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Regional Planning and Development of Kota Medan: Effect on Electrical Power Distribution (Case Study on Medan City Development Area)

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Abstract- In this work, the objectives are "(1) To ascertain, assess and analyze the regional planning and development in the city of Medan, (2) To establish, assess and analyze the influence of the regional planning and development to the electric power distribution in the city of Medan". Junaidy argued that "the method used in this research is descriptive and quantitative by using Structural Equation Modelling (SEM). The data collection techniques used in the form of questionnaires, observation and documentation. Analysis of the data used is descriptive and verification, where verification studies conducted by testing the hypothesis that test the causal relationship between exogenous variables on endogenous variables. Based on the results shown that (a) the regional planning and development in the Medan city based on employee perceptions are within the range of fair or reasonably agree to the category sense of good, general employees already have a good and deep understanding of the domain knowledge exposed to them, (b) Results of verification analysis showed that the regional planning and development gives a significant positive impact on the distribution of electric power. This gives a general description that the regional planning and development has a significant role in supporting the availability of electric power". Therefore, this finding is now shared in this paper.

Keywords: Regional Planning and Development, Electric Power Distribution.

Introduction

Junaidy explained "In the planning and development of the region often have prior delineation of the area (region) in which there are activities to determine the boundaries. Determination of the boundaries with respect to the concept of territory. In this regard, the concept of territory more stressed regions as a tool (means) for a purpose than the goal itself. As a concept, it can be shown by taking the example of the concept of territory that had been used as a method of classification through two distinct phases, namely the phase which reflects the economic progress of a simple agrarian economy towards a complex industrial systems. The first phase shows the formal area (regarding uniformity, and is defined by homogeneity), while the second shows the development phase as a functional area (involving interdependent, interrelationship and defined on the basis of international relations) (Setiawan, 2009).

The approach applied in the development of the city of Medan is very diverse because influenced by the development of theories and models of regional development and socio-economic order, the system of government and a development of administrative. Approach that promotes growth without regard to the environment, even impeding the growth itself. Development of the region with regard to the potential growth will help boost sustainable economic growth through a more rational distribution of the population, increasing employment and productivity (Mercado, 2008).

Planning of power distribution systems are essential in addressing the growing needs of electric power which is fast enough. Planning is needed because associated with the goal of developing a distribution system which must meet several technical and economical criteria. This distribution system planning should be done systematically with an approach based on load forecasting to obtain an optimal service pattern. The systemic planning will provide a number of alternative proposals that can assess the consequences that are directly related to the reliability and economical aspects.

This distribution system planning can be done in a period of short-term, medium term and long term. Long-term planning should always be in the actualization and coordinated with the medium-term planning and corrected by the existing conditions of distribution network development. The effectiveness of the distribution system planning is increasingly necessary when associated with the higher investment towards energy, equipment and manpower. In addition, good planning will make a major contribution to the development of the distribution system. This condition is due to the fact the distribution system is the spearhead of electric power services as directly related to the consumer so that the disturbances on the distribution side will lead directly to the consumer. While the disturbances on the transmission side or the plant may not necessarily lead to the interruption of the consumer side.

Procurement of electricity networks rely heavily on other resources and distribution to consumers is very dependent on the availability of road infrastructure, since the installation of the electrical network is usually placed on the shoulder of the road for easy installation, operation, and maintenance.

Electric power is an important input for production activities and can affect economic activity in a variety of ways, both directly and indirectly. Electric power is not only a production activity that will create the output and employment, but the presence of electric power also affects the efficiency and smoothness of economic activity in other sectors.

Sibarani (2002) have examined the contribution of infrastructure to economic growth in Indonesia in 1983 to

1997. infrastructure variables used are roads, electricity, and telephone, as well as adding the variable investment and education index variable. The results showed a positive elasticity value on the availability of roads and electricity to economic growth in Indonesia. The road has a value of 0.013 and the electricity elasticity has a value of 0.057. Sibarani also take into account the elasticity of the road and electricity for each island, for example, to the island of Borneo (Kalimantan) obtain the elasticity values of 0.127 and 0.080 for electricity elasticity".

It is known that as "the central government in the province of North Sumatra, Medan require the supply of electrical energy will continue to grow each year. This is due to the economic growth driven by the increase of population which resulted in the demand for electricity continues to grow installation. Increased energy consumption in the city of Medan each year showing that the electrical load demand tends to increase with increasing economy of Medan", as in Junaidy.

No doubt as in Junaidy that "the increasing socio-economic activities lead to increased demand and the need for electricity from year to year. However, the increase in demand for electric power has not been supported by an increase in the electric power accordingly. This condition would be very worrying because it can lead to a shortage of electricity supply, which in turn has the potential occurrence of a power crisis.

Based on these problems, it will be relevant conducted studies on: (1) How is the planning and development of the region in Medan; (2) how the influence of the planning and development of the region to the power distribution in the city of Medan".

A. Regional Planning and Development

Argued by Junaidy that "according Chaprin, regional planning is an intervention against the forces of the market in the context of regional development which has three main objectives namely to minimize conflicts of interest between sectors, improving sectoral progress and bring progress for society as a whole.

Regional planning is a planning process that is intended to make changes towards a better direction for the development of a community, government, and the environment in a particular area, by utilizing or to leverage existing resources, and must have an orientation that is comprehensive, complete, stick to the principle of priority (Riyadi and Bratakusumah, 2003). Planning is the only path open to raise the per capita income, reduce income inequality and increase employment opportunities (Jhingan, 2000).

The approach applied in the development of regions in Indonesia is very diverse because it is influenced by development theories and models of regional development and socio-economic order, the government system and administrative development. Approach that promotes growth without regard to the environment, even impeding the growth itself (Directorate General of Spatial Planning, 2003)". In this respect "development of the region with regard to the potential growth will help boost sustainable economic growth through a more rational distribution of the population, increasing employment and productivity (Mercado, 2002)".

B. Electrical Power Distribution

Junaidy commented that "In general, the power distribution is the distribution of electricity from the source (generator) to the user. Electric power network can be concluded briefly that the distribution network is part of the electric deployment of large-capacity power source to the user.

Structure of electric power or electric power systems are very large and complex because it consists of components of equipment or electrical machinery such as generators, transformers, electrical load and safety tools and settings that are interconnected to form a system that is used to generate, distribute, and use of energy electricity.

Electricity network after leaving the substation commonly called the distribution network, while the electricity network between the center and substation commonly called the transmission network. Channel transmission or distribution channels exist in the form of the airways and also there in the form of underground cables. After going through the primary distribution network and then power will be reduced voltage into low voltage distribution network or to secondary with 380 V or 220 voltage V. Through the low voltage network will then be distributed to the homes of customers (consumers) through house connections to the appliance measuring and limiting at the client's home or commonly called kWh Meter.

Method

This research uses explanatory survey method, as it will explain the relationship between the variables studied. While the type of relationship between the variables used in this study is causality. Causality is the independent variable affects the dependent variable. Explanatory research refers to the hypothesis that will be tested against the phenomenon occurs.

Referring to the objectives of the research aimed to identify and examine more deeply to the research variables that influence the planning and development of the area of the power distribution and its implications on the economic growth of the city of Medan, this research is descriptive and verification. Given this type of research consists of descriptive and verification which is carried out through data collection in the field, then there are two methods were applied namely descriptive survey and explanatory survey survey. Therefore, the type of investigation in this study is the type of causality.

Verification analysis used in this research is Structural Equation Modeling (SEM). The reason for choosing this method is the ability to measure the construct either directly or indirectly, ie through the indicators and analyze the indicator variables, latent variables, including measurement error.

To obtain primary data and secondary data, data collection techniques that have been made by the author are as follows:

A. Questionnaire

Author distributing questionnaires to the respondents and made in the form of questions that are closed and each respondent was asked to choose one of the alternative answers which have been determined. Before the questionnaires distributed, the authors have done a number of testing beforehand, i.e. testing the validity and reliability testing.

B. Observation

Besides the questionnaire, this study also performs observation. According Nawawi & Martini (2001) observation is the systematic observation and recording of the elements that appear in a symptom or symptoms in the research object.

In this study, observation is needed to be able to understand the process of the interview and the interview can be understood in context. Observations made against the respondent, the respondent's behavior during the interview, respondents interaction with researchers and the things that are considered relevant in order to provide additional data on the results of the questionnaire.

C. Documentation

This method is used to obtain secondary data by means of studying the archives or records, books may include geography, demography and form of writing that has to do with this research. This data is used to supplement the data obtained through observation and interviews".

Result (SEM Method)

Descriptive Analysis, as in Junaidy.

Junaidy agreed that "descriptive analysis was intended to get a picture / description of the respondents in this case the employee regarding the planning and development of the region, as independent variables. The establishment of criteria for the average value of the respondents answered that entered into classes' interval, wherein the determination of the interval uses the following formula:

$$ClassInterval = \frac{HighestValue - LowestValue}{NumberofClass}$$

Description: The highest value is 5, the lowest value is 1, and the number of classes is 5.

From the above formula, the value of the class interval is 0.8 to apply the provisions of categories with the following results.

TABLE 1. Interval Value and Category of Respondents Answered

Interval Value	Category
1,00-1,80	Extremly not agreed
1,81-2,60	Not agreed
2,61-3,40	fair
3,41-4,20	agreed
4,21-5,00	Extremely agreed

Source: Data adapted 2014

Based on data collection that refers to the questionnaire, obtained a score range of data values for the variables of planning and development of the region which is represented by a 25 item questionnaire to 224 respondents, in this case the employee. The range of values obtained from the multiplication of 224 respondents with 18 items of questions and then multiplied by the maximum number (5) and minimum (1) alternative answers, so that the range of values obtained scores maximum response (Rmaks = 28000), and the value of the minimum response (Rmin = 5600)".

Discussion

From the research, it is obtained by Junaidy that "variables planning and regional development with a total average value of 3.72 with a standard deviation of 0.537. Based on these data, the categorization for questions on these variables included in the fair range.

The average value of most of the answers given by the respondents turned out to be contained in the statement item number 17, the Plan of the city structure and spatial planning area of Medan has set several areas of the city as a strategic area to improve the economy of the community, with an average of 3.902 and a standard deviation of 0.852. In addition, it points out that the average value of the first smallest of the answers given by the respondents turned out to be contained in item 9, In order to increase public participation in the development of the city needs to set up a public consultation forum as a place of shelter and aspirations society and the business world in the design of policies, with an average value of 3.598 with a deviation of 0.997, then the average value of the second smallest of the answers given by the respondents turned out to be contained in item 10, social factors such as the increase in population and the gap is one aspect that must be considered in planning and development of the region, ie with an average value of 3.607 and a standard deviation of 1.058, and the average value of the third smallest of the answers given by the respondents turned out to be contained in item 6, there are a variety of aspirations screening process undertaken in the preparation development planning, ie with an average value of 3.616 and a standard deviation of 1.022.

Based on these results indicate that the planning and development of the region based on the perceptions of employees are within the range of the category of fair, in the sense that the position is quite good, in general employees have the knowledge and good understanding in the matter. Knowledge is one of the supporting aspects in a person to do the job. In addition skills are very important in a person; skills backed with extensive knowledge will produce a good work. These results indicate that the employee generally has a good competence in terms of knowledge, skills and abilities. This is possible because the majority of respondents are S1 and S2, so it has had a fairly extensive knowledge. In addition, respondents also have experience in the field of work, an average of more than 3 years, so it has to have an understanding in the occupied areas of work. Thus, in planning a regional development employees can learn the details of what to do. Also in the planning stages and regional development in the city of Medan is bottom up, so that in determining the measures and policies refer to the aspirations of the people and the urgent need to develop to the welfare of society. This is justified by the results of interviews with the head of BAPPEDA Medan city as follows:

Basically every policy both in terms of planning and regional development, as well as other policies certainly originated from the bottom, so that the policy is a priority, this is because each region has a variety of different problems

and more than one problem, so the government should also have the most urgent priority that the main thing to do, so that the development can be carried out gradually and continuously.

Based on the results above shows that in general the planning and development of the region can be classified as good, it is possible with the priorities for implementing a policy for the benefit of society, so it is necessary breakthroughs as well as a variety of measures to capture the aspirations of the people for the progress of a region. Although in general the planning and development of the region are within the criteria of fair in the sense that quite well, however there are still some deficiencies that must be corrected, among others, is the lack of public consultation forums as a container for accommodating and aspirations society as well as in the business world for the design of policies in City development, in addition, the social factor to consider is the lack of anticipation in the long term".

Verification Analysis

It was found by Junaidy that "analysis of the structural models created in this study carried out with due regard to the relationship of values or coefficient numbers that appear from each model that has been formed earlier. Analysis of Structural Equation Model (SEM) in full model is intended to test the model and hypotheses developed in this study. Examiners model in Structural Equation Models conducted by the significance test of causality through path coefficient. Furthermore, the test results shown in the image below".

In the Junaidy's thesis it was argued that "based on Fig. 1 above, the influence of the regional planning and development to the electric power distribution area can be formulated into the structure equation as follows:

$$\eta_1 = 0{,}512^{*}\xi + \text{Errorvar} = 0{,}106,\ R^2 = 0{,}266$$

Based on the the above structural equation can be explained that the coefficient of exogenous variables on the endogenous pathway has a value of path coefficients ξ to η of 0.512, this means that any change / improvement of regional planning and development, assuming other variables remain, so the distribution of electric power will be unchanged at 0.512.

Based on structural equation 1 is also known R-square value of the variable η (power distribution) of 0.266. The higher the R-square value, the greater the independent variables can explain the dependent variable, so will have a better of structural equation as well. R-square value from power distribution variable which stated at 0.266 which means that 26.6% variance of electric power distribution explained by the variable of regional and develoment planning the rest is explained by other variables outside the model study.

Furthermore, statistical test was used to test hypotheses with structural equation modeling calculations as quantitative analysis. The results of hypothesis testing based on structural equation have been stated previously, to determine the independent variables significantly influence the dependent variable with the t test.

H0 rejection criteria, if *t* is greater than *t* table or *t*0> *t*, table with degrees of freedom = 224 - 1-1. The total effect is calculated based on the quadratic coefficient of the path, while the magnitude of the effect on variable of regional planning and development to the electric power distribution amount is (0.512 x 0.512) = 0.262. Based on the analysis results show that the path coefficients ξ to η of 0.262 and 10.197 t calculated values obtained with α significance level of 5%, then the value t table or t 0.05.224 = 1.971, t = 10.197 due to the greater of the table = 1.971, then H0 is rejected which means there is positive and significant relationship between the regional planning and development to the electric power distribution. Based on these results can be made summarized in tabular form as follows.

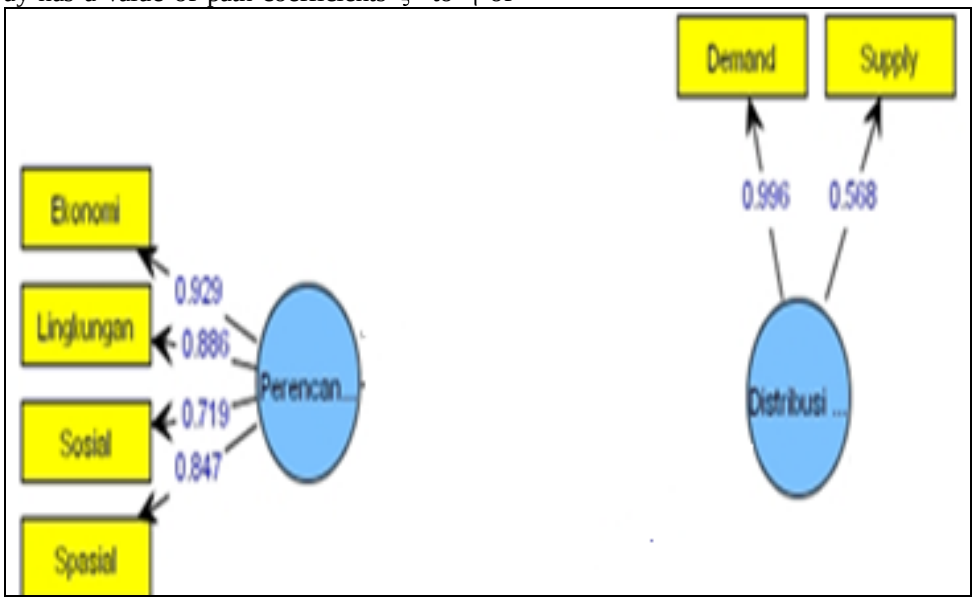

Fig.1. Model of Structural Equation Modelling (SEM)

TABLE 2. Test of The Influence of Regional Planning and Development variable to Electrical Distribution Power

Structural	Path Coeficient	$t_{calculated}$	t_{table}	Conclusion
ρηξ	0,262	10,197	1,971	Ho rejected: There is positive influence and significant relationship with regional planning and development (ξ) to Electrical Power Distribution (η_1)

Source: Data 2014

Based on the table above shows that the regional planning and development has the effect of 0.262 on the electrical power distribution by t-test bigger than t-table (10.197> 1.971). This means that the regional planning and development has a positive and significant relationship with the distribution of electrical power. This gives a general description that the regional planning and development has a significant role in supporting the availability of electrical power. This concurs with the theory put forward by Husnan, (2005) regional planning is all aspect that has planned for the advancement of the region so that the availability of the necessary infrastructure can be met".

Conclusion

The work clearly established that as in Junaidy's thesis, "based on the research outcome and discussion it can be concluded that:

1. Based on the descriptive analysis result shows that the regional planning and development show fair results agree fairly well in terms of the average value of 3.733 and a standard deviation of 0,539 to enter the category of fair to the extremely agree. Based on these results indicate that the regional planning and development based on the perceptions of employees are in the range of reasonably agree or fair toward extremly agree category, with both leading to a very good, which is generally an employee has to have a good knowledge and understanding in them. This means that in general the regional planning and development can be classified either, it is possible with the priorities for implementing a policy for the benefit of society, so it is necessary breakthroughs as well as a variety of measures to capture the aspirations of the people for the progress of a region.
2. Results of verificative analysis showed that the regional planning and development gives a significant positive impact on the distribution of electric power. This gives a general description that the regional planning and development has a significant role in supporting the availability of electric power.

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Recommendation

1. It is necessary to strengthen the functions of goverment servant in charge of controlling the use of space and coordinated managerial functions, linked with a potential area of Medan. This institutional framework is very important for improvement of one region.
2. Further research is expected to examine more deeper and not limited to the variables that have been studied, but additional variables might be required and is expected to be developed in terms of measurement and wide literature review".

References

[1] Adisasmita, R. 2008. Konsep dan Teori Pengembangan Wilayah. Graha Ilmu.Yogyakarta.

[2] Arsyad, L. 2005**.** *Pengantar Perencanaan Pembangunan Ekonomi Daerah*. BPFE. Yogyakarta

[3] Bakti Setiawan, 2009. *Tata Ruang dan Lingkungan Hidup*.

[4] Departemen Pemukiman dan Prasarana Wilayah, Direktorat Jenderal Penataan Ruang. 2003. *Laporan Akhir Bantuan Teknis Peninjauan Kembali Rencana Tata Ruang (RTRW) Kabupaten*. Jakarta.

[5] Jhinghan, M.L., 2000, Ekonomi Pembangunan dan Perencanaan. PT. RajaGrafindo Persada, Jakarta.

[6] Mercado, R.G. 2008. Regional Development in The Philippine: A Review of Experience, State of The Art and Agenda for Research and Action, Discussion Paper Series. Phillipine Institute for Development Studies.

[7] Nawawi, Hadari dan Martini. 2001. Instrumen Penelitian Bidang Sosial. Yogyakarta: Gadah Mada University Press.

[8] Riyadi dan Bratakusuma D. 2003. *Perencanaan Pembangunan Daerah*. Jakarta: Gramedia Pustaka Umum.

[9] Sibarani, M.H.M. 2002. "Kontribusi Infrastruktur terhadap Pertumbuhan Ekonomi Indonesia". *Tesis Magister Sains*. Program Pascasarjana, Universitas Indonesia, Jakarta.