URBAN POVERTY ANALYSIS USING CONSUMPTION INDEX OF DURABLE GOODS AND SERVICES IN SULAWESI REGION, INDONESIA ; A Structural Causal Model by Path Analysis

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Key Words : *Durable-good consumption, Indonesia, path analysis, poverty, and urban community.*

Abstract

This research aims to construct structural causal relationship of the urban poverty using consumption index of durable-goods and services, and to highlight its policy implications. By making used of the path analysis, the structural model constitutes the path way of important intermediate and independent variables towards the consumption. The most important intermediate variable is *Business Area Proportion*, it provides direct impact on the consumption, and facilitates indirect impacts of the important independent variables. There are five important independent variables in this structure; they are *Medical Doctor Availability, Village Size, Number of Households, Woman Households* and *Population Density*. All of these variables have positive relationship with the consumption rate, except the *Woman Households*. The population density's impact is indirect ones that are through *Business and Residential Areas* as well as economic activities especially the *Service and Trade Activities*. This structural relationship highlights the importance of promoting business activities especially service and trade sectors besides improving health service accessibility in line with the poverty reduction efforts. The model also reveals that there are still rooms for more urban population. However, it is important to pay a specific attention towards those households headed by women, in which most of them are vulnerable fall into—or already in—poverty. Thus, the urban pro-poor policies in Sulawesi Region should take into account not only in promoting business activities but also providing better health service accessibility, and with special attention in supporting the *Woman Households*.

1. Introduction

Consumption of durable goods is widely utilized as one of the prosperity indicators, and therefore for poverty analysis. Possession and increased of durable consumption by a

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community is related to the increased of the prosperity of that community (Slesnick, 2001). Since the prosperity is exactly the opposite end of the poverty, increasing community prosperity should be directly perceived as reducing the poverty. *The poverty reduction* has been one of the most important development objectives, nevertheless it was declared as the first target of the development in the United Nations Millennium Development Goals (MDGs) in World Development Summit (UNDP, 2003).

Hentschel and Lanjouw (1996) demonstrate that using different consumption definitions would result in significant bearing on measured poverty as well as community welfare. On the other hand, needs to present consumption behavior and or pattern across region becoming increasingly important to provide a more comprehensive picture of the regional economy and development in line with the poverty reduction efforts. More over, sociologists have found that consumer behavior is a rich subject not only for economists but also for social emulation and social-class differentiation (Davis, 2001 ; Miller, 2002).

Consumption expenditure can be divided into three main categories such as non-durable goods (daily consumption), durable goods, and service expenditures (Eastwood, 1985). Durable goods are goods that provide service flows over extended periods of time, or they have long service live such as vehicles, house, television set, radio, home furniture, etc. Service expenditures consist of house utilities (phone, gas, electricity and water), education, health service, recreation, financial services etc. Davis (2001) states that those who earn the least income purchase fewer consumer durables and almost never engaged in expensive new leisure pursuits. In connection to the poverty study for instance, Kawamura (2002) finds that consumption of durable consumer goods is the first factor to describe the level of living at the households in the communities of South Sulawesi Province, Indonesia. Similarly, the consumption rate of goods and services in fact is among the best indicators to describe level of living for the household level in Sulawesi Region, Indonesia (Said, 2000).

In connection to the data availability, which is difficult and very expensive to conduct household survey across region, then the matter of facts is there are extensive data that were collected by various agencies and institutions, sometimes even regularly such as through census, economic survey, survey inter census etc. In the case of Indonesia, Central Statistic Agency (BPS) takes responsibility to conduct this census and survey regularly. As a result an extensive secondary data set ought to be able to be acquired.

Based on the above viewpoints and the need to contribute to the policy formulation for better living condition and prosperity of the community in the region especially, we initiated this study.

Objective of Study

In general, the aim of this study is to construct a structural causal relationship of the Consumption of Durable Goods and Services—as a community welfare indicator—for the urban poverty analysis in Sulawesi Region of Indonesia. The more specific objectives of the study are as follows :

1. To identify the important factors determining the rate of consumption of durable goods and services in Sulawesi urban communities.
2. To construct structural causal relationship and model among important determinants in terms of independent and intermediate variables towards the consumption of durable goods and services.
3. To highlight important factors that should be taken into account in the policy formulation in line with the poverty reduction for the urban areas in Sulawesi Region, Indonesia.

2. Review of Previous Study

Consumption studies on durable goods have drawn attention for many years for many purposes including in determining poverty and well being of the communities. However, compare to the non-durable goods, durable consumers have *the flexibility* to maintain existing stock instead of making additional purchase. This flexibility makes durable expenditures both difficult and interesting to analyze (Eastwood, 1985).

There are two elements determining the set of consumption or ownership of durable goods by households, namely preferences as expressed in a priority pattern, and rates or velocities of accumulation at past moments (Pyatt, 1964). The two elements converged into a single index called the stimulus that has normal distribution over households and depend upon the *household income, wealth* and *age*. So, it depends upon the living condition and situation of the household. Standard of living of the household is determined not only by income for expenditures, but also by the dominant feature of the society, at times income control the process and desires for economic sensationalism, and at other times, values of a non-economic nature become dominant (Zimmermann, 1976). Then she concludes that a system of living includes absolute values to be found in the social organization as well as the goods of life.

Dubin (1985) elaborates that large initial setup costs might affect durable choice when some consumer access to capital market is limited, further more it may affect the choice of other economic goods and thus affect consumer welfare. Therefore, beside durable goods

costs, access to capital market could be an important factor in consumption expenditures. Thus, access to capital market and that availability of financial sources such as credit is essential in purchasing durables (Eastwood, 1985). In addition, economic activities also significantly determined durable goods as well as better services (Davis, 2001).

Herrnstein (2002) emphasizes that rational choice theory tells us how we should behave in order to maximize reinforcement but not how we do behave. He suggested that consumer behavior as people behave rationally should be left to their own devices, except when collective behavior undermines individual interest. Thus, he implied that for consumers in selecting their choice of goods and services are (but not all) determined by their environments. In connection with poor community, Slesnick (2001) insists that in some ways even the poor manage to acquire about 11 to 14% of their total spending for durable goods especially housing. Similarly, Pyatt (1964) and Davis (2001) point out that there are still some low price durable goods that always can be purchased even by low income poor, but the issue here could be the quality of the goods as well as the quantity.

Wilk (2001) identifies that a number variables in the wider of social and economic sphere play important roles in the case of houses as consumer goods. He insists that we could build up a body of empirical data on the cultural, economic, environmental and psychological factors that affect that decision making in different context. Similarly Hursh (2002) states that there are strong interdependencies between rates of responding to the environmental condition/constraints and daily consumptions. He emphasizes that natural environment is significantly closed to the consumer behavior.

Belk (2001) describes that the concept of possessions as extended self has much to offer the quest for an understanding of consumer behavior instead of buyer behavior. He concludes that there is evidence of relationship between possessions including durable goods and one's sense of self. On the other hand, however, Easwood (1985) and Slesnick (2001) suggest that possession and increased durable consumption by the population is positively related to the economic growth and therefore the increased of the community welfare.

Finally, it seems that there are so many influencing factors on durable consumptions, not only in the outset of the individual and the internal situation of the households but also in line with the social, economic and physical environments of the community. Therefore not only economic factors and market prices are important but also non-economic values are essential including the consumers' self-identity as well as social and natural environments. Thus, Consumption of Durable Goods and Services could be affected by households' economic activities, access to market, financial institution, transportation

means/infrastructures, and natural environments such as topographic condition, land utilization in the area, as well as socio-cultural situation such as education, health situation, government involvement, and any other things related to the community living environments. In addition, Pradhan *et al* (2000) find that recent studies shows that regardless the macro economic situation of the country, study on the poverty structure and situation remain important.

3. Research Methodology

This research is a study of secondary analysis or secondary analysis of survey data (Kiecolt and Nathan, 1985) in which the data set being used are secondary data obtained from relevant institutions. In this case, the data set was acquired from Indonesian Central Statistic Agency (BPS) namely Statistics "Potensi Desa", 1996. This statistic is one of the main outputs of the National Economic Census that contains a wide range of information for every village in Indonesia, such as topography, demography, social economic activities, institutions, transportation and communication means, education, health, village government etc. Therefore, this data set consists of sufficient multi-dimensional information.

This study has been conducted from April 1999 to March 2002, partially funded by JICA in line with the project of Strengthening Local Community Development to Support Poverty Alleviation Programs in Sulawesi, Indonesia. As shown in the project title, the project site as well as the research site is the Sulawesi Region, the whole Sulawesi Island and its surrounding small islands. Sulawesi (Celebes) is one of the five Indonesian main islands besides Sumatra, Java, Kalimantan (Borneo) and Irian (Papua) Islands. Sulawesi Island situates right in the center of the country.

The "Potensi Desa" data set used in this regards is a data set utilizing "Desa or Kelurahan", namely village, as an observation unit. In Indonesia, village is the smallest administration unit of the governmental structural system.

The data set consists of massive information ranging from general information of administration to geographic and demographic situations, including environment and housing condition, social, cultural and economic activities and facilities, education, entertainment, health, transportations, and communication facilities. Over all data are divided into 12 blocks as follows ; (1) Place, (2) General data of Desa/Kelurahan, (3) Demography, Environment, Housing and Settlement, (4) Education, (5) Social and Culture, (6) Recreation and Entertainment, (7) Health, (8) Transportation and

Communication, (9) Area and Its Utilization, (10) Economic, (11) Finance of Desa/Village, and (12) Data of Village Head.

The data are arranged into 413 items (variables) for each village. So, the data matrix size depends upon the number of villages in the region being observed (number of cases or rows) times 413 (number of column). For instance, for South Sulawesi province consisted of 2,883 villages, 206 of them are urban villages, so the data matrix is 206 by 413. Therefore, for Sulawesi Region that consists of five provinces and 6,649 villages, 531 are urban villages, so the data-set matrix size is 531 by 413.

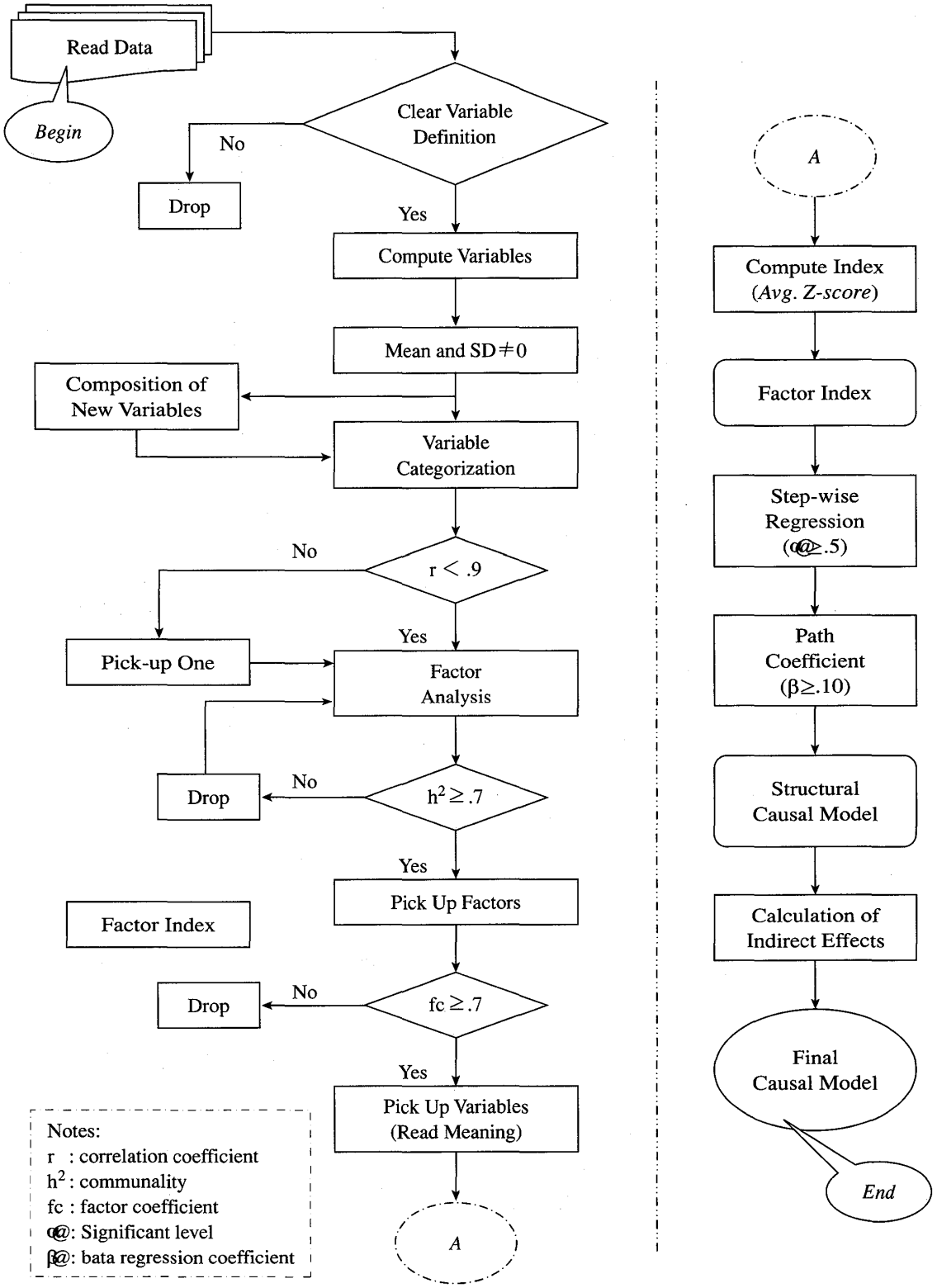
Based on the data in the original data set, there are some entries that seem irrelevant, missing and doubtful or awkward. Therefore, we do some procedures of data cleaning, verification and recoding. The final data set consisted of 356 original variables plus 81 composit variables. The composit variables are various combinations of the original variables such as population density, sex ratio, desa prosperity level, village dependency ratios on various resources, educational and health service availabilities, etc. Thus, the total variables are 437 variables against 531 cases/villages in the Sulawesi Region urban areas.

Data analysis employs factor analysis, additive summation index construction and path analysis (Knoke and Bohrnstedt, 1994). SPSS Version 11.0.1, 2001 and then SPSS V.10.5, 2003 are used to execute these statistical procedures.

Factor analysis is widely used to identify underlying variables or factors that explain the pattern of correlation within a set of observed variables. Beside that, this analysis is often used in the data reduction, by identifying a small number of factors, which explained most of the variance observed in a much larger number of manifest variables. In this case, factor analysis was selected in order to achieve both purposes above. Factor analysis procedure consists of three main subsequent steps as follows :

1. Principle Component Analysis (PCA) as an extraction method is used to calculate the communality among variables. In this case, variables with communality coefficient less than 0.70 were eliminated, so at least 70% of the variance of the remaining variables can be explained by the common factors. These extracted variables used in the next run until all variables satisfied the communality coefficient above.
2. The factor loadings are estimated and factors/components are extracted. Here, the PCA is used to extract factors or components and then to construct component matrix by all variables, which satisfy the communality criteria. The extracted factors are the factors with eigenvalues equal or greater than 1.0, so the variances of the

Figure 1. Flowchart of Analysis Process for the Consumption Model Construction



Notes : Adopted from Yoshio Kawamura (2002), *Role of Social Statistic Analysis in Participatory Rural Community Development Programs for Poverty Alleviation, Case of a JICA Project in South Sulawesi, Indonesia*, JICA Commissioned Research Report ; and Adri Said (2004), *Constructing Indicators of Community Living Standards for Poverty Analysis in Sulawesi, Indonesia*, Ryukoku Journal of Economic Studies, Vol. 43. No. 4 March 2004.

extracted components/factors are greater than 1.0.

3. The loadings are rotated using Varimax Method to make the loadings more interpretable. Rotating methods make the loadings either large or small, not in-between for each factor.

The output of factor analysis is a set of several factors in which each factor is composed by several original variables. Therefore, by making use of these factors ones can examine the over all data set with relatively smaller number of explanatory variables or factors. In this case, rather than dealing with poverty equations consist of hundreds of explanatory variables, much nicer to have just tens of variables representing those hundreds ones. The over all procedure is presented in Figure1.

Path Analysis is a statistical method for analyzing quantitative data that yields empirical estimates of the effects of variables in a hypothesized causal system, using standardized multiple regression equations (Knoke and Bohrnstedt, 1994). Among the advantages of using this path analysis is the ability to identify both direct and indirect effects by the path coefficients, which are numerical estimates of the causal relationships between two variables in a path analysis. *The fundamental theorem of path analysis* states that the bivariate correlation between variable i and j implied by the hypothesized causal model is the sum of the products consisting of the path from variable q to variable i times the correlation between variable q and j. The sum of these products is formed over all q variables that have direct paths to variable i.[1)] Technically speaking, path analysis requires all factors or variables involved in the analysis to be standardized, such as using *z-score* standardization. Hence, the path analysis could present information which variables have the highest effect or impact directly and indirectly toward the dependent variable, in this case is the urban community welfare and poverty as well as their structural interconnection.

4. Consumption of Durable Goods and Services and Index Construction

Consumption of Durable Goods and Services (CDGS) is selected as a dependent variable to capture the community consumption level—in this regard especially to represent the community welfare state—in the urban areas for Sulawesi Region. This endogenous variable is constructed from eight original variables as a result of factor analysis as follows :

1. Var00041 (Number of HH with high education enrollment),

1) For more detail and technical explanation of the path analysis and path coefficient calculation, see Knoke and Bohrnstedt, *Statistics for Social Data Analysis, Third Edition*, 1994. pp 413-435.

2. Var00068 (Number of non stack houses),
3. Var00069 (Number of permanent houses),
4. Var00229 (Number of HH with telephone),
5. Var00235 (Number of HH with television),
6. Var00237 (Number of HH with radio),
7. Var00363 (Number of HH with electricity), and
8. Var00367 (Number of HH with 4 wheel vehicles).

Therefore, the CDGS represents the consumption rate of goods and services that only viable for middle-upper income class of the community, and because of that it is often used to indicate community welfare situation (Slesnick, 2001).

The CDGS is an index representing 8 (eight) variables as a result of the Factor Analysis (FA). FA extracts 5 factors out of the 34 variables regarding the level of living of the community. Regarding the 5 factors, so called LHH Factor 1 to LHH Factor 5, the analysis observes several aspects such as Total Variance Explained, Rotated Component Matrix as well as Component Transformation Matrix. The component matrix provided the *coefficient of correlation between components/factors and variables*. The represented variables were the variable(s) that has coefficient of correlation (r) greater than 0.70, meaning it explained at least 49% (say 50%) of the variable variability (r^2). The complete procedure and result of this calculation can be seen the research report by Said (2000).

Factor index of CDGS is calculated, first by standardizing the included variables on a specific factor. The standardization uses *z-score transformation* formula as follows (Knoke and Bohrnstedt, 1994) :

$$Z_x = (X_i - \bar{X})/S_x$$

Where,

Z_x is a z-score of X_i

X_i is an observation of the i^{th} case in a variable X

$\bar{X}$ is a mean of variable X

S_x is Standard deviation of variable X_i

Then, by calculating the mean of the standardized variable values, the factor index is found. In the case of CDGS or *Consumption of Durable Goods and Services and Services*, representing eight different variables, Var00041 (Number of HH with high education enrollment), Var00068 (Number of non stack houses), Var00069 (Number of permanent houses), Var00229 (Number of HH with telephone), Var00235 (Number of HH with television), Var00237 (Number of HH with radio), Var00363 (Number of HH with electricity), and Var00367 (Number of HH with 4 wheel vehicles). Therefore, index of

CDGS is equal to the average of standardized values of the all eight variables above as for the CDGS is shown in Table 1.

Table 1. Representative Index of the CDGS in Urban Sulawesi, Indonesia

Factor	Factor Name		Factor Index Composition
	Long form	Short form	
Level of Living of the Community	Consumption Rate of Durable Goods and Services	CDGS	(zVar00041+zVar00068+ zVar00069+zVar00229+ zVar00235+zVar00237+ zVar00363+zVar00367)/8

Notes : z-sign indicated the standardized value (*z-score*) of the variable.

Thus, the values of this Index Composition would be used in the analysis as a dependent variable of Consumption of Durable Goods and Services (CDGS).

In the next analysis we are going to examine the structural causal relationship of this poverty situation, represented by CDGS. In addition, it is important to notice that this index has to be standardized before running the path analysis ; therefore, the value used in the equation will be *zUrban-Consumption*, it is the CDGS, where *z-sign* indicates the standardized value of the variable.

5. Intermediate Variables : Land Utilization and Economic Activity

Intermediate variables are variables that contribute directly to the dependent variable as well as provide pathways for independent variables to the dependent variables, some times called as secondary endogenous variables or intervening variables. In this model, intermediate variables include Land Utilization variables and Economic Activity variables that have been identified using factor analysis. The factor analysis identifies important factors including its associated representing variables. Factor analysis explores 29 Land Utilization variables and 27 Economic Activity variables (Said, 2000). Then using these represented variables, each factor index is constructed (Appendix 1), and its descriptive statistics is presented in Appendix 2.

Land Utilization

Term of land utilization (LU) in this case is area utilization for certain purposes in each village, such as for agriculture—irrigated, non irrigated rice fields, plantations, secondary crops and vegetables—settlement, business, forest etc. There are 29 variables of LU in the data set. Using Principal Component Analysis (PCA) they are extracted into

four factors, namely LU1, LU2, LU3 and LU4. Output of the PCA in the form of Rotated Component Matrix allows to identify those variables having high association ($r \geq 0.70$), for every extracted factor. Since each factor includes several variables, which every variable consists of different values both in terms of value units or ranges. Therefore, a single value is needed for every factor, the representative values of the factors are called *factor indices*.

Factor indices are calculated, first by standardizing the included variables on a specific factor. Then, by calculating the *average values* of the standardized variable values, the factor index is assigned as shown in Table 1. The factor indices consist of entirely new set of data that all values are the standardized ones, and these values are suitable for path analysis.

Economic Activities

Economic activities (Ecact) constitute all productive activities or income generating activities by the pertinent community (villagers). There are 27 variables of economic activities. Using factor analysis similar to the one used for the land utilization analysis, Ecact variables are extracted into 3 factors namely Ecact1, Ecact2 and Ecact3. Ecact1 is *Households engaged in Agricultural Activities* (*Agricultural Sector*), Ecact2 is *Households engaged in industrial and crafting activities* (*Industrial Sector*) and Ecact3 is *Households engaged in Trade and Service Activities* (*Service Sector*). After index construction, a unique index for each of the 3 factors is calculated and usable for the next path analysis (See Appendix 1 and 2).

6. Independent Variables

Independent factors are all other factors that hypothetically could provide impact to the durable consumption (CDGS) both directly and indirectly. Therefore, we put as many dimensions here as possible. Based on the eight dimensions in which there are 294 variables, factor analysis identifies as many as 25 factors that can be used as independent variables in the path analysis (Said, 2000). The Independent variables cover 8 (eight) dimensions as follows ; Economic Institution (Ecinst) consists of 2 variables ; Financial and market access (Finmkt) consists of 4 variables ; Transportation and communication (Trcom) consists of 1 variable ; Education Access (Eduax) consists of 4 variables ; Medical access (Medax) consists of 2 variables ; Socio-Cultural access (Socult) consists of 2 variables ; Village government (Vilgovt) consists of 6 variables, and Topography and

demographic aspects (Topdem) consists of 4 variables (see Appendix 1). Based on the output of the factor analysis, the calculation of each factor index could be done using the similar methods of the ones used for intermediate variables ; therefore, the 25 independent factors are suitable for the following path analysis. Descriptive statistics of these variables is shown in Appendix 2.

7. Structural Causal Relationships and Structural Causal Model

Structural causal relationship is formulated by identifying the regressive relationship between Consumption of Durable Goods and Services (CDGS) as dependent variable and the intermediate as well as independent variables. Then, correlation coefficients (*Pearson Correlation*) among intermediate variables are calculated to identify the association across these variables. Finally, we calculate linear regression coefficient of every intermediate variable as a function of the independent variables. Both ***regression*** and ***correlation analysis*** use significant level of α=**0.05**. As a result, with only those significant coefficients are presented, it is shown in Table 4.

Table 4 shows that among 32 intermediate and independent variables, only 10 variables (2 intermediate variables and 8 independent variables) are significant at α=0.05. Similarly, for every intermediate variable, it has different significant independent variables. For instance, Residential, business, and public spaces (LU2) has 7 (seven) significant variables, but Business Area Proportion (LU3) consists of only three significant independent variables, they are Medax1, Socult2 and Topdem4. Agricultural Activities (Ecact1) and Service and Trade Activities (Ecact3) each of which consists of 6 (six) variables, Industrial Households (Ecact2) however, has only 5 (five) significant variables. It is important to notice that not all of these significant factors/variables are regarded as important ones.

In fact, there are so many variables with only very small association (coefficient of correlation r) or small contribution (regression coefficients β) to the dependent variable CDGS. Thus, only the variables with r or $\beta \geq 0.10$ are regarded as important ones that provide effect at least 10% to the dependent variable, and will be taken into account for further analysis.

Thus, the important parameters are those coefficient (β or r) values$\geq$0.10. For instance, in line with LU2, among seven significant variables, there are only five are important variables. Hence, there are six important variables as direct impact providers ; they are LU3, Medax1, Medax2, Vilgovt3, Topdem2 and Topdem3. Similarly, there are as

Table 4. Structural Relationship of the Intermediate and Independent Variables for the Consumption of Durable Goods and Services in Urban Sulawesi, Indonesia.

Intermediate and Independent Variables		Dep. Var.	Intermediate Variables						
		Urban CDGS	LU1	LU2	LU3	LU4	Ecact1	Ecact2	Ecact3
Intermediate Variables	**LU1**		1.000						
	LU2	0.099	—	1.000					
	LU3	**0.116**	—	**−0.114**	1.000				
	LU4		—	—	—	1.000			
	Ecact1		**0.412**	**0.197**	**−0.181**	—	1.000		
	Ecact2		—	—	—	—	**−0.137**	1.000	
	Ecact3		**−0.392**	**−0.197**	**0.226**	—	**−0.893**	—	1.000
Intermediate Variables	Ecinst1	−0.087			−0.090				
	Ecinst 2	−0.076							
	FinMkt1								
	FinMkt 2								
	FinMkt 3								
	FinMkt 4								
	Trcom1		0.080			**−0.102**			
	Eduax1	0.085							
	Eduax2								
	Eduax3								
	Eduax4		**0.264**					**−0.034**	
	Medax1	**−0.103**	**−0.165**		**−0.206**		**−0.254**		**0.155**
	Medax2	**0.268**	−0.100				**−0.168**		**0.167**
	Socult1								
	Socult2		−0.087	**0.155**	**−0.127**		**−0.196**		**0.220**
	VilGovt1		−0.086				−0.098	−0.035	−0.084
	VilGovt2		0.093	**−0.126**				0.039	
	VilGovt3	**0.148**		**0.123**					
	VilGovt4		**0.124**	0.092		**0.109**	**0.210**		**−0.197**
	VilGovt5								
	VilGovt6								
	TopDem1							0.034	
	TopDem2	**0.471**		**0.232**					
	TopDem3	**−0.101**		−0.087				0.087	
	TopDem4		**−0.152**	**−0.231**	**0.385**		**−0.399**		**0.379**
No of Sign. Vars.		10	9	7	3	2	6	5	6
R^2		0.664	0.211	0.154	0.237	0.024	0.383	0.013	0.333

Notes : −The Third column is significant (α=0.05) linear **regression coefficients** (β) of all intermediate and independent variables towards the Urban CDGS ;

− The shaded area of this table presents significant ($\alpha = 0.05$) **correlation coefficients** (*Pearson Correlation r*) among intermediate variables

−The non shaded area presents the significant (α=0.05) linear **regression coefficients** (β)

−Bold figures are those with β or r coefficients $\geq$ 0.10.

many as 4 important variables for LU1, 4 for LU2, 3 for LU3, 2 for LU4, 4 for Ecact1 and 5 important variables for Ecact3.

The Consumption of Durable Goods and Services (CDGS) receives as many as 10 significant influencing variables, however only 6 (six) variables are regarded as important ones ($\beta > 0.1$), that is which provide impact at least 10% to the independent variables. These important variables are as follows :

1. Business Area proportion (LU3), $\beta = 0.116$
2. Medical Service Accessibility (Medax1), $\beta = -0.103$
3. Medical Doctor Accessibility (Medax2), $\beta = 0.289$
4. Village Structure/Size (Vilgovt3), $\beta = 0.148$
5. Household Number (Topdem 2), $\beta = 0.471$
6. Woman Households (Topdem 3), $\beta = -0.101$

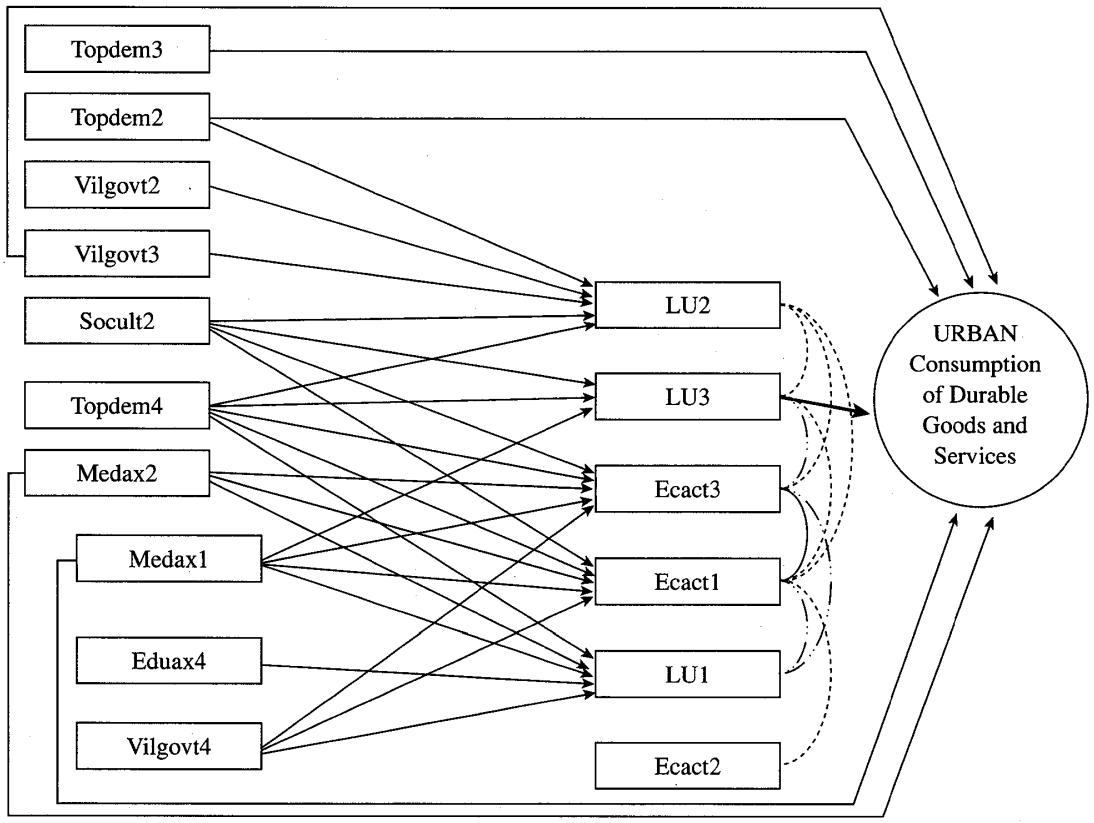
Calculation of coefficient of correlation (shown in the upper part of the Table 4 and Table 5) indicates that across the five significant intermediate variables, it is found the existences of significant correlations among them. In this case, however only those coefficients of correlations that are larger or equal to 0.10 ($r \geq 0.10$) are regarded as important and will be included in the following analysis. In Table 4 and Table 5, those figures are bolded. In addition, the strongest correlation exists between Ecact1 and Ecact3 with coefficient of correlation r equals to -0.893.

Among intermediate variables, there are several interconnection among them with coefficient association $r \geq 0.10$, such as between Ecact1 and LU1 with $r = 0.412$ and between Ecact1 and Ecact3 with $r = -893$, and so on. These interconnections are important in line with the pathways from the indirect impact provided by the independent variables. For instance, even though School access (Eduax4) has no direct association towards the CDGS, it does provide indirect impact through LU1 to Ecact3, then towards LU3, which has direct impact to the CDGS. Thus, the important function of the intermediate factor interconnections are in providing pathways for the indirect impacts. Indirect impacts through the intermediate variables will be explain in the following sections.

The Structural Causal Model

Structural causal model for Consumption of Durable Goods and Services (CDGS) is a diagrammatic presentation of the structural causal relationship such as explained in Table 4. Therefore, based on the performance of the intermediate and independent variables in terms of their impacts, then the structural causal model of the Consumption of Durable

Figure 2. Structural Causal Model for Consumption of Durable Goods and Services for the Urban Areas in Sulawesi Region, Indonesia.



Notes : —— : $r > 0.50$
–··– : $0.20 \leq r \leq 0.50$;
----- : $0.10 \leq r \leq 0.19$

Goods and Services in Sulawesi Region, Indonesia can be formulated as shown in Figure 2.

Figure 2 shows easily that the pathways of impacts from independent variables to the CDGS can be categorized into three types as follows:

1. Independent variable that only provide direct impacts toward CDGS, such as Topdem3.
2. Independent variables that only provide indirect impact through intermediate variables to the CDGS, such as Vilgovt2, Socult2, Topdem4, Eduax4 and Vilgovt4.
3. Independent variables that not only provide direct impacts but also at the same time providing indirect impacts as well, such as Topdem2, Vilgovt3, Medax2, Medax1

Similarly, this diagrammatic presentation also shows the interconnection among intermediate variables, such as between LU2 to LU3 to Ecact3 and to Ecact1. In addition, this figure provides easier observation to recognize important pathways by the type of lines, for instance dash, solid, or even tick lines. Therefore, the model is constructed to present the structural relationship in a more observable representation.

8. Path Coefficient; Direct and Indirect Effects

The next step is the calculation of impacts of intermediate and independent variables towards the dependent variable Consumption of Durable Goods and Services (CDGS). If intermediate variables could have direct impacts only, the independent variables could possess both direct and indirect impacts simultaneously. Direct impacts are the standardized regression coefficient (β) of the CDGS multiple regression as a function of intermediate and independent variables. However, the indirect impacts of the independent variables go through the intermediate variables.

Calculation of indirect impacts is executed using fundamental theorem of path analysis as mention before. The important point here is by following the pathways from independent variables to intermediate variable -through intermediate variable interconnections-then towards the CDGS. By following these pathways, ones can calculate the total correlation effects from pertinent independent variables. Calculation output is presented in Table 5.

Regarding the direct impacts towards CDGS, there are six important variables that are mentioned above. Among these six, there are four of them with positive signs, meaning they have positive effects in improving the CDGS. In other words, increasing these variables would increase the rate of CDGS as many as its pertinent parameter (β) coefficients. They are Business Area proportion (LU3) with $\beta=0.116$, Medical Doctor Accessibility (Medax2) with $\beta=0.289$, Village Structure/Size (Vilgovt3) with $\beta=0.148$, and Household Number (Topdem2) with $\beta=0.471$, and therefore have positive relationship with the urban consumption of durable goods and services. In terms of coefficient magnitude, Number of Household has the highest coefficient ($\beta=0.471$), therefore it provides the strongest relationship or impact to the consumption rate of durable goods. On the other hand Topdem3 (woman households) has negative coefficient, therefore it has negative association with the durable consumption.

In line with the important indirect impacts, the most important one is population density (Topdem4) with total indirect impact equals to 0.106, or more than 10% change in CDGS for every one percent change in population density. Actually there several independent variables deliver their indirect impacts such as Eduax4, Socult2 and Vilgovt4, but after calculating the indirect impacts, then we find that only Topdem4 possesses sufficiently high impact that is ≥ 0.10.

In terms of dominant determinants, independent variable total impacts—there are five

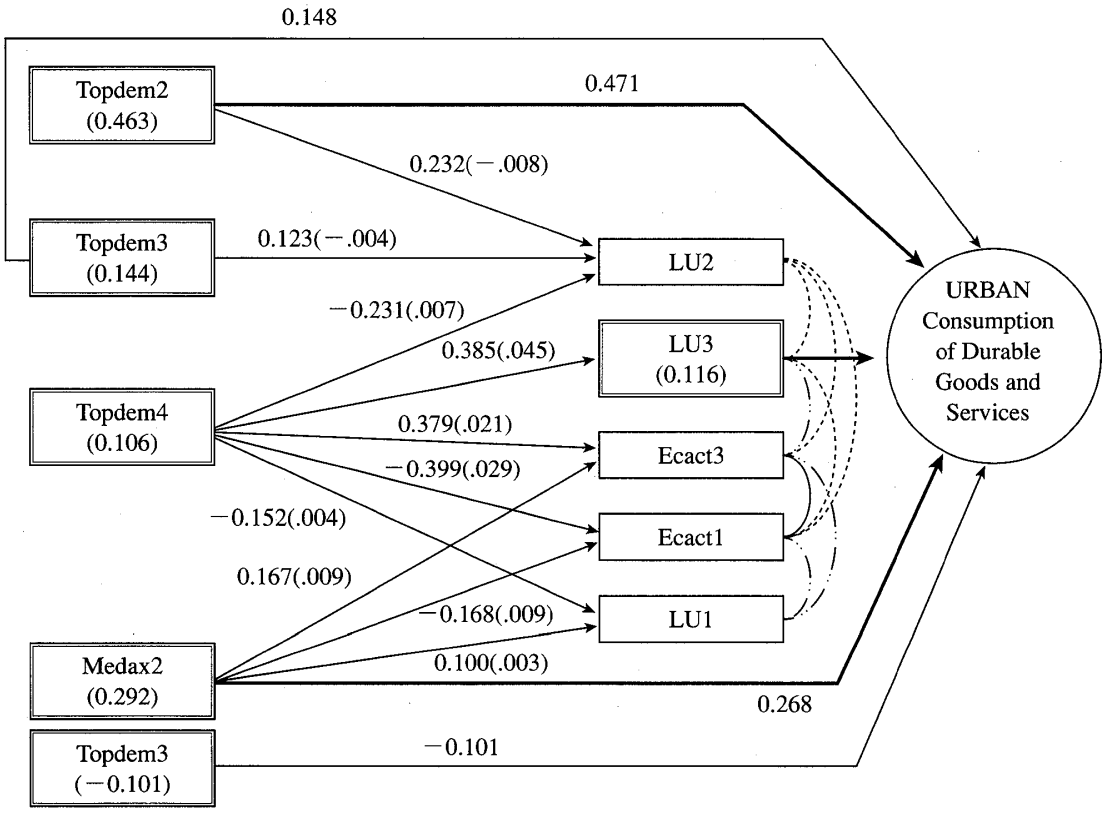
Table 5. Direct Impact of Intermediate Variables and Direct as well as Indirect Impacts of Independent Variables for the Consumption of Durable Goods and Services (CDGS) in Sulawesi Region, Indonesia.

Intermediate and Independent Variables		DIRECT	INDIRECT IMPACT								Total Impact
		Urban CDGS	LU1	LU2	LU3	LU4	Ecact1	Ecact2	Ecact3	Sub Total	
Intermediate Variables	LU1	—	1.000								
	LU2	0.099	—	1.000							
	LU3	**0.116**	—	**-0.114**	1.000						
	LU4	—	—	—	—	1.000					
	Ecact1	—	**0.412**	**0.197**	**-0.181**	—	1.000				
	Ecact2	—	—	—	—	—	-0.137	1.000			
	Ecact3	—	**-0.392**	**-0.197**	**0.226**	—	**-0.893**	—	1.000		
Intermediate Variables	Ecinst1	-0.087								0.000	-0.087
	Ecinst 2	-0.076									
	FinMkt1	—									
	FinMkt 2	—									
	FinMkt 3	—									
	FinMkt 4	—									
	Trcom1	—				0.000					
	Eduax1	0.085								0.000	0.085
	Eduax2	—									
	Eduax3	—									
	Eduax4	—	-0.007							-0.007	-0.007
	Medax1	**-0.103**	0.005		-0.024		0.018		0.008	0.008	-0.095
	Medax2	**0.268**	0.003				0.012		0.009	0.024	**0.292**
	Socult1	—									
	Socult2	—		-0.005	-0.015		0.014		0.012	0.007	0.007
	VilGovt1	—									
	VilGovt2	—		0.004						0.004	0.004
	VilGovt3	**0.148**		-0.004						-0.004	**0.144**
	VilGovt4	—	-0.003			0.000	-0.015		-0.011	-0.029	-0.029
	VilGovt5	—									
	VilGovt6	—									
	TopDem1	—									
	TopDem2	**0.471**		-0.008						-0.008	**0.463**
	TopDem3	**-0.101**								—	**-0.101**
	TopDem4	—	0.004	0.007	0.045		0.029		0.021	0.106	**0. 106**

Notes : — Path Coefficient Calculation for Independent Variables is based on Table 4 by using fundamental theorem of Path Analysis.

— The shaded area is the indirect impacts area from independent variables to the CDGS

Figure 3. Final (Simplified) Structural Causal Model for Consumption of Durable Goods and Services for the Urban Areas in Sulawesi Region, Indonesia.



Notes : —— : $r > 0.50$
–··– : $0.20 \leq r \leq 0.50$;
----- : $0.10 \leq r \leq 0.19$
– Figures in the brackets within the boxes represent the total effects
– Figures in the brackets (*not in the box*) represent the indirect effects

important factors in addition to the Business Area Proportion (LU3). The five are Medical Doctor Availability (Medax2) with total impacts=0.289, Village Size (Vilgovt3) with total impact = 0.144, Household Number (Topdem2) with total impact = 0.463, Woman Households (Topdem3) total impact and it is direct impact only = −0.101, and the population density (Topdem4) with total impacts, which is all indirect ones=0.106. Again four of them are with positive signs and only one (Topdem3) is with a negative sign.

Finally, after having the direct and indirect impacts of the independent variables towards the dependent variable of Urban CDGS, then the procedure of developing structural relationship of the urban the Consumption of Durable Goods and Services (CDGS) is concluded. As the result, based on the total impacts/effects we can identify some more important factors—compared to the others—as well as its pathways towards the urban consumption of durable goods and services as shown in Figure 3.

The Business Area Proportion (LU3) plays a central role in the structural model towards the consumption of durable goods and services. It provides direct effect by itself

as well as facilitates the pathways from other intermediate variables and more importantly for the independent variables especially the service and trade sectors (Ecact3) and population density (Topdem3). This output implies that for the urban area, the spaces or areas for business activities is very vital. It is not only providing better opportunities for business activities such as many kinds of services and trades (Ecact3) but also attracting more other activities including surrounding residential and public facilities (LU2). And then, population density will increase along side with the increasing of economic and public activities which are good for the regional economy (Klein, 2003) thus nothing less good for poverty reduction.

Health cares and services are very important for the urban communities. Medics' availability (Medax2) is important not only directly but also indirectly. This especially essential to support people activities in the busy urban life style including in many ways are unhealthy environment. The indirect effect especially goes through the service and trade activities (Ecact3), which is closely related to the business areas availability. Therefore, in the urban areas, among other health services importance, it is also important to promote income generating activities, and then the consumption rate in which in turn would substantial effect in reducing the urban poverty. Hence, any policies to improve health service accessibility by the urban community ought to be eventually providing positive effect in the poverty reduction efforts.

Population density (Topdem4) and number of households (Topdem2) in many cases happen to increase by the availability of attractive facilities and opportunities to acquire better ways of living. In this respect, these two factors could be the consequences of the improvement of the economic activities in any urban areas. Then, in the case of Sulawesi Region, there are still rooms for population increase since the population density is "only" around 1,133 people per km2 or about 217 households per square km. Even though the space is still available, provision of employment by improvement of business facilities and supporting systems should be the way to attract more employees entering the urban economy. With the average size of more than 5 persons per households (in average are about 5.23), increase number of households can still halt the population density if the household size can be smaller. Thus, population policy in the urban areas seems more flexible in terms of number and the employment productivity among urban residents. More over, in line with this population concerns, it is also open for the increase of village size (Vilgovt3) in the urban areas along side with the development of more and better business areas.

Households headed by a woman (*Woman Households*) seem to deserve specific

attention in the urban policy. In the urban areas of Sulawesi Region, there are more than 30,636 woman households, with the average of 58 households in every village or about 5.41% of the total households. Most of these households are in (or vulnerable fall into) poverty. Therefore the local government should be able to provide sufficient supports and facilities, at least a kind of social safety net, that have been occasionally implemented during the 1997/1998 economic crisis period.

Finally, after determining the important factors such as areas for business activities, health care delivery system, population and woman households that are related to the urban poverty, and having identifying of some policy implication highlights, now we should have been able to have better insights to the urban community poverty problems in Sulawesi Region.

9. Conclusion and Implication

Structural causal relationship of the Consumption of Durable Goods and Services (CDGS) for the urban areas in Sulawesi Region of Indonesia provides a way to reveal a better understanding of the welfare as well as the poverty problems in the region. Having said these, we should by now have better insights including the poverty reduction policies.

The model consists of several important intermediate and independent variables. The most important intermediate variable is Business Area Proportion in urban areas, not only because it provides direct impact on the consumption rate but also facilitates indirect impacts of the important independent variables. In other words business areas enlargement is a necessity along side with the enlargement of the urban areas. However, city government should take a number of necessary measures to anticipate this development such as preparing required infrastructures, utilities, administration supports as well as security to be able to attract more investments in making these business areas functioning well. More specifically, in addition to the more business areas provisions, we have identified at least 5 (five) different important variables, however they can be categorized into three primaries that are health service accessibility, population and woman households.

Health care service system improvement should be among the policy priorities. It is also important in reducing poverty especially by providing accessible and affordable health care delivery services for the grass root communities. With a good health care it would allow them to work and explore employment markets more freely in addition to reduce their health care expenditure in order to provide higher income proportion for their basic

necessities. As Chambers (1997) has pointed out that worse health condition could lead to what he calls a poverty trap. Thus, better health care provision should help significantly to escape from the poverty trap especially for the lowest income people.

As far as population as concern, the urban areas in Sulawesi Region are still able to provide spaces for more households and therefore population. Similarly the village size is still improvable. The problem however is in line with job provision and also housing development. The bottom line, as we pointed out above, is the availability of better business environments especially in supporting trade and service sector activities. Thus, again the urban policies should prioritize business area development such as spreading out the business centers in line with the city spatial plan in addition to the provision of better facilities and supporting systems for business sector.

The last but not least is the importance to cope with the households headed by women. The fact that there are more than 5% households in this urban areas are headed by women and directly related to the poverty situation should draw serious attention and commitment by the government especially the city government in finding ways out from the poverty. For instance, government can facilitate to help their children to have access for basic and secondary education, health care support, and if possible to assist them in finding jobs. During the economic crisis time, government support them in line with the social safety net program. However more importantly after the crisis, they are still need public assistance in order to sustain their basic need fulfillment.

Finally, we would like to conclude with strong recommendation of the necessity of coping with poverty problems including in urban areas from multi dimensional—not only within economic provision—approaches since the poverty problems itself is multi-dimensional ones.

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Appendix 1. Factors, Variables and Their Descriptive Names for Sulawesi Urban Areas

No.	Factors	Variables	Variable Description/Name
1	LU Factor 1	LU1	Rice field Area
2	LU Factor 2	LU2	Residential, business, and public spaces
3	LU Factor 3	LU3	Business Area Proportion
4	LU Factor 4	LU4	Unused agriculture land
5	Ecact Factor 1	Ecact1	Households in Agricultural Sector
6	Ecact Factor 2	Ecact2	Households in Industry/craft Sector
7	Ecact Factor 3	Ecact3	Households in Service & Trade Activities
8	Ecinst Factor 1	Ecinst1	Group Enterprises
9	Ecinst Factor 2	Ecinst2	Industry
10	Finmkt Factor 1	Finmkt1	Shop/store Accessibility
11	Finmkt Factor 2	Finmkt2	Shop Availability
12	Finmkt Factor 3	Finmkt3	Agriculture Input Shop
13	Finmkt Factor 4	Finmkt4	Market for Agro-products
14	Trcom Factor 1	Trcom1	Road Transportation Infrastructure
15	Eduax Factor 1	Eduax1	High Education
16	Eduax Factor 2	Eduax2	Vocational School
17	Eduax Factor 3	Eduax3	Private High School
18	Eduax Factor 4	Eduax4	School Access
19	Medax Factor 1	Medax1	Medical Service Accessibility
20	Medax Factor 2	Medax2	Medics Availability
21	Socult Factor 1	Socult1	Entertainment and Recreation access
22	Socult Factor 2	Socult2	Cultural Facility
23	Vilgovt Factor 1	Vilgovt1	Village Formal Status
24	Vilgovt Factor 2	Vilgovt2	Community Participation
25	Vilgovt Factor 3	Vilgovt3	Village Structure/Size
26	Vilgovt Factor 4	Vilgovt4	Village development expenditure per capita
27	Vilgovt Factor 5	Vilgovt5	Local Government assistance
28	Vilgovt Factor 6	Vilgovt6	Village budget balance
29	Topdem Factor 1	Topdem1	Geography and Topography
30	Topdem Factor 2	Topdem2	Number of Households
31	Topdem Factor 3	Topdem3	Woman Households
32	Topdem Factor 4	Topdem4	Population Density

Notes : These Variables are factors extracted by employing factor analysis, then serve as variables in the path analysis, such as Variable LU1 for LU Factor 1.

Appendix 2. Descriptive Statistics of the CDGS, Intermediate and Independent Variables for Poverty Analysis in Sulawesi Urban Areas.

No.	Variable	Range	Minimum	Maximum	Mean	Std. Deviation	Variance
DV*	CDGS	5.77	−0.47	5.30	1.3963	1.11170	1.236
1	LU1	0.11	−0.05	0.06	−0.0452	0.01515	0.000
2	LU2	1.13	−0.10	1.02	−0.0306	0.10683	0.011
3	LU3	9.28	−0.29	9.00	0.5337	1.62533	2.642
4	LU4	0.04	−0.04	0.01	−0.0370	0.00304	0.000
5	Ecact1	4.08	−3.06	1.02	−1.6698	1.51872	2.306
6	Ecact2	5.72	−0.50	5.22	0.0477	0.83625	0.699
7	Ecact3	4.84	−0.70	4.14	1.4077	1.38032	1.905
8	Ecinst1	7.45	−0.30	7.15	0.1158	1.13688	1.292
9	Ecinst2	3.93	−0.13	3.81	−0.0809	0.26395	0.070
10	Finmkt1	2.38	−0.74	1.63	0.9953	0.61606	0.380
11	Finmkt2	14.42	−0.28	14.13	−0.1954	0.88591	0.785
12	Finmkt3	7.16	−0.18	6.97	−0.0147	0.58774	0.345
13	Finmkt4	19.54	−0.17	19.38	0.0731	1.14826	1.319
14	Trcom1	2.93	−2.37	0.57	0.5021	0.28856	0.083
15	Eduax1	7.49	−0.07	7.43	0.2884	0.93847	0.881
16	Eduax2	6.81	−0.15	6.66	0.6698	2.08352	4.341
17	Eduax3	12.45	−0.30	12.15	1.1786	2.10614	4.436
18	Eduax4	1.99	−0.61	1.38	−0.5827	0.09932	0.010
19	Medax1	7.44	−0.61	6.83	0.0035	1.12748	1.271
20	Medax2	14.03	−0.21	13.82	1.6597	2.50918	6.296
21	Socult1	9.42	−0.37	9.04	−0.2658	0.70944	0.503
22	Socult2	2.93	−0.40	2.54	−0.1366	0.80948	0.655
23	Vilgovt1	2.56	−0.43	2.12	1.8730	0.75088	0.564
24	Vilgovt2	12.30	−0.80	11.50	0.2484	1.35655	1.840
25	Vilgovt3	8.60	−1.21	7.38	0.8881	1.30273	1.697
26	Vilgovt4	3.33	−0.69	2.63	−0.4112	0.35920	0.129
27	Vilgovt5	15.17	−0.18	14.99	0.1298	1.16392	1.355
28	Vilgovt6	11.66	−4.01	7.65	−0.0022	0.56942	0.324
29	Topdem1	2.84	−0.89	1.95	−0.3550	0.49905	0.249
30	Topdem2	9.34	−0.82	8.52	1.3494	1.47644	2.180
31	Topdem3	9.02	−1.19	7.83	−0.1495	0.91540	0.838
32	Topdem4	18.11	−0.21	17.91	1.7936	2.97778	8.867

Valid N (listwise) : 531

* Dependent Variable.