

Dynamic System Model Development for Strategic Planning Information Technology in the Framework of Developing Smart People and Smart Economy (Case Study in Surabaya)

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ABSTRACT

Use and application of technology in a smart city requires careful planning so that the investment costs incurred can be in line with the benefits expected. For that, we need a model to make it easier in analyzing technology strategic planning. In the model can also be used a variety of different scenarios, so it is expected to make it easier for policymakers to see the possibilities that may occur to determine the decision more precisely. In this research, we will create a dynamic system simulation model to see whether the current information system strategic planning is feasible to face the challenges and problems that will be facing in the future. The model is used to see the effect of Key Performance Indicators (KPI) on Surabaya Smart People and Smart Economy by the development goal of Surabaya city. The output of this research is a dynamic simulation model that is expected to help to provide recommendations to policymakers in determining the appropriate strategic planning for urban information technology development, so it is expected that the investment issued following the intended purpose.

Keywords : Smart Economy, Smart People, Dynamic Simulation

I. INTRODUCTION

The economic growth rate of Surabaya city that continues to increase and is above the economic growth of East Java and national become the attraction for other city residents to come and try their fate.

With the denser population will undoubtedly cause new problems that must be faced by Surabaya city government. Issues such as the increasing availability of residential areas and green areas for urban communities, increased use of private and public transport vehicles that will impact traffic congestion and a large number of pollution and accumulation of waste from personal or industrial disposal that also impacts on clean water supply.

It takes hard work and coordination between agencies to solve the above problems. Not only the government should bear the burden of responsibility but also a shared responsibility between the community, experts, and policymakers that are expected to improve the quality of life of Surabaya city residents.

For that city of Surabaya trying to develop an intelligent city concept or better known as Smart City, which is a city that has six characteristics, namely: Smart Economy, Smart People, Smart Governance, Smart Mobility, Smart Environment and Smart Living.

Smart City is a city that can utilize information and communication technology to improve the quality of life of society with sustainable development [1].

Smart City's basic concepts include Instrumented, Interconnected and Intelligent. Instrumented refers to near-real-time and real-world data sources from both physical and virtual sensors. Interconnected means integrating all data and communications across a range of city services. Intelligent can perform sophisticated analysis, modeling, optimization, and visualization of operational business processes to help make better decisions [2].

It has become a demand for the city of Surabaya to be able to compete with other cities by improving the quality of service and providing information for all citizens of Surabaya. Therefore, the government needs to plan, invest and hold technology that supports all these activities.

The Surabaya city government has determined several performance indicators for each target as a means of measuring whether the objectives have been determined to be well achieved. Performance measurement results are reported periodically every year in the form of a Surabaya City Government Performance Report.

In this research, we will create a dynamic system simulation model to see the match between Key Performance Indicators (KPI) representing the characteristics of Smart People and Smart Economy following the development goals of Surabaya city in the future. The model developed uses references from Causal Loop Diagrams developed by DK. Das (2013) that tailoring to the indicators developed by the municipal government of Surabaya.

II. LITERATURE REVIEW

A. Smart City

Smart City is a city development concept by integrating various information owned through the utilization of information and communication

technology. The goal to be achieved is to improve the quality of life by improving the quality of service to the needs of the community more effectively and efficiently.

The concept of Smart City is different for each city, depending on the resources it has, the willingness to change and develop and the sense of care and active involvement of the citizens themselves..

Smart City is a city that employs six characteristics (Smart Economy, Smart People, Smart Governance, Smart Environment, Smart Living, Smart Mobility) to achieve its objectives well, based on an intelligent combination of funding manageability, the ability to be independent and the concern of the citizens of the city [3].

B. Smart Economy

One of the concepts in smart city relating to how attractive and competitive a region relates to factors such as the stimulation to create innovation, entrepreneurship, productivity and international appeal..

C. Smart People

How a city provides adequate educational facilities so that it can create professional and creative human resources and support an environmentally friendly lifestyle.

D. Key Performance Indicators

Key Performance Indicators are numbers that are designed briefly to convey as much information as possible. An excellent Key Performance Indicators are clearly defined, correctly presented, create expectations and encourage action [4].

III. SIMULATION DESIGN

A. Causal Loop Diagram (CLD)

From the reference modeling of existing smart city then created the concept of Causal Loop Diagram for information technology development planning in the framework of Smart Economy and Smart People development in Surabaya municipality government.

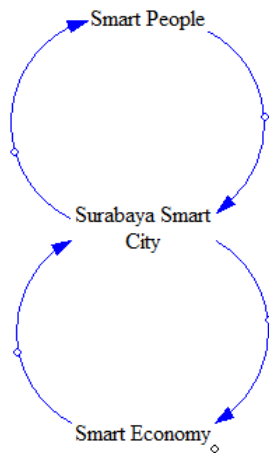


Figure 1. CLD of Surabaya Smart City

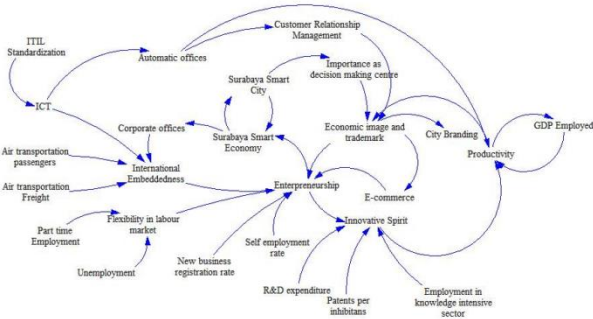


Figure 2. CLD of Surabaya Smart Economy

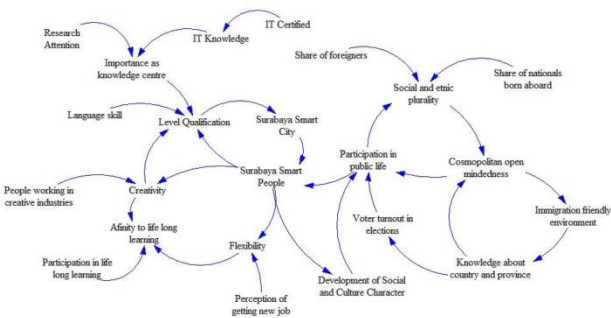


Figure 3. CLD of Surabaya Smart People

B. Stock and Flow Diagram

Surabaya Smart People model to find out how big the level of community participation and the readiness of Surabaya to the smart city by looking at the indicators that have been set previously. In Surabaya Smart People model several other submodels influence each other, the sub model consists of:

- ✓ Level Qualification
- ✓ Participation in Public Life
- ✓ Cosmopolitan Open-Mindedness
- ✓ Perception Model Getting New Job
- ✓ Creativity

Surabaya Smart Economy model to measure how far the readiness of Surabaya city to the smart city by looking at some of the indicators that already exist. Surabaya Smart Economy model consists of several submodels as follows:

- ✓ International Embeddedness
- ✓ Entrepreneurship
- ✓ Innovative Spirit

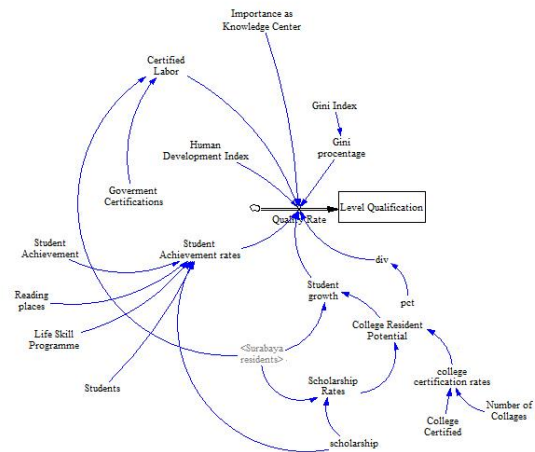


Figure 4. Level Qualification Submodel

$$Quality\ Rate = (Certified\ Labor * 0.16 + Human\ Development\ Index * 0.16 + Importance\ as\ Knowledge\ Center * 0.16 + Student\ Achievement\ rates * 0.16 + Student\ growth * 0.16 + Gini\ procentage * 0.16) * div$$

Figure 5. Mathematical Model of Qualification Model

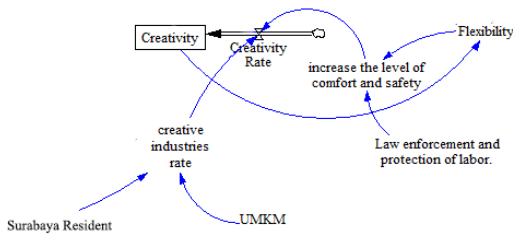


Figure 6. Creativity Submodel

$$Creative\ Rates = (creative\ industries\ rate * 0.5 + increase\ the\ level\ of\ comfort\ and\ safety * 0.5) * div$$

Figure 7. Mathematical Model of Creativity Submodel

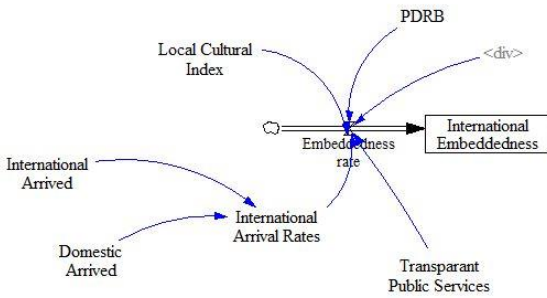


Figure 8. International Embeddedness Submodel

IV. SIMULATION SCENARIOS

Furthermore from the model that has been built made a scenario model and analyzed to see how far the impact of the parameters that affect the model. Scenario results are only retrieved data in the last month or month to 120.

Table 1. Scenario for Flexibility Market

Skenario	Current	Skenario	Unit
Life Skill	561	610	People/month
Law Labor	91,25	91,25	%
Industry Programme	36	53	Programme
School Programme	142	142	Programme

New Job	898	1299	Jobs
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Table 2. Scenario for Entrepreneurship

Skenario	Current	Skenario	Unit
Transparansi Public Services	82,67	87,05	%
UMKM Empowerment	8656	28656	people

Table 3. Scenario for Enterpreneur, Innovative and Economy

Model	Current	Skenario	Unit
Enterpreneurship	57	68,95	%
Innovative Spirit	36,7	40,67	%
Smart Economy	22,23	24,83	%

From several scenarios, Smart People and Smart Economy on the road obtained the following results :



Figure 9. Qualification Level Scenario Results

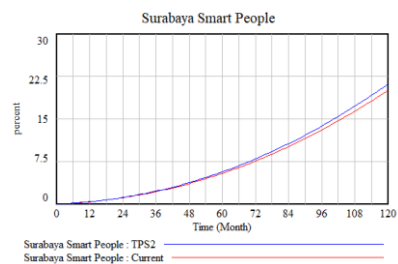


Figure 10. Smart People Scenario Results

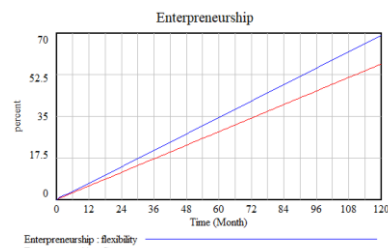


Figure 11. Enterpreneurship Scenario Results

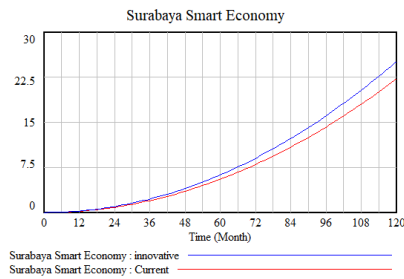


Figure 12. Smar Economy Scenario Results

V. CONCLUSION

From the model in this simulation, some variables can help to increase the level of Smart People and Smart Economy in Surabaya city, such as college certification, Life skill program, scholarship, public service transparency and Entrepreneur Empowerment in the city government of Surabaya.

VI. REFERENCES

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