Smart Nation Initiative: Strategy and Implementation

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Abstract. Population growth due to urbanization raises a variety of typical urban problems such as decreasing the quality of public services, reducing the availability of residential land, congestion on highways, swelling levels of energy consumption, garbage accumulation, increasing crime rates, and other social problems. These problems are not facing only in cities, but also in regencies, provincial and even at the national level. APIC was formed to answer the need for an organization or collaboration that brings together various stakeholders to solve these problems. The collaboration of various stakeholders in one forum that can synergize all potentials by involving all potential to overcome the problems in a smart way. APIC views the need for an ecosystem that consists of human resources, governance, and adequate technology, which is needed to create smart villages, smart cities, smart regencies, smart provinces and at the end: smart nation. Implementing a smart solution starts with solving a small-distributed problem, but it is carried out appropriately and supported by all regional stakeholders thoroughly through synergy. These solutions are implemented in a strategic, gradual, and continuous manner. One of strategic way proposed was The APIC Innovation & Marketplace Hub that will open Supply & Demand of various Smart solutions (cities, public service providers, companies, etc.) that are tested and validated to be implemented. It required sufficient ecosystem to support the hub that is now undergoing and monitored through the Technology Readiness Level (TRL) to show the status of developing smart city.

1. Introduction

The rate of urbanization in Indonesia increases through years very rapidly. It is estimated that by the end of 2035 (15 years from now) more than 66.6% of the population will inhabit big cities in Indonesia, in some city it is even getting higher up to 85% (BPS 2010).

Table 1. Urbanization trend

| Province  | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 |
|-----------|------|------|------|------|------|------|
| Banten    | 67.0 | 67.7 | 69.9 | 73.7 | 78.8 | 84.9 |
| Jawa Timur| 47.6 | 51.1 | 54.7 | 58.6 | 62.6 | 66.7 |
| Jawa Barat| 65.7 | 72.9 | 78.7 | 83.1 | 86.6 | 89.3 |
| Jawa Tengah| 45.7 | 48.4 | 51.3 | 54.3 | 57.5 | 60.8 |
| Bali      | 60.2 | 65.5 | 70.2 | 74.3 | 77.8 | 81.2 |
| NTB       | 41.9 | 45.4 | 49.4 | 53.6 | 58.1 | 62.7 |
| INDONESIA | 49.8 | 53.3 | 56.7 | 60.0 | 63.4 | 66.6 |
Previous research showed city population growth due to urbanization raises a variety of typical urban problems[1] such as decreasing the quality of public services, reducing the availability of residential land, congestion on highways, swelling levels of energy consumption, garbage accumulation, increasing crime rates, and other social problems as depicted in figure 1.

![Figure 1. Problems in the city][1]

These problems are not facing only in cities, but also in regencies, provincial and even at the national level. The big problems now are how to make the Village/Regency remain attractive to the community so as to prevent excessive urbanization. And also how can the potential in the Village/Regency can be maximized for the benefit of its citizens. In this way, the smart nation can be achieved and implemented.

The purpose of this study is to propose a strategic implementation to initiate the Indonesia smart nation, covering not only the smart city but also smart villages, smart regencies, and smart provinces. It is expected that the result of this study can be used to accelerate the initiative to build a smart nation.

2. Material and Methods

2.1 APIC (Association of Smart Indonesia Initiatives / Asosiasi Prakarsa Indonesia Cerdas)

The Association of Smart Indonesia Initiatives (APIC) was born from the embryo of the Smart Indonesia Initiatives Forum. This community holds the 2nd Smart City Forum on July 20-21 2016 in Surabaya. Located in the City of Heroes, 21 July 2016, APIC declared [2]. APIC was formed to answer the need for an organization or collaboration that brings together various stakeholders of this nation. It is encouraging the collaboration of various stakeholders in one forum that can synergize all potentials by involving cities in Indonesia. APIC views the need for an ecosystem that consists of human resources, governance, and adequate technology, which is needed to create smart villages, districts, cities, and provinces. Implementing a smart solution starts by solving a small problem, but it is carried out appropriately and supported by all regional stakeholders. These solutions are implemented in a strategic, gradual, and continuous manner.

The vision of APIC is to be an organization that initiates and realizes the development of Smart Indonesia. With some missions, e.g., facilitating stakeholder collaboration in the exchange of
experience and knowledge to educate Indonesian life, facilitating the creation of smart solutions that are integrated into realizing smart Indonesia, accelerate the creative development process of Indonesia through technological, governance and human synergy[2].

2.2 Strategy and Implementation
In order to implement a smart nation, there are several strategies developed. First is to develop model recommendations and regulations on Smart Indonesia governance, including its components, such as; City, Regency, Village, Province, and National scale, through the related compartments. Garuda Smart Model (GSM) was proposed in order to standardize the platform used for smart city development[3].

The second strategy is together with relevant partners, to initiate and to assist the development of Smart Indonesia, within the scope and possible components, from many aspect and compartments. It includes smart healthcare, smart citizen, Smart safety security and mitigation, smart tourism and culture, smart Infrastructure, smart energy and environment, smart industry and economy, smart transport mobility and logistics, smart model standard architecture and technology[4].

Next strategy, the third strategy is to develop standardization certification platform recommendations and related components of Smart Indonesia. The latest version of Garuda Smart Model was issued in 2018 cover latest technology, including big data and artificial intelligence [5].

Strategy number 4 is to help the process of increasing the capacity of human resources from the users, developers, servants to the government.Human resources always are the primary concern in developing the smart city and therefore, should take emphasized in the implementation [6].

Last, it is essential to increase the component of the Domestic Content Level of the Indonesia Smart ecosystem as the fifth strategy. The development of smart nation should bring positive impact and growth of the industry in the country itself. Some solution provided with high domestic content can be found, for example, in the environment [7], energy used [8], wastewater [9,10], planting [11], water pollution [12] and also for river height and speed monitoring system[14].

3. Results and Discussion

3.1 APIC Innovation & Marketplace Hub
Innovation is the process of translating ideas or inventions into products that create the value or solution that customers will need. The idea of innovation results must be replicated effectively and efficiently and must meet individual needs. In business, innovation often occurs when ideas are implemented by companies to meet customer needs and expectations better.

The marketplace as a term is a location for product transactions where sellers and buyers meet somewhere. Seller will sell the product in a place that has been provided by the Provider with the marketplace concept. The products (platforms, frameworks, models, applications) sold in the marketplace will then be advertised by the Provider to get potential buyers. A large number of sellers and buyers who join the marketplace and transactions that occur between sellers and buyers determines the success of the provider with the marketplace concept [13].

There are gaps between the two sides. Problems faced by governments, public service providers, and communities are less information about what solutions are available and how to choose the right solution. In the other hand the industry lack of information about what necessarily needed by the government to solve their problems. This situation is well described through figure 2 below.
Figure 2. Gaps problems between industry and government

APIC Innovation & Marketplace Hub provides Supply & Demand Smart solutions (cities, public service providers, companies, etc.) that are utilized, tested, and validated to be implemented. APIC-Marketplace manages all stakeholders to be able to connect, exchange experiences, and show & provide the best solutions.

The marketplace required supports from all stakeholders: main and other stakeholders to create the marketplace ecosystem, as shown in figure 3. Main stakeholders include Cities, Public Service Providers, communities are key stakeholders to receive smart solutions, and meanwhile, the business people are the main suppliers of smart solutions. Other stakeholders include Consultant to identify needs and implement smart solutions to problems, Solution providers to Business people who provide smart solutions, Living Labs to environmental inspection/testing environment for smart solutions, Testing & Research institutes to independent institutions that validate smart solutions, Institution of standardization to an institution that sets standards for smart solutions, Developer Investor to invest in developing Smart City solutions and other smart regions, Foundation to Parties who contribute to the development of smart solution and Government, Company, Community to Parties who need smart solutions.

Figure 3. Marketplace ecosystem
APIC-Marketplace offers stakeholders a unique online and offline experience by bringing together the right stakeholders through an event and through the APIC Innovation Marketplace Hub for solutions that can be implemented. APIC Marketplace organizes the Offline APIC Marketplace at a specific time to connect and take advantage of experience and best practice solutions. Business side displays and provides their smart solutions that are independently tested and validated at APIC-Marketplace events. APIC-Marketplace adds value with Living Labs where Business side test, pioneer, and validate their business solutions.

3.2 Smart City Technology Readiness Level (TRL)
APIC-Marketplace uses the Technology Readiness Level (TRL) to show the status of developing Smart City solutions.

The following Technology Readiness (TRL) levels are determined:

- a. TRL 1 - basic principles observed
- b. TRL 2 - a formulated technology concept
- c. TRL 3 - experimental proof of concept
- d. TRL 4 - technology validated in the lab – Prototype type A
- e. TRL 5 - technology validated in the relevant environment (industry environment relevant in terms of possible technology)
- f. TRL 6 - technology is shown in the relevant environment (industry environment relevant in terms of possible technology)
- g. TRL 7 - demonstration of system prototypes in an operational environment type B
- h. TRL 8 - complete and quality system
- i. TRL 9 - a system that is actually proven in an operational environment (competitive manufacturing in terms of possible technology)

4. Conclusion

The existence of Smart Solution Marketplace is expected to be able to help the government, public service providers, communities to realize smart cities in Indonesia more effectively and productively while continuing to support the growth of the industries involved in it. Promotion of the work of APIC in the form of ideas or in the form of products that are ready to be implemented. In addition, a synergic relationship between all stakeholders is expected to be established so that the ideals of Indonesia Smart Nation can be achieved. Garuda Smart Model / Smart Nation Framework can be used to accelerate and streamline the progress of Indonesia smart nation.

Acknowledgments

Authors wishing to acknowledge to Mr. Suhono Supangkat as head of APIC Indonesia who provided data and information needed for this paper.

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