A model of smart regency framework using Meta-ethnography approach and TOGAF ADM 9.1

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Abstract. The concept of Smart City has now become the primary choice and trends in improving the quality of public services and is expected to be a solution to problems that occur in urban areas that are increasingly complex by offering an integrated ICT-based city governance concept. However, there are significant differences between the concepts of City and Regency in terms of government structure, area, livelihood variations, population, economy, and socio-culture. So that the idea of Smart City is not always probable and valid if applied to the District. This study aims to create a Smart Regency Framework Model that is different from the Smart City Framework Model, which has been widespread. The method used in this research is Meta-Ethnography to synthesize qualitative findings of regency building factors and TOGAF ADM 9.1 to develop an information system architecture model. The results are expected to produce a new Information Systems Architecture Model and contribute to the development of smart district service models.

Keyword: architecture enterprise, smart city strategies, smart regency, meta-ethnography, TOGAF ADM 9.1

1. Introduction

Smart City is a city governance concept that integrates ICT into the management of city resources to become more efficient and effective. Smart City has now become a trend and is expected to be a solution to increasingly complex city problems. Like traffic jams, accumulated garbage, problems with energy supply and management, poor quality public services, and so on.[1]. Some major cities in Indonesia have tried to implement the Some cities have implemented the concept of smart cities, including the cities of Bogor, Surabaya, and Bogor. In 2016, the FISIP Digital Community Center (CFDs) of Gadjah Mada University had named Surabaya as the top-ranking city in the ranks of 12 smart cities in Indonesia. [2][3].

Madura Island as a region with distinctive culture, ethnicity, and topography has also begun the application of smart cities in the management of their cities to be able to manage their city resources more efficiently based on ICT. The four districts on Madura Island, namely Sumenep, Pamekasan, Sampang and Bangkalan Regencies have also begun city initiation into smart cities. By cooperating with partners with the Faculty of Computer Science, Universitas Brawijaya, the Smart City Study
Center of Gadjah Mada University and Telkom have been made a Master Plan for the application of smart city concepts. However, in the implementation, there were many obstacles in terms of policy, budget, political will, community involvement, and technical aspects so that until now the application of smart cities was still far from previous expectations.

There are various problems that are very complex in the effort to implement smart cities in Indonesia, among them, being carried out in an irregular and planned manner [4], do not have a framework that fits the situation [5], limitations of the template because each city usually has different problems, needs, and priorities. [6]. Another issue that is quite important to note is that there is still a lack of understanding and similarity of thought patterns or perceptions in the development of smart cities [3]. Data systems and management are still separate and not yet integrated between government institutions [7], citizen and community participation are still very low [8], lack of coordination and involvement of smart city stakeholders [9], government policies that are even overlapping and inefficient [10] and sectoral ego problems and political leadership [11].

In order to solve the problem above some researchers have proposed various models of smart city concepts that have been used in many cities around the world, including Garuda Smart City Model [12][13][14][15], Cohen Wheel [16][17], Scottish [18] and SIEC [19].

There are significant differences between cities and districts in terms of aspects of the area, population [20], population livelihood [20], government structure [21], socio-cultural, and economic aspects [22]. So that the concept of Smart City is not always possible and valid if applied to the Regency. For this reason, a Smart Regency governance model is needed that is different from the Smart City that has been popular.

This study aims to create a Smart District Framework Model that is different from the Smart City Framework Model, which has been simplified. The location of this research renewal is that there has never been a Framework for Smart Districts before. The method used in this study is Meta-Ethnography to synthesize qualitative findings of district development factors and TOGAF ADM 9.1 to develop an information system, architectural models.

The results of the study are expected to produce an Information System Architecture Model that is by the existing regional conditions and can be a recommendation for the application of the Smart District concept to the Regional Government. This research contributes to the creation and development of information system architectural models and ICT-based district resource governance.

2. Literature Review

2.1. City and Regency Builder Factors

A city is an area that has the main activity, not agriculture with an arrangement of regional functions as a place of government services, social services, and economic events [23]. A city is a place that has administrative boundaries of regions such as municipalities and central towns. The town also means an urban living environment that has non-agrarian characteristics, for example, the district capital, the capital of the sub-district, which functions as the center of growth. Cities are the center of settlements and activities of the population which have administrative boundaries stipulated in-laws and settlements and settlements that have shown the character and characteristics of urban life [24].

The city is a center for residential solutions and community activities with administrative boundaries regulated in-laws and settlements that show the character and characteristics of urban life. City system is a group of cities that have interdependent relationships with each other functionally within a region and give influence to the surrounding area. Policies in the city area have a distribution of cities, indices, and primacy of cities and functions of cities. A town has three main features, namely high population density, the center of all activities and the main events of its population are non-agricultural.

The Regency is the administrative division after the province and is led by a regent as head of government. Administratively the District is not subordinate to the province, because of this the regent is not responsible to a Governor. Districts and cities are autonomous regions that have the authority to manage their government.
The term district which is currently used first is only used on Java and Madura. In the era of the Dutch East Indies, the term district was known as regentschap, which in a sense is the area of a regent or deputy ruler. The division of territory into a district in Indonesia which is currently used is actually a legacy from the era of the Dutch East Indies government. Formerly the term district was known as the District Level II District. However, since the enactment of Law Number 22 of 1999 concerning Regional Government, the term Level II Region has been deleted, so that it is only called Regency.[23]

There are some differences between cities and regencies based on broad aspects of the area, population aspects, aspects of people’s livelihood, aspects of government structure, socio-cultural issues, economic aspects, regulations, typology of geographical conditions, based on function, Settlement Problems and Environmental problems from various sources provided by the following table:

Table 1. Difference between cities and districts [21][20][25]

| No | Dimension                               | Regencies                                                       | Cities                                                                 |
|----|-----------------------------------------|----------------------------------------------------------------|----------------------------------------------------------------------|
| 1  | broad aspects of the area               | • relatively more comprehensive than the regional government area of the city<br>• in the regency area, there are many underdeveloped villages, while to reach equitable development in all regions a more substantial budget is needed. | • Relatively narrower than the district area<br>• Equity in city areas is usually more homogeneous and evenly distributed |
| 2  | population aspects                      | • the population density in districts is lower than in cities   | • higher urban population density than districts                       |
| 3  | aspects of people’s livelihood          | • District residents generally operate in agriculture or are agrarian | • while urban residents are engaged in trade and services               |
| 4  | aspects of government structure         | • In the district, there are sub-districts, villages and villages or villages.  
|    |                                         | • the village is a separate autonomous region in the district area, so it has its budget, including the source of income allocated from the district budget | • in the city area sub-districts and villages are formed  
|    |                                         | • sub-districts are part of the district and city governments, which are united in terms of policymaking and budgeting with local governments |
| 5  | socio-cultural aspects                  | • accumulatively the district population has lower levels of education, health services, and public services than cities | • City residents have better levels of education and health than districts. Public service facilities are also better in cities than in districts |
| 6  | economic aspects                        | • the average gross regional domestic product (GRDP) and Regional Original Income (PAD) in the district is lower than the city GRDP | • economic activity and income (income) in the city is also higher than the district |
| 7  | regulations                             | • District regulations are legislation established by the district legislature with the approval of the regent | • rules of the city area is a statutory regulation formed by a council of representatives of the city area with the support of the mayor |
| 8  | typology of geographical conditions     | • A typology based on the geological conditions of urban areas known as coastal, delta cities, and waterfront cities  
|    |                                         | • typology based on the size or scale of the city known as small, medium, large, and metro cities, according to the population | • The district typology covers all regions.  
|    |                                         | • The district typology encompasses all areas of the city, whether small, medium or large. |
| 9  | based on function                       | • the regency regulates and manages government affairs according to the principle of autonomy and duty, carries out the broadest possible independence, has a relationship with the central government in organizing government affairs | • The city has three functions, namely: as a central government, as an education center, as an information center |
| 10 | Settlement Problems                     | • in the district, the level of building congestion is lower, more open space knows green land, adequate water supply networks and the availability of sewage disposal | • problems that occur in urban areas are too high building density, the disappearance of parks and open spaces, insufficient water, electricity and sewage disposal networks, reduced levels of services and public facilities such as schools, meeting and sports, recreation ... and others, the loss of specific characteristics or specific characters from certain residential areas |
| 11 | Environmental problems                  | • in the district, the issue of pollution and noise is relatively lower because the number of motorized vehicles is not too high | • The high rate of urbanization and urban development will have an impact on the environment in and around the city. Problems that often arise in urban areas are air pollution, water pollution, soil pollution, noise, and congestion. the consequences or hazards caused by environmental pollution generally harm humans, especially those who live in cities |

2.2. Meta-Ethnography Approach

A meta-ethnographic approach is an interpretive approach to the results of primary study studies. Because the method is interpretative, the analytical technique is iterative (spiral). The results of the first study are re-interpreted so that they can generate new understanding and theory by conducting cross-field analysis so that extraction and analysis are not sequential linear. A meta-ethnographic qualitative approach was initially introduced and popularized by Noblit & Hare in 1988 as the development of an inductive interpretive knowledge synthesis model[26]. Meta-ethnography
makes it possible to take concepts that are often implicit in being connected and arranged into a theoretical model that has new meaning.

Meta-ethnographic methods have been used in many fields to synthesize various variables so that new understandings and theories are obtained that are different from before. The application of meta-ethnographic methods include the determination of the role framework for mobile devices in the field of education[27], the relationship between personality and process of software teams[28], study of validity and reliability for e-Government success factors[29], models of success determinants for e-Government implementation in Indonesia[30][31], Tools Proof Factory[32] etc.

2.3. TOGAF ADM 9.1

The Open Group Architecture Framework (TOGAF) is a framework for compiling an enterprise information system architecture by approaching designing, planning, implementing, and managing the company's information system architecture[33]. TOGAF is an approach to high-level design. Usually, the modeling is done at four levels, namely the level of Business, Application, Data, and Technology. This process depends on standardization, modularization, existing products, and proven technologies. This TOGAF framework was introduced and developed in 1995 based on the DoD TAFIM. In 2016, TOGAF was claimed by 80% of 50 global companies and 60% of Fortune 500 companies.

The TOGAF ADM framework has been used in designing information systems in a variety of important sectors including the Cybersecurity Business Framework[34], designing IT governance in local governments[35], corporate architecture for non-cloud to cloud migration[36], government organization architecture[37], Integrated Indonesian Agricultural Information[38], development of IPDC information (Instituto Profissional de Canossa)[39], implementation of government cloud computing requirements[40], Enterprise architecture planning for higher education[41][42], Design Gap Analysis of Information Technology Plans in Bank [43], and Special Mobile Health Design[44].

3. Methodology

The research method used in this study uses Meta-ethnography to collect the district builder factors qualitatively, then the Smart District Model will be designed using the TOGAF Framework. The steps used in Meta-Ethnography are as follows:

The seven (7) Steps of Noblit and Hare's Meta-Ethnography are presented in the following table:

| No | Stages | Explanation |
|----|--------|-------------|
| 1  | Preparation | Identify research topics for the synthesis process |
| 2  | Determine relevant studies | Determine studies that are relevant to research interest and search for literature from scientific databases |
| 3  | Read and review studies | Read repeatedly and review and mark metaphor concepts |
| 4  | Determine relationships between studies | Incorporate studies together and determine the relation |
| 5  | Translate the study with each other | Transition by comparing concepts or metaphors with each other |
| 6  | Synthesis of translational results | Compile the whole study |
| 7  | Express synthesis | Name the results of the synthesis |

After the qualitative synthesis process, the district builder factor uses meta-ethnography, then an information system architecture model is designed using TOGAF ADM 9.1. The steps for developing information system architectural models using TOGAF ADM are as follows:

| No | Stages | Description |
|----|--------|-------------|
| 1  | Preliminary Phase | This phase includes preparation activities for compiling architectural capabilities, including TOGAF customization and defining architectural principles. This phase aims to convince everyone involved in this approach to succeed in the architectural process. In this phase, you have to specify who, what, why, when, and where from the architecture itself. |
2 Phase A: Architecture Vision
This phase is the initiation phase of the architectural development cycle, which includes defining the scope, identifying stakeholders, compiling the architectural vision, and submitting approval to start architectural development.

3 Phase B: Business Architecture
This phase includes developing a business architecture to support the agreed architectural vision. At this stage, tools and general methods for modeling such as DEFINition Integration (IDEF) and Unified Modeling Language (UML) can be used to build the required models.

4 Phase C: Information Systems Architectures
At this stage, more emphasis on activities is how information system architecture is developed. Defining information system architecture in this stage includes the data architecture and application architecture that will be used by the organization. Data architecture focuses more on how data is used for business functions, processes, and services. Techniques that can be used are ER-Diagram, Class Diagram, and Object Diagram.

5 Phase D: Technology Architecture
Building the desired technology architecture, starting from determining the type of candidate technology needed by using the Technology Portfolio Catalog, which includes software and hardware. In this phase also consider alternatives that are required in technology selection.

6 Phase E: Opportunities and Solutions
At this stage, the model that has been built for the current architecture and destination will be evaluated, identification of the leading project to be implemented to implement the destination architecture and classify it as new development or reuse of the existing system. In this phase, a review of gap analysis will also be carried out in phase D.

7 Phase F: Migration and Planning
In this phase, risk and cost analysis will be carried out. The purpose of this phase is to select implementation projects that vary in order of priority. Activities include the interpretation of dependencies, costs, benefits of various migration projects. A list of project priorities will run to form the basis for planning detailed implementation and migration plans.

8 Phase G: Implementation Governance
This phase includes supervision of the architecture implementation.

9 Phase H: Architecture Change Management
This phase includes the preparation of procedures for managing changes to the new architecture. In this phase, the drivers of change will be described and how to manage these changes, from simple maintenance to architectural redesign. ADM outlines strategies and recommendations at this stage. The purpose of this phase is to determine the architecture change management process for the enterprise architecture that has just been achieved with the completeness of period G. This process will specifically provide ongoing monitoring of things such as developing new technologies and changes in the business environment and determining whether to formally initialize the new evolutionary architecture cycle. Phase H also provides changes to the framework and the establishment of discipline in the Preliminary phase.

4. Conclusion and future work
Previous research by researchers around the world has produced quite several models of smart city applications. Among the most famous are the Cohen Wheel model and the Garuda Smart City Model. In this study, modeling of smart regencies models will be conducted with the assumption that smart city models are different or not the same as smart regencies models. This study tries to combine two methods that are widely used in synthesizing regencies building variables, namely meta-ethnography and TOGAF ADM, in designing the information system architecture.

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