

DEVELOPING & DESIGNING SMART CITY PROFILING FRAMEWORK

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Abstract

A smart city is a change in the pattern of life, wherein seeing the concept of smart city, we must focus on one side or several sides but must see the bigger picture so that the definition of a smart city can create precisely. This article developed from previously article such as smart city articles 1.0-5.0 and then developed into three final concepts regarding the smart city. These three concepts consist of the smart city profiling framework, innovation profiling, and the seven stages of smart city profiling (the maturity level of smart city profiling). The focus of the problems to be developed can see in the smart city profiling framework which divides into six important parts: social profiling, BMM (Business model mapping) 101 framework, innovation profiling, social media profiling, culture profiling and education profiling. These six parts cannot be separated from each other and must build together. Therefore, this article will focus on completing the concept of smart city profiling, so that a strong foundation will create in implementing smart city. The method contained in the smart city 5.0 framework and the framework developed to be more advanced. The result of this article is a smart city profiling framework and a more detailed concept. Although the maturity level table shows, the discussion will complete in the next article and innovation profiling.

Keywords: *Smart city profiling, BMM 101 framework, Innovation profiling, Culture profiling, education profiling, social media profiling*

Abstrak

Smart city merupakan perubahan pola hidup, dimana melihat konsep smart city, kita harus fokus pada satu sisi atau beberapa sisi tetapi harus melihat gambaran yang lebih besar agar definisi smart city dapat tercipta dengan tepat. Artikel ini dikembangkan dari artikel sebelumnya seperti artikel smart city 1.0-5.0 dan kemudian berkembang menjadi tiga konsep akhir mengenai smart city. Ketiga konsep tersebut terdiri dari smart city profiling framework, innovation profiling, dan tujuh tahapan smart city profiling (tingkat kematangan smart city profiling). Fokus permasalahan yang akan dikembangkan dapat dilihat pada kerangka smart city profiling yang terbagi menjadi enam bagian penting yaitu: social profiling, framework BMM (Business model mapping) 101, inovasi profiling, social media profiling, culture profiling dan education profiling. Keenam bagian ini tidak dapat dipisahkan satu sama lain dan harus saling membangun. Oleh karena itu, artikel ini akan fokus melengkapi konsep smart city profiling, sehingga akan tercipta fondasi yang kuat dalam mengimplementasikan smart city. Metode yang terdapat pada framework smart city 5.0 dan framework yang dikembangkan menjadi lebih maju. Hasil dari artikel ini adalah kerangka kerja pembuatan profil kota pintar dan konsep yang lebih detail. Meski terlihat tabel tingkat kematangan, pembahasannya akan selesai pada artikel berikutnya dan profil inovasi.

Kata kunci: *Pembuatan profil kota pintar, kerangka kerja BMM 101, Profil inovasi, Profil budaya, profil pendidikan, profil media sosial*

1. INTRODUCTION

Technological developments develop rapidly, and changes occur very significantly in human life. These changes can impact daily activities, and change requires innovation; change also requires human resources, and change requires technology that can make activities more effective and efficient. Because of these changes, a city/region must change called a smart city. There are many debates about smart cities; some say that smart cities are cities based on information technology. Some say that smart cities based on developing human resources and technology. Some say smart cities are the sophistication of transportation and so on. These things which said are not wrong, but they are still incomplete. Therefore, a more solid definition is needed and does not only look at one side or several things as the basis for a smart city. A smart city has a very broad nature, where the way to see the context and content of a smart city must distinguish from other ways of seeing knowledge. A smart city has a broad meaning, namely, change. According to our definition, a smart city is a change in culture and habits supported by information technology to produce a faster process[1],[2]. Without changes in culture and habits, implementing a smart city will be impossible. Some experts say important things in developing a smart city, including: (1)"Clusters can define as groups of companies and institutions that are placed together in a geographic area. This relationship has a dependence on the provision of products/services. It has geographic proximity characteristics, including social level, intense exchange of information, and knowledge"[3]. From this statement, we can understand that detailed mapping is very important to do in developing a smart city, (2)"The level of maturity of a smart city determines the development of a city layout; therefore, it is necessary to make policies and directions. Right in determining what technology will be implemented in the city"[4]. Technology is a determining factor in developing a smart city; therefore it is very necessary to determine which technology is suitable for implementation and what kind of innovation is right for the city, (3)"Competitive development, according to significant changes concerning mindsets, products/services, processes, technology and business models. This competitive thinking will encourage innovation in technology, production, marketing and innovation in business models"[5]. Innovation is needed, especially in business models to compete globally, this is the essence of the statement, (4) "Globalization makes a shift in business models"[6].

The same thing also expressed, that global competition demands changes in business models and the way we live our lives, (5)"A region must have important facilities, including: (1) data connectivity, (2) logistic, (3) financial flow connectivity, (4) virtual world network "[7]. An area must have these four important things before applying the smart city concept, (6)"Artificial intelligence is a system that is useful for interpreting external data and for studying that data and using this learning to achieve certain goals and tasks through flexible adaptation "[8]. AI implementation is needed to be able to apply the principles contained in a smart city, (7)"The level of critical variable capability must be taken into account when determining the maturity level of a smart city"[9]. Several variables need to be taken into account to determine the level of a smart city. Even its development and development hampered. Why do we say that? We will answer it in the smart city profiling framework and concept that we created.

This article develops it from previous articles that published smart city 1.0,2.0,3.0 and 5.0, which are called smart city intelligence. Smart city profiling is developing a final

framework regarding the smart city, followed by the seven stages of smart city profiling (the maturity level of smart city profiling). This research's development is almost complete. We have created three final concepts: the smart city profiling framework, the seven stages of smart city profiling (the maturity level of smart city profiling), and innovation profiling. All of these articles are in progress, and we have submitted them. The end of this research is an application to measure smart city profiling's performance as a whole and specifically for the maturity level. We will make the article, so three final concept articles discuss smart city profiling, namely the smart city profiling framework. In developing research, the first thing that must understand is that we must create and develop very strong basic concepts so that targeted applications can produce with research published. If the results are the main reference, there will be many weaknesses in the research. Still, if the conceptual foundation is strong, then it can be adjusted to global development conditions and conditions when the application finished.

2. RESEARCH METHOD

2.1. The Roadmap of research

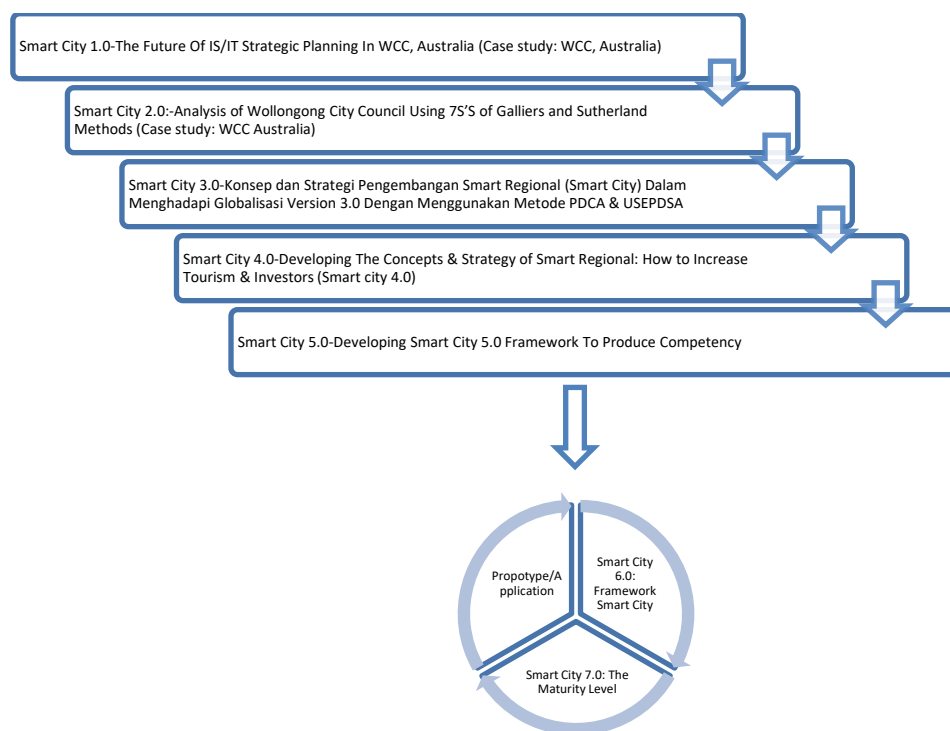


Figure 1. The roadmap of research from smart city intelligence become smart city profiling

Figure 1, explains the research process we are doing, this starts from smart city 1.0 to smart city 5.0, this is the basic concept for the first level of the big picture called smart city intelligence. We develop research and literature reviews by creating a complete profile to develop a smart city. Lastly and currently in creating an application to measure performance, we wait until this concept is published. The basic foundation of our research is strong and has a solid foundation in application development.

2.2. The process of research framework smart city profiling

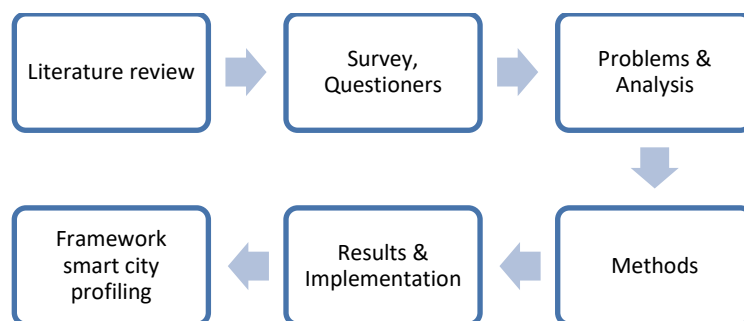


Figure 2. The process of framework smart city profiling

Figure 2 explains. First, we conducted literature review research, starting from journals, textbooks, websites on smart cities, surveys, and questionnaires with 100 participants which included (10 lecturers, 40 students, 10 small-level traders, 10 middle-level, 10 traders- large level, 10 employees are working in factories, 10 business owners. We use google forms to conduct surveys. The questions we ask are: (1) Does education already have the infrastructure in your area? (1: not yet, 2: still far from standard, 3: infrastructure is not well developed and there are still transportation constraints, 4: good enough, but still not integrated, 5: good and some integrated) Question 1, is useful for knowing whether education in the area meets the requirements for implementing smart city profiling, namely education profiling and social profiling. (2): Can the people in your area be open to new things to develop infrastructure and other things to improve the people's living standards? (1: very closed and chooses to maintain what is already there, 2: quite closed but still has a little openness to change, 3: enough to open oneself to new things, but still not willing to change existing habits, 4: open, but choose to keep the old and new systems running simultaneously, 5: open and choose to change the whole system so that it can be even better. Question 2 is useful to find out whether society is flexible to changes such as culture profiling and innovation profiling. (3): Is it in your area investment can go well and investors feel comfortable in developing their investment? (1: no, our region does not have investors, 2: our region has quite a lot of local investors developing their business, 3: our region has no integration or does not yet have a supporting system in increasing the convenience of investors in investing, 4: the system in our area is sufficient good in increasing investment, 5: the system is well integrated, and there are national and international investors. Question 3, is useful for knowing investment in an area and investors, which has to do with social profiling and the BMM101 framework.

The next process is to analyze the problem from the survey results and the data set obtained from the literature review. This article finally produces a framework and table of smart city profiling (the maturity level of smart city profiling). Specifically, this maturity level will discuss in another article to be more detailed in the discussion. Specifically, for data sets in this article, we will take from several articles, including: Kominfo, Profile and implementation guide for ICT Pura program: Mapping movement, index calculation, and appreciation for digital cities/districts in the Republic of Indonesia[10]. Datasheet showing the impact of work environment on productivity I higher education institution[11]. Dataset on the sustainable smart city development in Indonesia[12]. Survey data on the antecedent of the entrepreneurial intention in

Indonesia[13]. The implementation of Garuda smart city framework for smart city readiness mapping in Indonesia[14]. Smart city implementation modelling in Indonesia with an integration platform approach[15].

3. RESULTS AND ANALYSIS

3.1. Survey-results

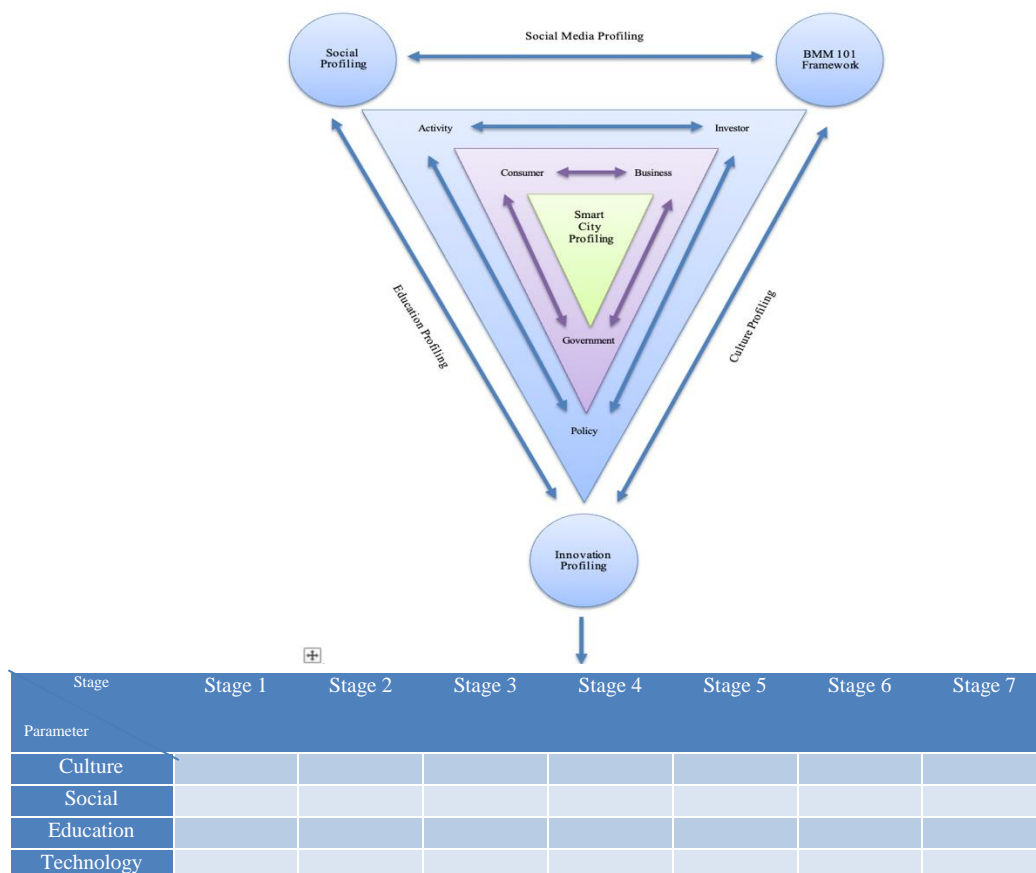
The survey results from 100 participants are:

Question 1: 10% (1: not yet); 10% (2: still far from standard); 12% (3: infrastructure is not well developed and there are still transportation constraints); 33% (4: good enough, but still not integrated); 35 (5: good and some integrated)

Question 2: 5% (1: very closed and chooses to maintain what is already there); 10% (2: quite closed but still has a little openness to change); 5% (3: enough to open oneself to new things, but still not willing to change existing habits); 35% (4: open, but choose to keep the old and new systems running simultaneously); 35% (5: open and choose to change the whole system so that it can be even better)

Question 3: 3% (1: no, our region does not have investors); 5% (2: our region has quite a lot of local investors developing their business); 5% (3: our region has no integration or does not yet have a supporting system in increasing the convenience of investors in investing); 36% (4: the system in our area is sufficient good in increasing investment); 15% (5: the system is well integrated, and there are national and international investors)

3.2. Framework smart city profiling



Business Model							
Market							
Implementation							

Figure 3. Smart City Profiling Framework & The Seven Stages Of Smart City Profiling (The Maturity Level Of Smart City Profiling)

Figure 3, explains the framework stages starting from the inner triangle, including consumers, business government, then the second triangle, namely activities, investors and policies. The position of the triangle and the top is education profiling, social media profiling, culture profiling. The first circle is BMM 101 framework (Business Model Mapping), the second circle is social profiling, and the third circle is innovation profiling. Each circle is connected, and this is known as the development cycle of a smart city in an area. If one of the cycles is interrupted and not completed, a smart city's construction and development will not be perfect.

3.2.1. Consumer-business-government

In this triangle, a smart city must ensure several important things, namely a strong and stable local government in terms of policies not to confuse investors or people who want to develop the area into a smart city. It is necessary to understand that building a smart city is not talking about how many smart cities can build but about mapping the area's strengths and weaknesses honestly and about priority, namely which areas to build first. "Comparison of the future between user perceptions and attitudes based on different personality characteristics and demographics needs to be taken into account properly"[16]. Furthermore, "People can have different perceptions about the types of services contained in a smart city, which can use as a means of promoting, learning, training and developing entrepreneurship on a global scale"[16],[17].

If we look at the side of profits, then a smart city must improve the people's standard of living in that area. Therefore, it is also necessary to have an initial mapping of each region's products/services /services' strength. To maintain balance, we must also be able to see whether there are consumers in it. It refers to the level 1 smart city profiling framework:

On the Government side: the questions that need to ask as an indicator are (1) whether regional policies have been very supportive of these regions' development without the existence of regional regulations that contradict other regulations? It is necessary to understand that local regulations must have a legal force that can support the process consistently and with certainty because investors always need certainty in investing something. (2) what kind of support can the regional government provide to the region in developing the strength of products/services in the area? (3) has regional regulation been implemented properly? If yes, anything, explained in detail, if not, what are the problems and the solutions? No, this question needs to be discussed and answered in detail first to obtain certainty in local regulations

On the business side: (1) what are the superior products/services in this area? Explain in detail the strengths and weaknesses of each product/service that owned. Each region is sufficient to include three types of products/services and be explained in detail. (2) is the infrastructure such as supporting facilities and technology available to develop the advantages of this area? If so, anything? Explain in details, if not, what is the problem

and the solution?. (3) Is the area easy to reach? By what kind of transportation? And for how long? It is very important because it is about speed in distribution

On the customer side: (1) does this area have a large number of potential consumers? The data collection must be detailed because it will be useful to know the velocity in the circulation of money in this area. (2) what are the habits of consumers in this area? And what are the main target needs ?. (3) segmentation of consumers needs to be done in detail, has this area done a detailed mapping of market and consumer segments? if yes, explain the existing data, if not, do a data segmentation mapping

These questions must answer because this is the initial level to determine whether this area is ready to be established as a smart city or not. It should understand that not every region can be a smart city because each region has its uniqueness. Starting from culture, habits, potential population, location, and many other factors, in areas that are difficult to be made into smart cities, integration of transportation and transfer of technology and human resources needed to grow well. Still, for areas that are already able to implement smart cities, significant development and building enormous strength are required so that what's already there. Will this create social inequality? The answer is no! Suppose there is integration from regions that are already strong with regions that are not. In that case, this will help develop other areas; this is called the profiling integration strategy. The profiling strategy means that a strong, smart city area connected to areas that are not yet strong so that these areas can also develop slowly. Here, very good management is needed, where local governments must ensure that the regulations must fully support the process. There should be no obstacles to the process. It will explain in more detail in the next article, namely the seven stages of smart city profiling (the maturity level of smart city profiling).

3.2.2. Activity-Investor-Policy

Position of activity: this position is about the activities in the community in an area. Activities include habits and processes as well as economic growth in the area. We need to understand that activities influenced by the habits or culture that already exist in the area so that it takes time to make changes by changing the people's wishes in the area. Therefore, the questions for this part of the activity are (1) do people in this area have a habit or culture that is difficult to accept change? If yes, explain what factors influence it so that it is very difficult to change, if not, what are the things that can do to improve the standard of living of the people in this area? (2) Are the economic processes in this area stable or dynamic? If it is stable, it means that the development is very slow, and it is difficult to accept change. If it is dynamic, the community is very open to new activities and welcomes enthusiasm for new things found in this area. (3) what indicators are the obstacles in the development of this area? What is the human factor that doesn't want to change? Is it because of infrastructure? Or other factors? In this question, it must be explained in detail, indicators of inhibiting progress so that the area can develop and the root of the problem known why it cannot develop.

Investor position: to be able to develop an area must attract investors and cooperate in developing it. (1) Is there a local investor in this area who develops his business to increase the community's standard of living in this area because of local investors in the area? if yes, what are the things done by the local investors so that the community can improve their standard of living, if not, what are the things that are the main problems that hampered? (2) does this area already have national level investors who have collaborated with local investors in developing the area? If yes, what are the things that

developed ?, if not, what are problems ?. (3) does this region already have international investors? If yes, what did international investors improve the standard of living of people in the area? What are the main obstacles so that international investors do not want to invest in that area?

Policy position: (1) Are the policies of the central and regional governments synchronized? So that investors are not worried about investing. (2) what policies can accelerate the development of the area so that it becomes a smart city? (3) what problems exist in the implementation process and what needs to change in the short-medium and long term?

3.2.3. Social profiling, BMM101 framework, Innovation profiling

In this section, three very important things must understand. Of course, these factors will be the main thing in developing a smart city.

Social profiling: this indicator covers three things: community, potential people at the regional and national level, potential people at the international level.

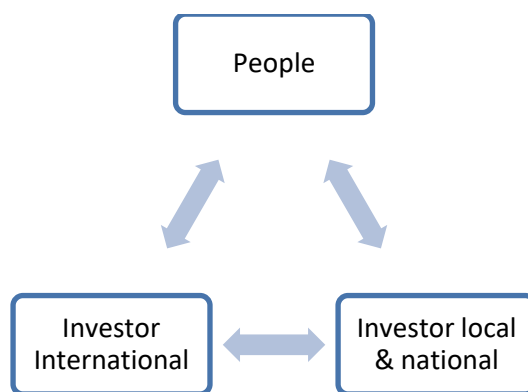


Figure 4. The cycle of social media profiling

Figure 4 explains the behaviour in implementing social profiling. The difference between local and national investors is that local investors consist of middle and large level traders who have lived in the area for a long time and have had businesses that have been in the area for a long time. These businesses are engaged in fields that have the potential to help improve people's lives. For example, a trader who owns a fashion shop business and opens a bakery and its brands are known to the local community. National investors can be said to be successful at the national level and have businesses that have spread across several cities but have not yet reached overseas. For example, an entrepreneur who opens a franchise business in city A and develops in cities B, C and D can be called a national level investor. Meanwhile, international investors are of two types: (1) people with large businesses called entrepreneurs, where the business has reached in several countries, and these people reside in our own country. (2) people who have a large enough and large business and have business networks in several countries; they want to expand their investment in other countries.

This data collection does not cover too many people because if we focus too much on many people, it will not become too many things that will interfere with development. The total social profiling is five local investors for each region, ten investors at the national level, and five investors at the international level. It can describe as follows:

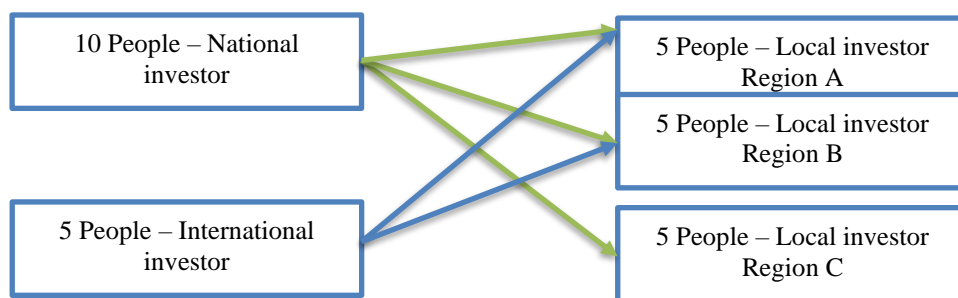


Figure 5. Relationships between local, national, international investors

Figure 5, explains that regions A, B, C have a relationship between local and national investors, regions A and B connected with international investors, where regions A and B have developed well, with three types of investors. Next is innovation profiling. Innovation profiling is a type of innovation that can apply to a smart city, flexibly, where innovation is needed to answer the community's main needs and improve people's lives.

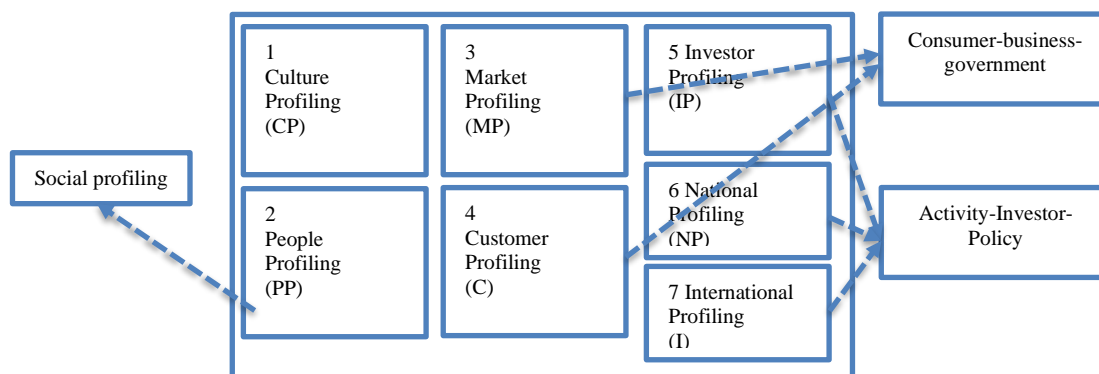


Figure 6. BMM 101 Framework

Figure 6 explains the profile mapping of each indicator to make it easier to implement. BMM 101 is a more detailed mapping to produce the best brainstorming and strategy in implementing smart city.

Next, these three things can be related to three other very important things: social media profiling, education profiling, and culture profiling.

"The maturity level of a smart city reflects that each city has a different maturity level. It is a benchmark for identifying smart city developments based on the scale of development. It is necessary to optimize the system in the city. Meanwhile, smart city references designed to identify policies and innovation processes needed to support sustainable smart city planning. It results in an in-depth concept of the work required for smart city development, including technology, integrated infrastructure to support our

capabilities and innovation services"[18]. Therefore, "The term smart city refers more to certain skills and characteristics", "Advances in technology can facilitate the development of strategies and programs that are useful for improving quality of life of society"[19],[20]

3.2.4. Social media profiling, Education profiling, Culture profiling

In the position of social media profiling: (1) does the area already have social media in promoting its superiority? If so, what social media use? And how many followers already? Where do you come from, is it local or national/international? If not, what are the obstacles in implementing social media? What are the things needed for social media to implement? (2) Are there human resources who can manage and supervise social media? What are the things needed to improve human resources' competence in using social media?. (3) is there a major centre in developing technology? In other words, is the information technology infrastructure well developed in the area? These questions are important to answer because they will answer the needs of technology and human resources

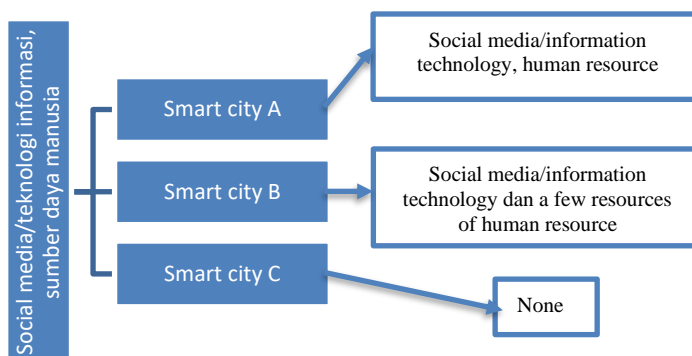


Figure 7. The relationship between technology-human resources and social media with the surrounding areas

Figure 7 describes the mapping of technology and human resources, where each region has its capabilities. For example, area A is an area that is already very good because it has the technological infrastructure and competent human resources. Region B has a technology infrastructure, but it is not sufficient in terms of human resources. Region C does not have anything yet, so assistance is needed to develop, train, and build.

In the education profiling position: in this position, a region must improve the quality of education to produce human resources. It can be called a balance between invisible and visible knowledge profiling.

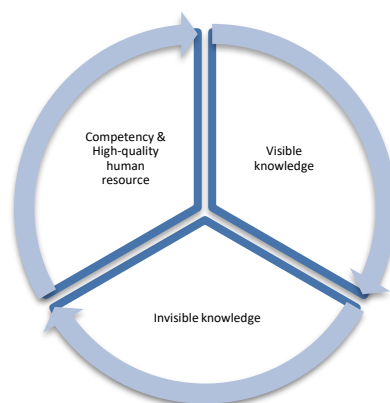


Figure 8. The circle of education profiling

Figure 8 describes the cycle of educational development in producing high human resources and competence. The first cycle is visible knowledge, where people must have a minimum of a bachelor's degree and master one international language to increase competence. The number of bachelor's with new competencies can be counted and included in the smart city profiling requirement category. If you have a bachelor's degree but do not master one international language, it can say that you do not have any competence. Therefore, the first question is (1) does education in your area have very good and integrated infrastructure? And how many human resources have bachelor degrees, master degrees, PhDs and have added value, namely mastering international languages. (2) does education in your area already have information technology to help educational facilities to become more globally competitive? (3) is the education in your area integrated with international or just stand-alone according to old standards, and there are no significant changes? These questions will help to more objective education development. Furthermore, it takes the development of invisible knowledge, where this ability obtained from experience gained while doing it. For example, when someone already has visible knowledge and competence, then that person must have invisible knowledge as a basis for balancing their abilities.

Position of culture profiling: this section is talking about habits, and this is very important because, in culture profiling, there are things that have become the culture of an area. (1) Does your area have a certain culture and adhere to these principles so that you refuse to make changes? If so, explain what culture or principles and how these values can trust explain in the beginning. (2) do people in your area think openly to things that can change their lives or do not think openly, so they don't want to change and directly reject the change itself even though logically, the changes described are very good? (3) What is the culture that can use as a regional strength and technology can be applied so that the culture can become more modern and globally acceptable? These questions will help us to understand what is happening to the people in the area. Before we implement a smart city, we must understand the rationale for how they behave like that and how they interact with other people and what principles the local community hold firm so that it believed to be something that not violate. Culture will influence the smart city development process, and the smart city will be influenced by good or bad culture, depending on the level of flexibility. Culture can describe as follows:



Figure 9. The level of culture profiling

Figure 9, explains that this stage starts from the individual himself, to be able to form a good culture. The culture must form from the increasing competence of human resources in it, not the other way around if a culture binds a person and makes him closed to new things that can help him develop, then that culture must completely change. The basic principle is that a good culture is a culture that pays attention to the values of knowledge and does not limit itself to being able to change flexibly if needed and if it is for the common good. Furthermore, when competence and knowledge are well developed, the next is a new habit with a more open mindset. It will affect every culture in the family, affecting the area, which makes a culture trustworthy, continues to culture in the city, and will affect people's whole mindset in a country. Culture can change our mindset as well as the way we behave towards other people and speak. Therefore, it is necessary to pay attention to cultural change first, not technological concepts. Without changes, smart cities' application will produce something that is not maximum and miss the actual target. Smart city talks about changes in culture, habits, mindsets and almost all life processes, not just some. A smart city's concept requires us to pay close attention to what is good and can be useful for improving living standards and making life better.

4. CONCLUSION

After analyzing and explaining, the following conclusions drew:

1. This article is a concept type article, where this article is a long-term process developed from smart city intelligence (smart city 1.0-5.0) which then develops into three concept layers, namely the smart city profiling framework, the seven stages of smart city profiling (the maturity level of smart city profiling) and innovation profiling. In this article, this concept is the basis of application development that designed after all these concepts published as the basis for the strength of the development of a smart city performance measurement application.
2. Smart city profiling consists of three main things: social profiling, BMM 101 framework (business model mapping) and innovation profiling, which supported by social media profiling, education profiling and culture profiling. These six

things must not be separated from each other and constitute one unit. In the explanation of each point, it is mandatory to brainstorm to answer questions in a big picture so that the real root of the problem will be known and then proceed to the questions in the table which are centralized questions that will answer the real root of the problem and obtain more accurate data

3. In this smart city profiling framework, this will be able to help in the big picture in developing a smart city in an area so that the area can grow on target and objectively in deciding and determining something in implementing smart city

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