. Considering the result of SWOT analysis, 11 (eleven) strategic issues are found. Those strategic issues are identified as follows:

- 1 Issue 1 is a SO strategic issue. There are 3 SO strategic issues, the first of which is the strategic issue of developing cooperation with stakeholders in developing the Office's strategic plan and the Smart City Master Plan, particularly the Smart Mobility (S3, S6, and O3, O4).

- 2 The second SO strategic issue is the strategic issue of e-government application in ITS application and development (S1, S8, and O2).
- 3 The third SO strategic issue is the strategic issue of developing transportation inter mode integration by developing BRT Corridor and the existing BST and feeder fleet route (S6, S7, and O1).
- 4 Issue 4 is a WO strategic issue. There are 3 WO strategic issues, the first of which is the strategic issue of optimizing Central and Provincial Government's Grant to improve BST operational cost (W1, W3, and O4).
- 5 The second WO strategic issue is the strategic issue of improving cooperation with stakeholders to optimize BST and Feeder's operation and to improve BST's accessibility (W1, W3, and O3).
- 6 The third WO strategic issue is the strategic issue of developing Single Trip system through cooperating with central and provincial governments and stakeholders, through the e-ticketing application (W6 and O3, O4).
- 7 Issue 7 is a ST strategic issue. There are 4 ST strategic issues, the first of which is the strategic issue of synchronizing the policy to limit the number of private vehicles (S2, S3, S6, and T2).
- 8 The second ST strategic issue is the strategic issue of developing regulation for the operation of online transportation and BRT transportation (S2, S3, S6, and T3).
- 9 The third ST strategic issue is the strategic issue of developing accessible public transport facilities to user community (S2, S6, S7, and T4).
- 10 The fourth ST strategic issue is the strategic issue of developing accessible public transport facilities to user community (S2, S6, S7, and T4).
- 11 Issue 11 is a WT strategic issue. There are 1 issue of WT strategic i.e. the strategic issue of optimizing Feeder transportation to cater on the area unreachable by BST, thereby reducing the use of online transportation and private vehicles (W2, W4, and T4, T5).

The results of the evaluation with the Litmus test showed 4 (four) strategies, namely: 1) Strategy to develop and enhance cooperation with stakeholders in developing Smart city strategic plans and master plans, especially smart mobility: this is in line with the results of research of Vrščaj et al., (2020) regarding stakeholder involvement related to policies on smart mobility shown in the Smart Mobility Roadmap. The results of the research of Vrščaj et al., (2020) show that the stakeholder engagement focuses on involving users in the smart mobility roadmap. Meanwhile, those of this study focus on involving all stakeholders. 2) Strategy to increase and intensify the application of e-Gov through the application and development of ITS: this supports the results of the research of Ghasemi & Saberi (2020), that one of the solutions for the latest and most effective traffic management problems using information technology is the development of public transportation along with the use of ITS. This shows that the use and development of ITS is a strategy for smart mobility. 3) Strengthening the integration of intermodal modes of transportation through developing BRT corridors, train modes and existing BST feeder transports: this is consistent with the results of the research of Yigitcanlar & Kamruzaman (2018) on sustainable transportation. The existence of a strategy for integrating intermodal transportation modes through the development of BRT corridors, railways, and BST feeder transportation is a strategy that directs sustainable public transportation. The results of the research of Manders et al., (2020) stated that the biggest transportation problems are caused by ownership of private vehicles so that a strategy that directs sustainable public transportation is needed in this smart mobility strategy. It is different from that of the research conducted by Warren et al., (2015) where there are three transportation problems in Havana, namely the high level of unmet demand, lack of financing, and the state of the poor transportation system. In this case, the problem is in the transportation system, not on private vehicles. This situation makes the urban transportation system still far from expectations. Therefore, it is necessary to strengthen and improve public transportation services through long-term strategic planning. 4) Strategies for developing improvisation and synchronizing policies of the central and regional governments to limit the number of private vehicles; this strategy supports the results of research from Manders et al., (2020) which states that some of the obstacles to smart mobility are operational and technical issues and the difficulty of involving users in sustainable transportation. Based on a study of Manders et al., (2020), the biggest transportation problem is caused by private vehicle ownership. Therefore, it is necessary to develop strategies for improvisation and synchronization of central and regional policies to limit the number of private vehicles.

Determining strategic choices is meant to select and agree on priorities from strategic issues that have been prepared previously. Issues obtained by conducting internal and external analysis are then assessed by conducting a litmus test in order to investigate the priority level of the issues obtained. The strategy to be formulated and defined is an outline of the organization's response to fundamental policy choices directed at dealing with strategic issues. Bryson (2004) argues that strategy is a pattern of goals, policies, programs, actions, decisions, or resource allocation that defines the organization, what the organization does, and why the organization does it. In establishing a strategy, it should be believed that its success can be trusted by others and can indeed be implemented. Thus a strategy that is determined must be based on the opportunities, threats, strengths and weaknesses faced and owned by the organization.

CONCLUSION

In dealing with transportation problems in Surakarta, it is necessary to apply technology in the transportation sector through the concept of smart mobility. The strategic plan in Developing Smart Mobility in Surakarta consists of 11 (eleven) strategic issues. The evaluation using Litmus test has resulted in some strategies: 1) Strategic issue of developing and improving cooperation with stakeholders in developing strategic plan and Smart City Master Plan, particularly Smart Mobility; 2) Strategic issue of improving and intensifying E-government application through ITS application and development; 3) Strategic issue of reinforcing the transportation inter mode integration by developing BRT Corridor, train mode and existing BST feeder transportation; and 4) Strategic issue of developing measures to improve and to synchronize the policy of central and provincial governments in order to limit the number of private vehicles.

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