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THE INFLUENCE OF PUBLIC PARTICIPATION ON SUSTAINABLE TRANSPORTATION AND REGIONAL DEVELOPMENT IN MEDAN

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ABSTRACT

Sustainable transportation becomes very important in a certain town since it can influence the development of the town itself. One of the sustainable transportations is angkot (urban public transportation). Urban public transportation is one of the means of land transportation which is mostly used in big towns in Indonesia, including Medan. The aim of the study was to analyze the influence of public participation on sustainable transportation and regional development in Medan. There were 400 respondents who used urban public transportation in Medan. They were divided proportionally into 21 sub-districts in Medan. The data were analyzed by using Structural Equation Modeling (SEM) with an AMOS version 18 program. The hypothetical test was obtained by seeing the probability value or by seeing the significance of the correlation of each variable such as public participation, sustainable transportation, and regional development. The result of the study showed that there was the influence of public participation on sustainable transportation and regional development in Medan. Public participation could also directly influence regional development in Medan.

Keywords: Public Participation, Sustainable Transportation, Regional Development

ABSTRAK

Transportasi berkelanjutan menjadi hal yang sangat penting pada suatu kota karena akan berdampak dalam pengembangan kota itu sendiri. Salah satu bgian dalam transportasi berkelanjutan ini adalah transportasi angkutan umum kota (angkot). Angkutan umum kota adalah salah satu moda transportasi darat yang paling banyak digunakan di kota – kota besar di Indonesia termasuk dalam hal ini kota Medan. Tulisan ini bertujuan untuk menganalisis tentang pengaruh partisipasi masyarakat terhadap transportasi berkelanjutan dan pengembangan wialayah di Kota Medan. Sebagai responden adalah masyarakat pengguna angkutan umum di Kota Medan, jumlah respondennya sebanyak 400 orang dan dibagi secara proporsional terhadap 21 kecamatan yang ada di Kota Medan. Untuk analisis data dari penelitian ini digunakan Structural equation modeling (SEM) dengan program AMOS versi 18. Untuk mengetahu hasil pengujian hipotesis dilakukan dengan melihat nilai probabilitas (probability) atau dengan melihat signifikansi dari keterkaitan masing-masing variabel penelitian yaitu partisipasi masyarakat, transportasi berkelanjutan dan pengembangan wilayah. Dari hasil analisis terdapat pengaruh partisipasi masyarakat terhadap transportasi berkelanjutan dan pengembangan wilayah di kota Medan. Partisipasi masyarakat secara langsung juga dapat mempengaruhi pengembangan wilayah di Kota Medan.

Kata kunci : Partisipasi Masyarakat, Transportasi Berkelanjutan dan Pengembangan Wilayah

INTRODUCTION

The growth of urban transportation sector has achieved 7.9% each year and it is predicted that it will increase to 10% each year in the next decade. *Tamin*, [2000] points out that the need for urban transportation is predicted to increase since people tend to use their own vehicles instead of using public transportation. This increasing trend is caused by

1. The increase of the economic activities which can hardly be served by public transportation.
2. The increase of people's buying power and the privacy cannot be served by public transportation.
3. The increase of land price at the town center has caused the spread of urban settlements which is far from the town center; some of them are even located at the suburbs; consequently, public transportation cannot reach them.
4. New roads have caused many people to use their own automobiles since there has not been the access of public transportation in these new roads.
5. The unavailability of urban transportation which links the suburban roads to the main ones of public transportation.
6. People feel insecure, lack of punctuality and suffer from the length of travel when they use public transportation.
7. The rapid increase of the number of motor cycles has caused public transportation to become low.

Nowadays, many public policies ignore people's participation in the process of planning, implementation, and evaluation in public transportation. This top-down policy has many weaknesses. According to *Selo Soemarjan*, [2002], public involvement in various governmental processes by paying attention to local cultural aspect is the character of good governance. The question is whether people, such as the road users and the actors who play their role in the public transportation service, have been involved in the development and the management of urban public transportation.

There are three things which become our concern when we want to cope with the problems of transportation. They are, *first*, planning, implementation, and evaluation of the policy based on public participation; *secondly*, sustainable effort in developing public awareness in using roads in dignified and civilized manner; and *thirdly*, law enforcement is enforced equitably, transparently, and resolutely. *Bambang*, [2007] points out that in order to realize the public base transportation system, we should make various public components participate in implementing transportation. Public transportation will be the key from the planning process until the operation and the maintenance. Therefore, public access is needed for various kinds of information about the planning and the development of transportation.

The population of Medan as the capital of North Sumatera Province was 2,097,610 in 2010 [*BPS*, 2011], and the number of automobiles was 429, 851 units, the length of roads was 3,191.5 kilometers. It indicates that each automobile has relatively small room to maneuver; it has only 7.425 meters. Public participation in managing public transportation is not maximal. The planning, the implementation, and the management of transportation are mostly done by the government, without involving the people who use public transportation.

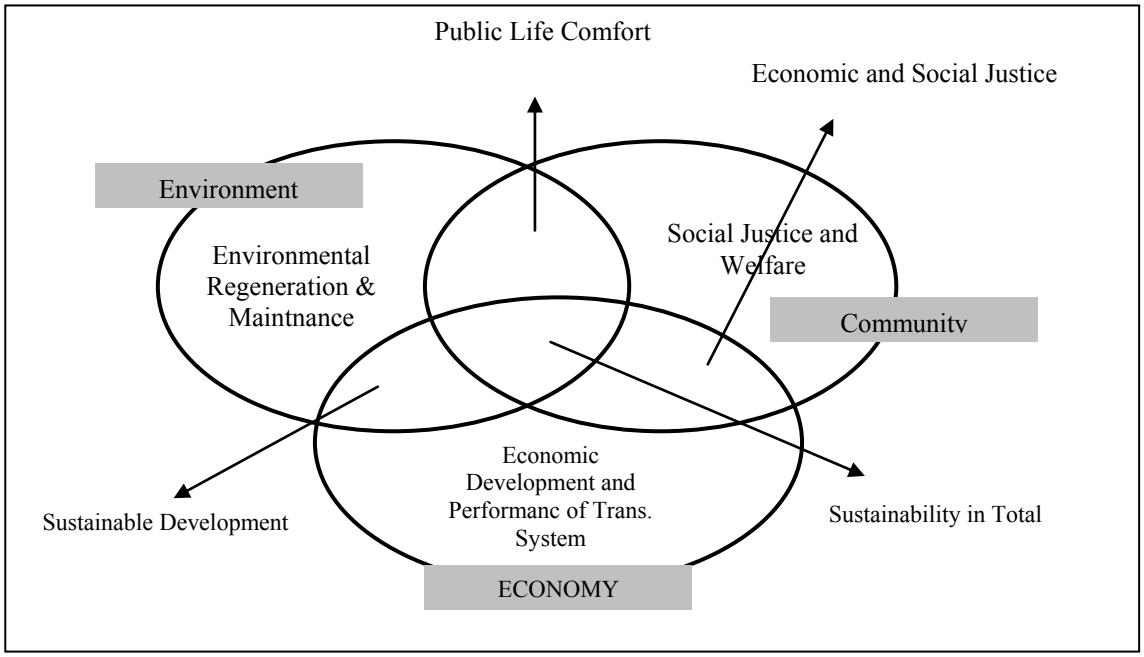
Transportation planning cannot be separated from regional or city planning. City planning without considering the condition and the pattern of transportation, which can occur because of its own planning, will eventually cause traffic complication, such as the increase of traffic jams and pollution.

Regional development, according to *Sandy* [1992], is principally the implementation of national development in a certain region which is adapted to its physical and social capability and complies with legal provisions. According to *Hardjisaroso*, [1994], regional development is the development of a region or the construction of a new region in order to improve social welfare, while *Jayadinata,* [1997] points out that regional development is intended to improve or to upgrade and to increase something which has been existed.

According to *Center for Sustainable Development,* Canada [1997], Sustainable Transportation System is a transportation system which provides the access to individual or public basic need safely, consistent with the health of human beings and with the ecosystem, in line with the social justice today and the future, financially affordable, operating efficiently, providing alternatives according to the means of transportation, supporting economic development, mitigating emission and waste according to the capability of natural absorption, minimizing the use of energy from non renewable resources, using recycled component, minimizing the use of land, and producing sound pollution as little as possible.

Sustainable transportation system is one of the global sustainability aspects which have three interrelated components: environment, society, and economy. *Litman*, [2004] points out that, in the broad sense, Sustainable Transportation is an attempt to decrease traffic jams, save the cost of facilities, increase safety and non-vehicle movement, and use space efficiently so that the mobility of each vehicle will be high. *Sutriadi*, [2006] points out that transportation is said to be sustainable by referring to the functions of the transportation which comprises the social function such as accessibility, economic function such as equality, and environmental function such as pollution.

According to *Talizuduhu*, [1990], a person's participation, either mentally or emotionally, gives his contribution to decision making about a problem in which he is involved in taking the responsibility. *Meanwhile, Khadiyanto*, [2007] points out that public participation is the participation/involvement of a certain community in the implementation of the development in planning, implementing, controlling, and being able to increase the desire to accept and the desire to respond, either directly or indirectly, to idea, formulation of a policy, and implementation of a program. Public participation, according to *Godschalk* [in *Yulianti*, 2000], is mutual decision making between the community and the planners, and according to *Cohen* and *Uphoff* [1977], participation is public active involvement in the process of decision making, implementation, the use of income, and evaluation. Participation is defined by *Sajogyo*, [1998] as an opportunity to participate in determining the development policy and an opportunity to participate in evaluating the development outcome.



Source : Center for Sustainable Development, 1997

Picture 1. Interaction among the Elements in the Sustainability System

METHOD OF RESEARCH

The object of the research was the inhabitants in Medan. The population of Medan today is 2, 097,610 [*BPS*, 2011]. To be in line with the aim of the research, the researcher used 1,406,265 inhabitants (the age of 15 to 59) who are assumed to use public transportation (productive ages). The samples were taken by using Slovin formula as follows:

$$n = \frac{N}{1 + (Nd)^2}$$

Notes:
N = Population
n = Sample
d = Alpha

So that the number of samples is:

$$n = \frac{1.406\ .265}{1 + 1.406\quad .265\ (0.05)^2}$$

$$= 399.89 \text{ inhabitants} \sim 400 \text{ inhabitants}$$

So, the number of samples is 400 respondents.

The samples were then distributed proportionally to each sub-district, based on the number of its residents as it can be seen in the table below. Besides that, in order to have a deep understanding of the research, the researcher conducted interviews with some officials/staffs of the agencies concerned with the research, including the managers (operators), owners, and other public transportation agencies/organizations.

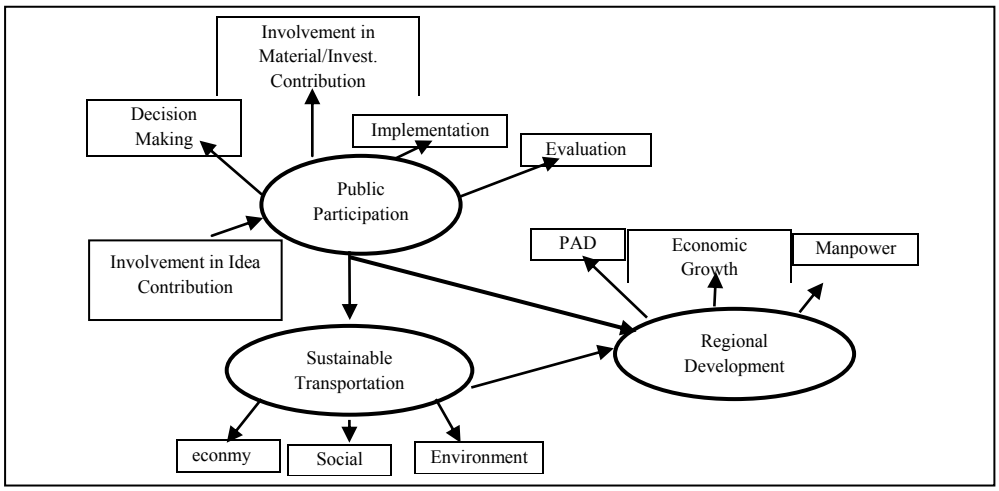
Tabel 1. Distribution of Samples to each Subdistrict Proportionally

No	Subdistricts	Number of Residents	Sample Proportion
1	M. Tuntungan	80,942	15
2	M. Johor	123,851	23
3	M. Amplas	113,143	21
4	M. Denai	141,395	27
5	M. Area	96,544	18
6	M. Kota	72,580	14
7	M. Maimun	39.581	8
8	M. Polonia	52,794	10
9	M. Baru	39,516	8
10	M. Selayang	98,317	19
11	M. Sunggal	112,744	21
12	M. Helvetia	144,257	28
13	M. Petisah	61,749	12
14	M. Barat	70,771	14
15	M. Timur	108,633	21
16	M. Perjuangan	93,328	18
17	M. Tembung	133,579	25
18	M. Deli	166,793	32
19	M. Labuhan	111,173	21
20	M. Marelan	140,414	27
21	M. Belawan	95,506	18
Total		1,406,265	400

Source: Result of Secondary Data Analysis, 2012

The collected data comprised the primary and secondary data gathered from the agencies concerned with the research, such as BPS, Transportation Office, Bina Marga Office, Layout and Architecture Office, Environment Board, Regional Development Planning Agency, Public Transportation Businesses, and owners and organizations of public transportation in Medan.

In order to analyze the data, the researcher used Structural Equation Modeling (SEM), a statistic modeling technique which is very cross-sectional, linear, and general. The SEM model of the research is as Picture 2 :



Picture 2. SEM Participation Model , Transportation

The result of the hypothesis test is known from the probability value or from the significance of the correlation of each variable. The criteria is that if $P<0.05$, the correlation among the variables is significant and can be further analyzed and vice versa. Therefore, by seeing the probability figure (*p*) at the *AMOS* output, we can determine the acceptance and the rejection of the hypothesis as follows:
If $P>0.05$, H0 is accepted (not significant).
If $P<0.05$, H0 is rejected (significant).
[*Santoso*, 2007:98]

The correlation among the variables can be seen by path analysis from each variable, whether the correlation is direct or indirect.

RESULTS AND DISCUSSION

Table 2 shows the number of public transportations, based on the licenses issued by Medan City Administration. Of 13,866 public transportation units which obtain licenses, 7,895 of them are realized (56%), but only 6,695 units (84.8%) are able to operate on the roads, for some of them are broken so that they cannot operate on the roads. This is caused by there are many vehicles which broken so that they cannot operate. This is really a great number of public transportation; let alone if they are given the licenses by Medan City Administration and realized by the operators/transportation businesses. In addition that, there are a great number of motor cycles in Medan. There are 2,805,545 units of motor cycles so that they cause traffic jams in Medan. Therefore, it is recommended that Medan City Administration should make a strict policy concerning the issuance of licenses for public transportation.

Table 2. The Number of Public Transportation and the Number of Licenses for Designated Route in Medan

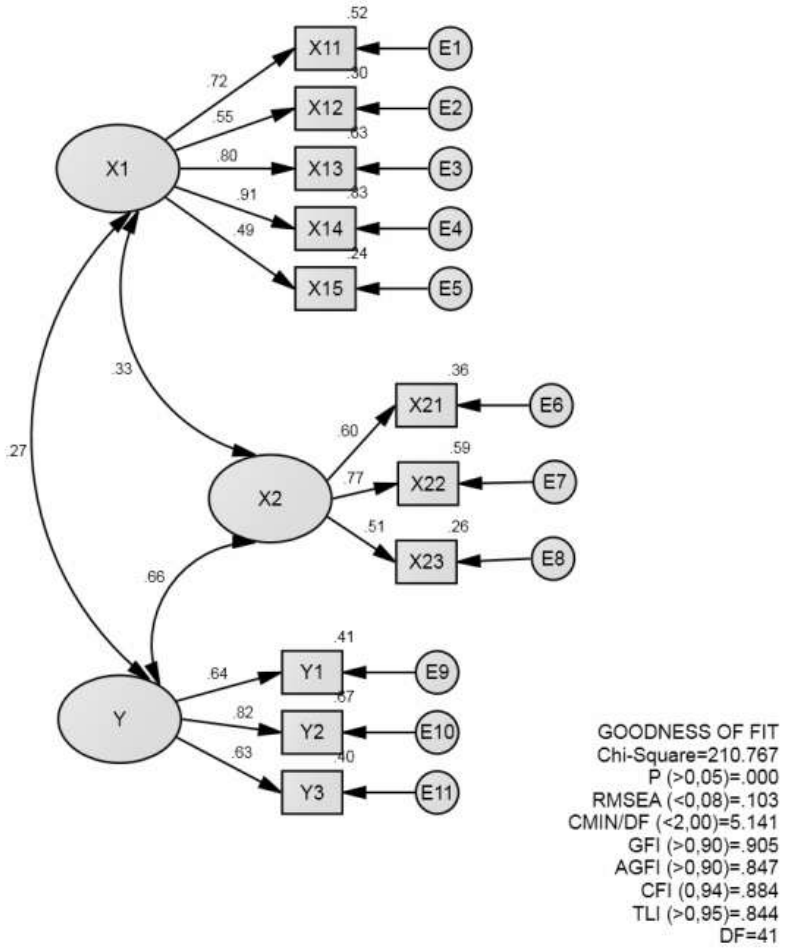
No	The Number of Pub. Trans/city Trans	Licenses (units)	Realizatization	Operating (Units)	Total of Lines
(1)	(2)	(3)	(4)	(5)	(6)
1	PKUM	5,646	3,434	2,924	93
2	GM Sakti	350	204	173	8
3	WAMP MNI	533	306	261	7
4	MEDAN JAYA	265	80	68	7
5	MORINA	1,170	546	464	21
6	RAHAYU	1,975	1,478	1,268	23
7	POVRI	193	104	89	5
8	MEDAN BUS	785	358	305	13
9	M.TRAN	380	275	234	10
10	MITRA	600	249	211	11
11	KOBUN	84	15	13	4
12	DESA MAJU	420	220	189	11
13	MARS	1,025	471	401	20
14	MREX	290	155	95	6
15	L DELI S	150	0	0	4
Total		13,866	7,895	6,695	240

Source: Report on the Implementation of the Activities of Transportation Office, 2012

Structural Analysis of Equation Modeling

The test of confirmatory factor was conducted on three simultaneous latent construct used in the research. The latent construct was public participation (X_1) which defined by observed variables X_{11}

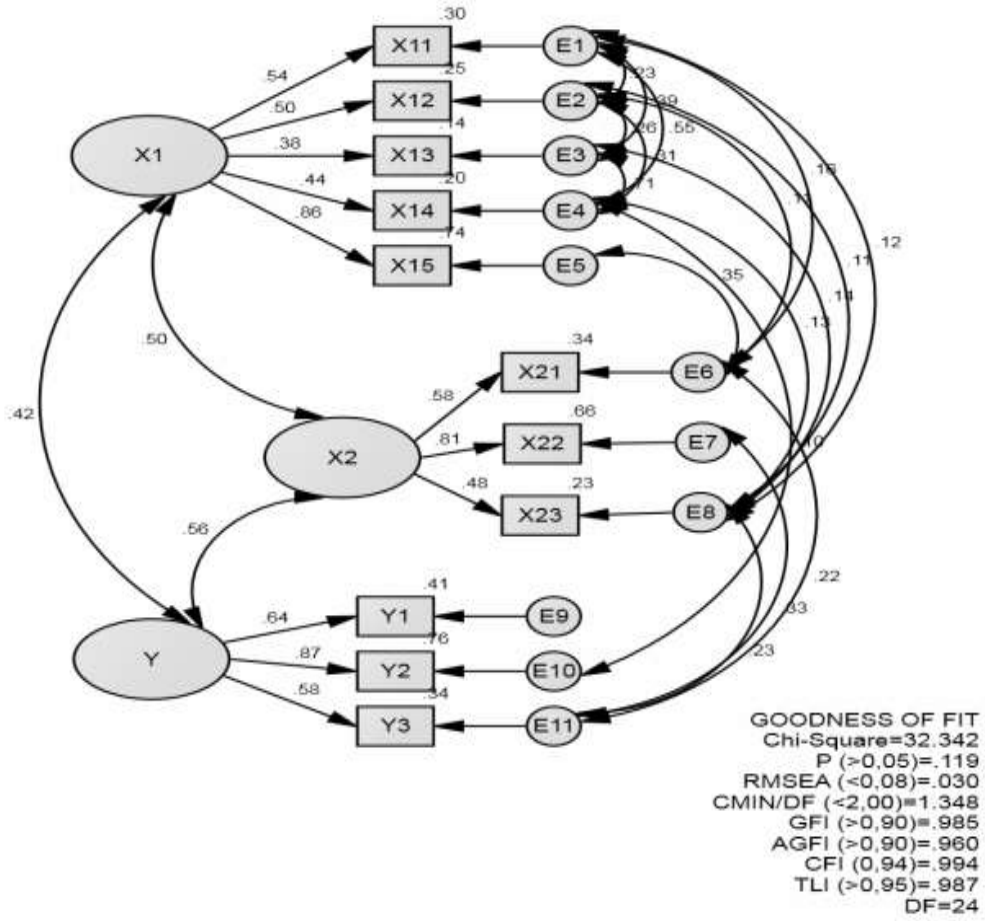
(involvement in making decision), X_{12} (participation in contribution to idea), X_{13} (involvement in investing), C_{14} (involvement in implementation), and X_{15} (involvement in evaluation). Simultaneous transportation construct (X_2) which was defined by observed variables X_{21} (social sustainability), X_{22} (economic sustainability), and X_{23} (environmental sustainability). The latent construct in regional development (Y) was defined as observed variable Y_1 (the Increase in PAD), Y_2 (economic growth), and Y3 (manpower). Graphically, the result of the estimation of the three constructs can be seen in Picture 3. From the Goodness of fit model in Picture 3, it can be found that the value of Chi-Square = 210.767 with the prob. = 0.000 which means that the model does not fit the data. The same is true for the other fit criteria (RMSEA, CMIN/DF, GFI, AGFI, CFI, and TLI) which do not fit the expected baseline so that the model should be modified.



Source: Result of Data Processing, 2012

Picture 3. *Confirmatory Factor Analysis* of Three Constructs

The model was then modified by correlating the suitable covariance based on the recommendation of modification indices value. The result can be seen in Picture 4.



Source: Result of Data Processing, 2012

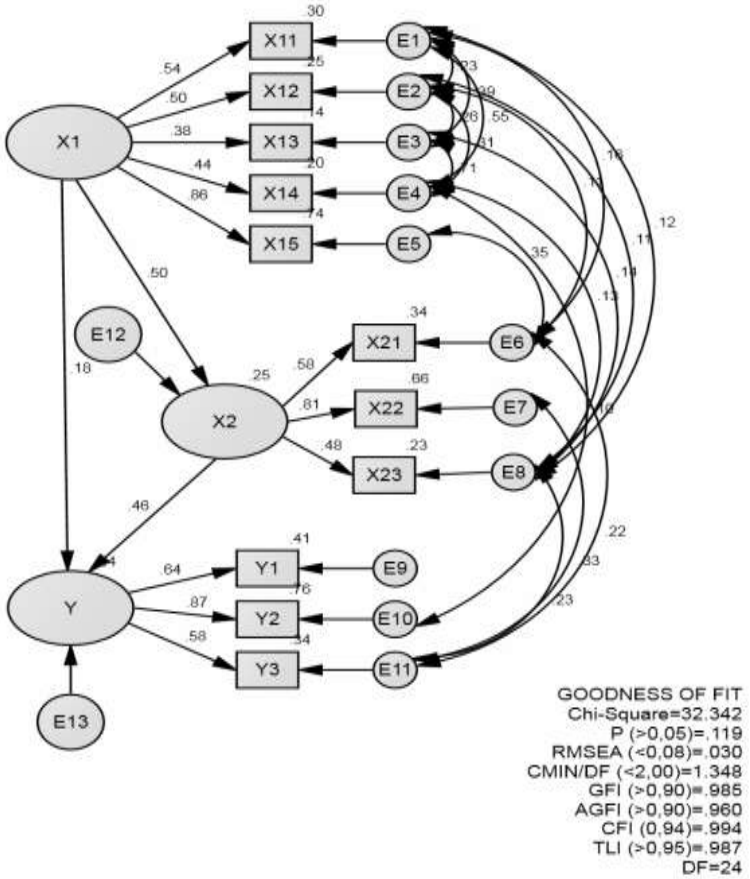
Picture 4. *Confirmatory Factor Analysis of Three Constructs (Modified)*

Based on Picture 4, it is found that the value of Chi-Square = 32.342 with prob. = 0.119. It indicates that the model has fitted the data. The ratio between the fit model criteria before modification and the fit model criteria after modification can be seen in Picture 3. Based on the other fit criteria in Picture 3 (RMSEA, CMN/DF, GFI, AGFI, CFI, and TLI), the modified model has fitted the Cut-Off and is better than the pre-modified model.

The estimation of the parameter indicates the positive marks and quantity which fit the expected theoretical correlation. Based on Table 4, it is found that there is no single correlation which is bigger than 1 (>1). This indicates that the individual parameter in the model has been fit.

The Test of Structural Equation Modeling (SEM)

The next analysis was the analysis of Structural Equation Model (*SEM*) in a full model after analyzing the level of uni-dimensionality from the indicators of forming latent variables which are tested with confirmatory factor analysis. The analysis of the result of data processing was done on the level of *SEM* full model by conducting fit test and statistic test. The result of data processing to analyze *SEM* full model is presented in Picture 5.



Source: Result of Data Processing, 2012

Picture 5. SEM *Full Model*

The test on hypothesis model indicates that the model in Picture 5 has been fit the data or fit the used data as it is seen in Table 3.

Table 3. The result of Feasibility Test on Structural Equation Model (*SEM*)

Criteria	Cut- Off	Result of Analysis	Evaluation
Chi-Square	Small	32.342	Good
Prob	*>0.05*	0.119	Good
RMSEA	<0.08	0.030	Good
CMIN/DF	<2.00	1.348	Good
GFI	>0.90	0.985	Good
AGFI	>0.90	0.960	Good
CFI	>0.95	0.994	Good
TLI	>0.95	0.987	Good

Source: Result of Data Processing, 2012

Based on Table 3, it can be seen that all in all model criteria can be accepted well. A structural equity model is considered good when the chi-square value is low, with the significance level of ≥ 0.05.

The Result of the Hypothesis Test

The result of hypothesis test can be known by seeing its probability value or by seeing the significance of the correlation of each variable. The criteria is that if *P*<0.05, the correlation among the variables is significant and can be further analyzed, or vice versa. Therefore, by seeing the probability figure (*p*) in the *AMOS* output, the criteria of acceptance and rejection can be determined as follows:

If *P* > 0.05, H0 is accepted (not significant).

If *P* < 0.05, H0 is rejected (significant). [*Santoso*, 2007:98]

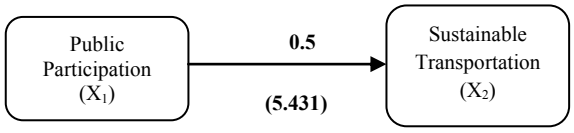
The correlation among the variables can be seen by conducting path analysis from each variable, directly or indirectly.

Tabel 4. Regression Weights and
Standardized Regression Weights: (Group number 1 - Default Model)

			Estima-te	S.E.	C.R.	P	Standardized Estimate
X2	<--	X1	0.737	0.136	5.431	***	0.500
Y	<--	X1	0.099	0.039	2.534	0.011	0.184
Y	<--	X2	0.17	0.033	5.12	***	0.465
X11	<--	X1	1				0.544
X12	<--	X1	0.177	0.021	8.394	***	0.498
X13	<--	X1	0.423	0.058	7.318	***	0.375
X14	<--	X1	0.334	0.034	9.873	***	0.444
X15	<--	X1	0.82	0.131	6.244	***	0.861
X21	<--	X2	1				0.580
X22	<--	X2	0.759	0.093	8.161	***	0.815
X23	<--	X2	0.638	0.088	7.236	***	0.481
Y1	<--	Y	1				0.641
Y2	<--	Y	2.126	0.214	9.951	***	0.874
Y3	<--	Y	1.435	0.152	9.466	***	0.583

Source : Result of Data Processing, 2012

The Influence of Public Participation on Sustainable Transportation



Picture 6. The Influence of Public Participation on Sustainable Transportation

The result of the analysis of *SEM* indicates that coefficient of public participation path (X_1) to sustainable transportation (X_2) is 0.5 with the value of C.R 5.43 > 2.0 and prob. 0.000 < 0.05 which indicates that there is positive and significant influence of public participation on sustainable transportation (urban transportation)/(X_2).

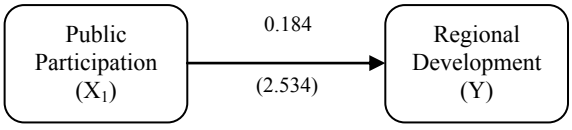
From the analysis, it can be found that there is the significant correlation between public participation in managing urban transportation and sustainable transportation. This sustainability is very important in ensuring social, economic, and environmental sustainability. The social sustainability of transportation is intended to facilitate people to get *angkot* (urban public transportation) in supporting their daily activities and to provide public transportation in any place so that people will take them easily. It is also intended to ensure punctuality, comfort, and security when people use public transportation.

The condition of roads is also very important to ensure the uninterrupted flow of vehicles if the roads are in good condition. The length of roads in Medan was 3191.5 kilometers which comprise national highways, provincial roads, and urban roads. Viewed from their condition, it was found that the length of roads with good condition in 2010 was 3,154.30 kilometers (98.83%), with moderate condition was 15.80 kilometers (0.50%), with bad condition was 20.10 kilometers (0.63%), and with very bad condition was 1.30 kilometers (0.04%). Viewed from the road surface, it was found that paved roads was 3,017.40 kilometers (89.16%), dirt roads were 58.10 kilometers (1.82%), and unidentified roads were 287.70 kilometers (9.02%). From these data, we can say that the roads are in good condition in supporting urban transportation service.

The urban transportations in Medan are still unequally distributed. The urban transportations which are operating are 6,695 units, let alone if it is viewed from the licenses issued by Medan Administration, the number is more than that: 13,866 units. It means that 1,171 units will be allowed to operate. These data indicate that Medan city Administration should make the policy in limiting the number of public transportations to operate and make the policy in balancing public transportations (urban transportations) with big buses gradually and proportionally. The social sustainability is intended to ensure the sense of justice in using public transportation; there will be no discrimination for the disabled, children, old people, and women who use urban transportation.

The economic sustainability is intended to ensure the affordability of fares for all people, the policy in the limitation of the number of public transportations, the replacement from old public transportations by new ones in order to cope with traffic jams. The environmental sustainability is intended to mitigate air contamination/pollution caused by urban transportation which will eventually affect people's health, to mitigate the level of noise caused by the great number of urban transportation, and to make the policy in using alternative fuel besides *BBM* (gasoline and solar).

The Influence of Public Participation on Regional Development

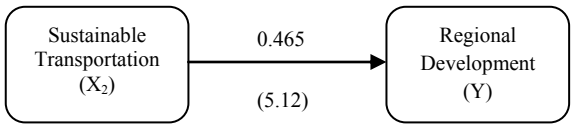


Picture 7. The Influence of Public Participation on Regional Development

The result of the analysis of SEM indicates the coefficient of public participation path (X_1) to the regional development in Medan (Y) is 0.184 with the value of C.R 2.534 > 2.0 and prob. 0.011 < 0.05 which indicates that there is positive and significant influence of public participation (X_1) on regional development in Medan (Y).

According to Sukawi [*Journal*, 2010], public participation in public consultation constitutes the realization of public role in the layout by giving suggestion or recommendation and by bringing up an objection to the government. Ericson [in *Slamet*, 1994] also points out that participation in the phase of implementation constitutes the involvement of a person in the stage of doing a certain project.

The Influence of Sustainable Transportation on Regional Development



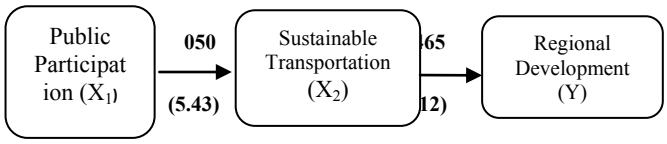
Picture 8. The Influence of Sustainable Transportation on Regional Development

The result of the analysis of SEM indicates that the coefficient of sustainable transportation path (X_2) to the regional development in Medan (Y) is 0.465 with the value of C.R 5.12 > 2.0 and prob. 0.000 < 0.05 which indicates that there is positive and significant influence of sustainable transportation on regional development in Medan (Y).

The influence on regional development is viewed from the aspects of the increasing in *PAD* (Regionally Generated Revenue), economic growth, and manpower. The regionally generated revenue (*PAD*) of Medan comes from two sources, tax and regional retribution. Urban public transportation service can influence people's income. One of the regional revenue from tax and retribution is from the management sector of urban public transportation. The primary data which state that the urban transportation service can influence the regional generated revenue (*PAD*) of Medan Administration needs the response from the respondents. Of 400 respondents, 321 of them (80.25%) agree with the statement above and 27 of them (6.75%) absolutely agree. From the secondary data, it is found that *PAD*, concerning the management of vehicles from 2009 until 2011, has been increasing. This revenue comes from motor vehicle tax (from 32.2 billion to 37.7 billion) and from retribution of *PKB/KIR* (from 5.2 billion to 6.2 billion). The increasing of *PAD* from this transportation sector, of course, influences the *PAD* of Medan. When it is viewed from the city level, the *PAD* of Medan is increasing significantly. Based on the secondary data, it is found that the *PAD* has increased from 303.3 billion in 2005 to 829.7 billion in 2011, and it is targeted to reach 935 billion in 2012. The source of this regional revenue comes from *PAD*, from balance funds, and from other legal sources.

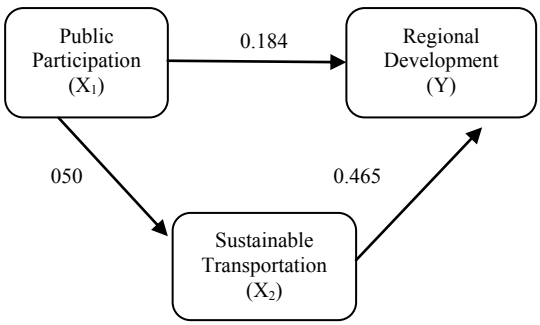
The influence of sustainable transportation on regional development has supported the previous theories. *Sabari*, [1994], in the theory of transportation, points out that there are two main theories which specifically explain the role of transportation lane in urban development. These theories are Axis Theory by Babcock and the Theory of Land-Cost Leasing by Haig. Since the beginning of community development, various business activities select their locations along the primary traffic lanes and places where their potential customers concentrate [*Branch*, 1995]. In consequence, the towns which have dense traffic lanes with economic activities will be more developed and be able to serve the other minor towns.

The Influence of Public Participation through Sustainable Transportation on Regional Development



Picture 9. The Influence Public Participation Through Transportation on Regional Development

The result of the analysis of SEM indicates that the indirect influence of public participation (X_1) through sustainable transportation (X_2) on the regional development in Medan (Y) can be calculated with product coefficient of public participation (X_1) to sustainable transportation (X_2) with the coefficient of sustainable transportation lanes (X_2) to the regional development of Medan (Y) with the value of 0.5 X 0.465 = 0.2325. In other words, there is significant influence of public participation (X_1) and sustainable transportation (X_2) on the regional development in Medan (Y).



Picture 10. The Direct and Indirect Influence of Public Participation on Sustainable Transportation and Reg. Development

The sustainability of urban public transportation which has involved public participation, as it has been mentioned above, such as economic, social, and environmental sustainability, should be maintained. These three aspects of sustainability are expected to support regional development. On this occasion, we need the government policy in limiting the number of public transportations, the policy in replacing older public transportations by newer ones through the limitation of the year of production, the policy in testing motorized vehicles regularly and strictly without focusing only on increasing regional generated revenue, the policy in conducting emission test regularly and directly on the roads for public transportations, the policy in using big buses in specific routes or lanes, the policy in determining the lanes participatively and righteously, the policy in determining bus stops for public transportation, the policy in supplementing road capacity by building new roads and widening roads and bridges, the policy in determining tariff with win-win solution between the users and the management of public transportation, and the policy, in the long run, in thinking about using alternative fuel, such as gas and electric fuel, for public transportation.

Regional development is indicated by the development in that region. In this case, one of the indications is the important role of the development in the transportation system. The development of transportation is one of the important parts in such a big town like Medan. Therefore, the sustainability of the public transportation management should be maintained.

The Program of Public Transportation in Medan

There are a lot of measures which can be taken in coping with the problems of traffic jams in Medan. *First*, public transportation should be improved and given the priority. A good system should be used in order to persuade people to use public transportation. In this case, public transportation should be safe, comfortable, punctual, able to reach all areas, and free from any obstacles. They should not speed up and stop at any place to make traffic chaotic and endanger passengers and other road users. *Secondly*, facilities for pedestrians should be improved. In order to encourage people to use public transportation, the government should

provide facilities for pedestrians because traveling by public transportation begins and ends with the pedestrians. *Thirdly*, the implementation of Transport Demand Management (*TDM*) should be intended to increase the efficiency and effectiveness in urban transportation system by adjusting and considering the condition and the limitation in Medan. Some measures which are recommended to be taken gradually are as follows:

a. Distributing Traffic in Rush Hours

The way how to do it is by shifting working hours. On this occasion, working hours at some companies in the industrial areas are arranged in such a way that the workers do not come to and return from the companies or factories at the same time. For example, in a company in the industrial area the workers get to the factory at 7:00 AM and return from it at 4:00 PM, while in another company, the workers should get to the factory at 8:00 AM and return from it at 5:00 PM. Another method is by applying odd and even license plate numbers as it has recently been applied by the Jakarta Administration. By implementing this policy, rush hours can be distributed evenly.

b. Increasing Vehicle Occupancy

The way how to do it is that people who live at the same area and their offices are not far from one to another can use the same vehicle at the same time. Another way is to give special lanes and priorities to the vehicles which have large capacity and to give the priority to parking lots, especially to the type of park and ride vehicles.

c. Limiting the Parking for Personal Cars

The way to do it is, for instance, by limiting parking lots, and, if possible, by imposing high parking tariff so that people who have vehicles will think twice to take their vehicles if the tariff is too high for them. They will automatically shift to using public transportation. The government should also prohibit people to park their automobiles on the road side, especially when the thoroughfare is busy.

d. Applying Road Pricing

This system is applied in specific stretches of road with high traffic jams. However, this system can only be applied if there have been many arterial roads available which is heading toward a certain area.

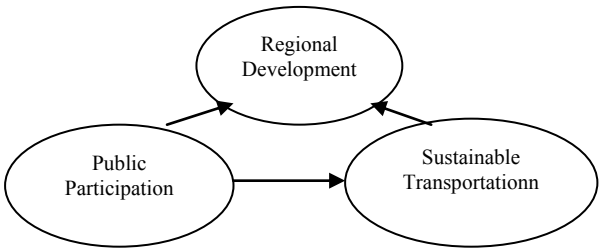
Fourthly, urban transportation should be conversed to moderate and big buses. The conversion from urban transportation with small existing seating capacity to a bigger existing seating capacity can be made step by step. Hard work and coordination are needed from all stakeholders, and it takes a long time although it can be one of the alternatives. *Fifthly*, traffic light system should be improved. The number of traffic lights should be increased and coordinated and Area Traffic Control System (*ATCS*) should be applied so that traffic jams and delay can be decreased. *Sixthly*, the number of vehicles in Medan should be decreased. It is very difficult to limit the ownership of personal vehicles since it is his own right to have them; but, at least, it can be handled by applying progressive tax to those who have more than one vehicle, and this system has been applied in Medan. The number of vehicles which pass over the roads can also be handled by applying the limitation of the age of vehicle; old vehicles are not allowed to operate as it has been applied in Singapore.

Seventhly, institutional behavior should be changed. Since one third percent of traffic jam is caused by human behavior, the socialization and education for people in order that they will be aware of and discipline in driving should be provided. *Eighthly*, building and maintaining roads are the last alternative since it takes a great deal of money. It can be done by increasing the capacity of the infrastructure or build new infrastructures. Some measures which can be taken are as

follows: widening and upgrading geometric junctions, making junctions which are not in the same plane in order to avoid the conflict of the road users, and building JPO (overpass bridges). Road widening and junction upgrading usually cause some problems in the utility network infrastructure so that good coordination among the agencies concerned in determining the position and the location of the utility network is needed.

Model of the Influence of Public Participation on Sustainable Transportation and Regional Development

A model can be made for the influence of public participation on sustainable transportation and regional development in order to see the correlation among these three variables. This model can be seen in Picture 11 below.



Picture 11. Model of the Influence of Public Participation on Sustainable Transportation and Regional Development

The model of public participation, sustainable transportation, and regional development can be seen in Picture 6.3 which indicates that regional development is also determined by public participation through sustainable transportation. If it is related to the pillar of regional development as it is pointed out by Misra, [1997], there are four aspects; namely, the aspects of economy, location, geography, and town planning. Budiharsono, [2005] also points out that there are six pillars of regional development; namely, institutional, economy, social, location, geography, and bio-geophysical. From the finding of these theories, there is another factor which determines regional development; namely, public participation, either directly on regional development or indirectly through the development of sustainable transportation.

CONCLUSION

1. There is the influence of public participation on sustainable transportation. The more people participate, the more increasing the sustainability of urban public transportation. The first participation is through public participation in the decision making in every program for urban public transportation, the second participation is through public participation in the contribution of idea, the third participation is through public participation in involving in investing their capital in the urban public transportation ownership, the fourth participation is public participation in managing urban public transportation, and the fifth participation is through public participation in evaluating the activities of urban public transportation.
2. There is the influence of public participation on the regional development in Medan. The more people participate, the bigger their influence on the regional development in a certain area. The regional development is measured from the increase of regional generated revenue (PAD) in the transportation sector, in the economic growth in the transportation sector, and in the employment of workers in the transportation sector.
3. There is the influence of transportation on regional development in Medan. The more the sustainable urban public transportation is created, the more an area is developed. In this case, the influence of the sustainable transportation is the urban public transportation which can be seen from some indicators; namely, the aspects of

social sustainability, of economic sustainability, and of environmental sustainability.

4. There is the influence of public participation through sustainable transportation on regional development in Medan. The more people participate through urban public transportation, the more developed a certain area is. The indirect influence of public participation through sustainable transportation actually can also influence the regional development in Medan which is measured from the increase in PAD in the sectors of transportation, economic growth, and the employment of workers in transportation sector. The result of the analysis shows that the indirect influence of public participation through sustainable transportation on regional development is bigger that the direct influence.

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