

Structural Causal Model on Consumption Rate of Durable Goods and Services in Sulawesi Region, Indonesia : A Path Analysis based on Statistics “Potensi Desa”

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Abstract

A consumption rate of durable goods is widely used to characterize poverty situation of the community. This paper attempts to focus on structural causal relationship for the Consumption Rate of Durable Goods and Services in Sulawesi Region of Indonesia, based on the secondary data statistics “Potensi Desa”. This relationship model consists of important intermediate and independent variables. The most important intermediate variable is Households in Trade and Service Activities (*Ecact 2*), not only because it provides direct impact on the consumption rate but also facilitates indirect impacts of the important independent variables. There are three important independent variables in this structure, which are Medical Availability, Village Size as well as Population and Household Size : coincidentally all these three variables deliver their impacts to the consumption rate through the *Ecact 2*. In addition to these important variables, there are four other intermediate factors have correlation with *Ecact 2* and involve in the structure as well : they are Vegetable Farm, Non-Agricultural Areas, Service Household Proportion and Households in Agricultural Sector. Therefore, the structural relationship tend to be more complex “in the middle” rather than in the outset of the independent variables. Finally, the Consumption Rate of Durable Goods and Services, is structurally determined by four predominant factors, that are Households in Trade and Service Activities, Medical Availability, Village Size as well as Population and Household Size, and Households in Trade and Service Activities occupies a unique and central position in this model because it contributes directly to the dependent variable as well as functions as a prime intermediate factor. This model signifies the important of these factors in dealing with the poverty situation of the region.

1. Introduction

A consumption of durable goods has been widely employed as an indicator of the poverty condition of the community. In this connection, consumer behavior as well as its

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pattern has been a subject of studies for many scholars. However most of the studies are limited for certain community due to the persistent difficulties in gathering household data. In the regional bases, it is very difficult to conduct similar household survey. On the other hand, regional type researches are needed to support policy formulation since the poverty condition is also regional problem. In addition to that, needs to present consumption behavior and/or pattern across region is becoming increasingly important to provide a more comprehensive picture of the regional economy and development. 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), and it is an interesting subject as well for psychologists (Miller, 2002)

Characterization of durable good consumption presents useful picture of the community welfare and therefore poverty condition. For instance, Davis (2001) states that those who earn the least income purchase fewer consumer durables and almost never engage in expensive new leisure pursuits. In the similar path, Hentschel and Lanjouw (1996) demonstrate that using different consumption definition would result in significant bearing on measured poverty as well as community welfare.

Eastwood (1985) states that consumption expenditures can be divided into three main categories such as non-durable goods (daily consumption), durable goods and service expenditures. Durable goods are goods that provide service flows over extended period 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. In connection to the poverty study, Kawamura (2002) finds that consumption of durable consumer goods is the first important factor to describe the level of living at 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 the standard of living at the household level in Sulawesi Region, Indonesia (Said, 2000). Therefore for this region consumption pattern of durable goods and services could be studied simultaneously.

In connection to the data availability, which is difficult to conduct household survey across region, there are in fact extensive data sets collected by various agencies and institution, sometimes even regularly such as through census, economic survey, survey inter census, etc. In Indonesian case, Central Statistic Agency (BPS) takes responsibility to conduct this census and survey regularly. As a result, extensive secondary data sets can be acquired for research purposes.

Based on the above viewpoints and the need to contribute to the policy formulation

for better living condition and prosperity of the region as well as for poverty alleviation programs, this study is conducted.

Objective of Study

In general, the aim of this study is to construct a structural causal relationship of the Consumption Rate of Durable Goods and Services in Sulawesi Region of Indonesia. The more specific objectives of the study could be outlined as follows :

1. Finding intermediate variables as well as independent variables providing influence directly and or indirectly to the Consumption Rate of Durable Goods and Services.
2. Constructing structural causal relationship among dependent, independent as well as intermediate variables.
3. Constructing structural causal model or network of the intermediate and independent variables determining the Consumption Rate of Durable Goods and Services in Sulawesi Region, Indonesia.

2. Review of Previous Study

Consumption of durable goods and services in connection to the community poverty has been interestingly studied by many scholars from different fields. Slesnick (2001) states that possession and increased durable consumption by the population is some thing to do with the increased of the community welfare. 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).

Pyatt (1964) states that there are two elements determine the set of consumption or ownership of durable goods by households, namely preferences as express in a priority pattern, and rates or velocities of accumulation at past moments. The two elements converge into a single index called the stimulus that has normal distribution over households and depend upon the household income, wealth and age. Therefore, 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 suggests that consumer behavior as people behave rationally should be left to their own devices, except when collective behavior undermines individual interest. Thus, he implies 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 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 hands however, Eastwood (1985) and Slesnick (2001) suggest that possession and increased durable consumption by the population are some thing to do with 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 household but also in line with the social, economic and physical environments of the community. Therefore, not only economic factors and values 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 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.

3. Research Methodology

Research Approach

This research is basically 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 obtain from relevant institutions. In this case, the data set was acquired from Indonesian Central Statistic Agency (BPS) namely Potensi Desa Statistic of 1996. This statistic is one of the results of the National Economic Survey 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, it seems that many analysis supposedly could be derived from this data set. However, unfortunately this data set almost never been used in a comprehensive ways, only partially and sporadically both by government agencies and researchers.

The approach employed in this study is analyzing the acquired data using some statistical tools to develop a causal relationship model. The main statistical methods used are Factor Analysis and Path Analysis (Knoke and Bohrnstedt, 1996). Execution of the statistical analyses uses the SPSS for Windows V.11.0.1. 2001.

Research Period and Location

This research has been conducted from April 1999 until 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 in Sulawesi Region, over all Sulawesi or Celebes Island, one of the five Indonesian main Islands beside Sumatra, Java, Kalimantan (Borneo) and Irian (Papua) islands. This island situated in the center of the country.

Data Collection and Data Set

Data set used in this regards is obtained from the database namely Statistics “Potensi Desa”, 1996. The database is acquired from Central Statistic Agency (BPS) of Indonesia. The agency conducts surveys and census in a regular basis through out the country. In the case of Statistics Potensi Desa, the agency uses “Desa” or village as an observation unit. In Indonesia, desa is the smallest administration unit of the governmental system.

The data set consists of massive information ranging from general information of administration to geographic and demographic situation, including environment and housing condition, social, cultural and economic activities and facilities, education, entertainment, health, transportations, and communication facilities. Over all information was 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. Recreations and Entertainment
7. Health
8. Transportation and Communication
9. Areas and Its Utilization
10. Economy
11. Finance of Desa/Village
12. Data of Village Head

The data/information is arranged into 413 items for each desa. So, the data matrix size depended upon the number of desas in the region that is being observed (number of cases or rows) times 413 (matrix column). For instance, for South Sulawesi province consists of 2,883 desas, the data matrix is 2,883 by 413. Therefore, for Sulawesi Region that consisted of four provinces—north, central, south and southeast—the data matrix size is 6,649 by 413.

Based on information/data in the original data set, there is some information that seems irrelevant, missing and doubtful or awkward. Therefore, some procedure would have to be taken such as data cleaning, verification and recoding. The final data set consists of 361 original variables plus 86 variables, various combination of the original variables such as population density, sex ratio, desa prosperity level, desa dependency ratios on various resources, educational and health service availabilities, etc, and so called

composed variables. Thus, total variables that would have to serve in the analysis are 445 variables against 4,649 cases/desas in Sulawesi Region. The overall and detail procedure of this data set construction can be seen in the research report ; Factor Analysis of Poverty Structure and Characteristics in Sulawesi, Indonesia ; A Social Statistic Analysis, JICA-Research Institute for Social Sciences, Ryukoku University (Said, 2000).

Data Analysis

The data analysis uses Factor Analysis, Index Calculation and Path Analysis, statistical procedures of these analyses are executed by using SPSS Version 11.0.1. 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 data reduction, by identifying a small number of factors, which explains most of the variance observed in a much larger number of manifest variables. In this case, Factor Analysis is selected in order to achieve both purposes above.

In the Factor Analysis, the 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 0.50 are excluded, so at least 50 % 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 greater than 1.5, so the variances of the extracted components/factors are greater than 1.5.
3. The loadings are rotated using Varimax Method to make the loadings more interpretable. Rotating methods make the loadings large or small, not in-between for each factor.

Factor Analysis is used to explore and identify several factors representing the 42 variables of Level of Living at Households (LHH). The first factor was Consumption Rate of Durable Goods and Services (CONSDGS), which will be the dependent variable of this analysis. Therefore the value—index—of CONSDGS needs to be calculated based on the values of all represented variables in the index construction/calculation procedure. After

index of the CONSDGS is calculated, as well as other intermediate and independent variables, then the Path Analysis could be executed.

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, 1996). Among the advantages of using this path analysis is the ability to identify both direct and indirect effects by 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 . For more detail and technical explanation can be seen in Knoke and Bohrnstedt (1996, pp. 413-435) Thus, the path analysis could provide information which variables have highest effect or impact directly and indirectly toward the dependent variable, in this case is the Consumption Rate of Durable Goods and Services (CONSDGS).

4. Consumption Rate of Durable Goods and Services and CONSDGS Index

Consumption Rate of Durable Goods and Services is an index representing 8 (eight) variables as a result of the Factor Analysis (FA). FA extracts 5 factors out of the 34 LHH Variables as shown in Appendix 1. 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. Factor 1 itself contributes the most with 19% of the variances. The component matrix provides the *coefficient of correlation between components/factors and variables*. The represented variables are the variable(s) that has coefficient of correlation (r) greater than 0.70, meaning it explains at least 50% of the variable variability (r^2). The complete procedure and result of this calculation can be seen the research report by Adri Said (2000).

Consumption Rate Of Durable Goods And Services (CONSDGS) or LHH Factor 1 represented 8 (eight) different variables as follows :

1. Var00041 (Number of HH with high education enrollment),
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 CONSDGS represents a kind of consumption rate of goods and services that only viable for middle-upper income class of the community and so called durable goods and services.

The Factor Analysis resulted in factor structure and contents which is explained above, provides variables needed to construct an index for each factor. Indices are employed to capture the notion of the factors consisted of several variables. Variables employed here are the variables that have high association (factor coefficient > 0.70) on specific factor loadings as shown in Appendix 1.

Index construction in this case uses the linear summation method of the standardized involved variables for each factor. Therefore, there are two steps in this procedure as follows :

1. Values of the extracted variables are standardized. Since the values of variables involved in the factor are different in range as well as in unit, then it was necessary to be standardized using z-standardization method.
2. Factor indices are calculated. The standardized variables are used to form the indices by calculating the mean of the variable values included into the factors.

Factor indices are calculated, first by standardizing the included variables on a specific factor. Then, by calculating the mean of the standardized variable values, the factor index is found (see Appendix 2). In the case of CONSDGS or *Consumption of Durable Goods and Services*, represents 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 CONSDGS is equal to the average of standardized values of the all eight variables above as for the CONSDGS is shown in Table 1.

Thus, the values of this Index Composition would be used in the analysis as a dependent variable of CONSDGS.

Table 1. Representative Index of CONSDGS

Factor	Factor Name		Factor Index Composition
	Long form	Short form	
LHH Factor 1	Consumption Rate of Durable Goods and Services	CONSDGS	$(zVar00041 + zVar00068 + zVar00069 + zVar00229 + zVar00235 + zVar00237 + zVar00363 + zVar00367) / 8$

Notes : z-sign indicates the standardized value of the variable.

5. Intermediate Variables : Land Utilization and Economic Activities

Factor Analysis of Intermediate Variables included Land Utilization Variables and Economic Activity Variables similar to the one used for the dependent variable (CONCDGS). Factor Analysis is used to explore 29 Land Utilization Variables and 22 Economic Activity Variables.

5.1. Land Utilization

The 29 variables of Land Utilization (LU) are extracted into several factors using Principal Component Analysis. By checking the communality aspect, all variables having coefficient of association less than 0.50 would be excluded, which means more than 50% of the variance of that variables that cannot be explained by the common factors. These variables are VAR00247 (Total area of rice field temporarily is not utilized for farming) VAR00253 (Other agricultural land), and VAR00254 (Total area of non rice field is not utilized for Agriculture). Therefore, until this stage we have 26 remaining variables. Then, next run confirmed that all variables have coefficient of association greater than 0.50.

Based on 26 variables satisfying communality aspect, Factor Analysis extracted 6 factors. Regarding the 6 factors, so called LU Factor 1 to LU Factor 6, the analysis observed several aspects such as Total Variance Explained, Rotated Component Matrix as well as Component Transformation Matrix. Factor 1 or LU 1 contributed the most with 23%, followed by Factor 2 of 14%. The following factors contributed about 8% respectively. Thus, more than 50% of the variance could be explained by just the four first factors.

By confronting the 6 factors and the 26 variables, then we could form the component matrix with matrix elements were the coefficient of correlation between components/factors and variables. In order to make it easier in doing interpretation, then it is rotated

orthogonal in the Rotated Component Matrix using Varimax with Keiser Normalization. Based on this matrix, it is found that the factors represent different variables as the summary is shown in Appendix 2. The represented variables are the variable(s) that has coefficient of correlation (r) greater than 0.70, meaning it explains at least 50% of the variable variability (r^2).

Each factor, to the some extends, represents a certain meaning that associate with the variables being represented in addition to the observation of their coefficient of correlation. Since the factors represented various number of variables—ranged from one variable to several variables—sometimes it is difficult to provide a clear-cut meaning of each factor. For instance, LU Factor 1 represents seven different variables, VAR00240 (Size or total area of village—Desa/kelurahan), VAR00248 (Total area of non rice field), VAR00249 (Total area of non rice field utilized for Agriculture), VAR00251 (Plantation/Estate), VAR00252 (Forest owned by community), VAR00255 (Area for housing and settlement), VAR00256 (Area for others buildings e.g. industry, offices, shopping center). Then, the LU Factor 1 represents kind of areas of land utilization for non-agricultural purposes, however in this case it is needed to differentiate the notion of agriculture and plantation, which are not always the case. Moreover, Factor 1 also including total area of the village. So that, what is a proper name for this factor was rather complicated, however by adopting the distinction between farm and plantation areas, one can name this factor as *Non-Farm Area*.

In case of Factor 2, it represents four variables, VAR00241 (Total area of rice field), VAR00242 (Total area of rice field utilized for Agriculture), VAR00243 (Technical irrigation) and Var00250 (Rainfed areas for vegetable and secondary crops). This is almost as complicated as Factor 1, it represents two things, first is areas of rice fields since the technical irrigation area always referred to rice-field. The second is areas of rainfed land used for vegetables and secondary crops, so we name it *Seasonal Crop Area*, in which seasonal crops include rice and secondary crops as well as vegetables.

All other factors, Factor 3 to Factor 6, represent two variables only respectively and in every case, representing similar issue. Therefore it is easier in naming them. For example, LU Factor 3 represented VAR00244 (Non-technical irrigation) VAR00246 (Tidal water, polder, swamp planted by rice); therefore it represented *the non-irrigated rice fields*. Another example, Factor 4 representing land proportion—to total village area (VEGEDEPT) and to non-rice area (VEGEDEPN)—used for vegetable farming, so called, *Vegetable Farm*. Following the same logic described above, then the unique name for each of the 6 factors is assigned as shown in Appendix 2.

Regarding how well each of which variables is being represented into a factor or several factors ; component matrix provided this observation by carefully reviewing the horizontal dimension of the rotated component matrix. First, we are expecting to find the coefficient of association that greater than 0.70—having very strong association—, but if it is not available we should go for smaller coefficient. Var00240 is well associated to be represented by Factor 1 with the coefficient of 0.827, Var00042 however, is represented by Factor 2, the coefficient is 0.711, Var00242 and Var00243 go for the same Factor 2, each of which by coefficients of 0.752 and 0.943. Thus, all of these variables have strong association with the representing factors.

In the case of Var00245, it associates with Factor 3 and Factor 1 with coefficient smaller than 0.70, which were 0.670 and 0.415 respectively. The existence of small coefficient of association or moderate to low association ($0.7 > \text{factor coefficient} > 0.3$) automatically would result in non-single representing factors. Since the variable indicates association with more than one factor, so it presents some kind of inter factor association. For example, Var00245 (rainfed rice field area) go for Factor 1 and Factor 3. Factor 1 is defined as *Non-Farm Area*, while Factor 3 is called *Non-Irrigated Rice-field*. It seems that Factor 3 represents Var00245 well, but actually when the name is assigned without even considering Var00245, meanwhile Factor 1 is entirely in different direction of representing non-farm areas.

The following sections, representative indices will be constructed for each of the 6 factors out of 34 variables of Land Utilization (LU),

Factor Index for Land Utilization

The factor analysis of LU variables results in six extracted factors. Each factors includes several variables, which every variable consists of different values both in terms of value units or ranges. Therefore, it is needed to assign single value for each factor. As mentioned above, the representative values of the factors in this case are factor indices. Factor indices were calculated, first by standardizing the included variables on a specific factor. Then, by calculating the mean of the standardized variable values, the factor index is found. For example, Factor 1 is NOFARM (Non-Farm Area) represents seven different variables, VAR00240 (Size or total area of village—Desa/kelurahan), VAR00248 (Total area of non rice field), VAR00249 (Total area of non rice field utilized for Agriculture), VAR00251 (Plantation / Estate), VAR00252 (Forest owned by community), VAR00255 (Area for housing and settlement), VAR00256 (Area for others buildings e.g. industry, offices, shopping center). Therefore, index of NOFARM is equal to the average of

standardized values of the seven represented variables.

In case of Factor 2 (SEASCR) or *Seasonal Crop Area*, it represents four variables, VAR00241 (Total area of rice field), VAR00242 (Total area of rice field utilized for Agriculture), VAR00243 (Technical irrigation) and Var00250 (Rainfed areas for vegetable and secondary crops). Therefore, index of SEASCR is equal to the average of standardized values of the four variables.

All other factors, Factor 3 to Factor 6, represent two variables only respectively. So, the index is the average of the standardized values of those two represented variables. Using this procedure, then the unique index for each of the 6 factors is assigned as shown in Table 2.

Table 2. Representative Index of LU Factors

Factors	Factor Name		Factor Index Composition
	Long form	Short form	
LU Factor 1	Non-Farm Area	NOFARM	$(zVar00240 + zVar00248 + zVar00249 + zVar00251 + zVar00252 + zVar00255 + zVar00256) / 7$
LU Factor 2	Seasonal Crop Areas	SEASCRP	$(zVar00241 + zVar00242 + zVar00243 + zVar00250) / 4$
LU Factor 3	Non-irrigated Rice-fields	NOIRRICE	$(zVar00244 + zVar00246) / 2$
LU Factor 4	Vegetable Farm	VEGFRM	$(zVEGEDEPT + zVEGEDEPN) / 2$
LU Factor 5	Non-Agricultural Land	PCNOAGR	$(zNAGRDEPT + zNAGRDEPN) / 2$
LU Factor 6	Community Forest	COMYFRST	$(zCOMFRSTT + zCOMFRSTN) / 2$

Notes: z-sign indicates the standardized value of the variable.

Based on the calculation above, the 6 factors consist of entirely new set of data which all values are the standardized ones.

5.2. Economic Activities

The 27 variables of Economic Activities (EACT) are extracted into 3 factors by using Principal Component Analysis. Factor Analysis extracts 3 factors out from the 27 EACT Variables. Regarding the 3 factors, so called EACT Factor 1 to EACT Factor 3, factor 1 contributes the most with 22%, followed by Factor 2 of 8%, and Factor 3 as well as Factor 4 each of which is 7% in explaining the variance of the over all 27 economic activities variables.

By confronting the 3 factors and the 24 variables, it forms the component matrix. In

order to make it easier in doing interpretation, then it is rotated into the Rotated Component Matrix using Varimax with Kaiser Normalization Method. Based on this matrix, it is found that the factors represented different variables as shown in Appendix 2.B. The represented variables are the variable(s) has coefficient of correlation (r) greater than 0.70 which means the factor explained variable variability (r^2) at least 50%, unless it is none of greater than 0.70, then we go for the highest coefficients existed.

Each factor, to the some extends, represents a certain meaning that associate with the variables being represented in addition to the observation of their coefficient of correlation. Since the factors represent various number of variables—ranged from one variable to several variables—sometimes it is difficult to provide a clear-cut meaning of each factor. For instance, ECACT Factor 1 represents three different variables, HHAGR (Proportion of HH engage primarily in Agriculture), HHSERVIC (Proportion of HH engage primarily in Service), and HHAGWRK (Proportion of HH engage primarily in Agricultural sector). Then, the ECACT Factor 1 represents a proportion of the HH engaged primarily in agriculture and services, However both agricultural variables consist of *negative—signs—coefficient*, so how should be named is rather dubious, in the following analysis we name it as *Proportion of Service-engaged Households* (SERVHH). Other ECACT factors represents single idea such as ECACT Factor 2 is about HH engaged in trade activities and Factor 3 is in agriculture, then unique names for each of the 3 factors are assigned as shown in Appendix 2.B and Table 4.

The component matrix provides other observation regarding how well each of which variables is represented into a factor or several factors. This observation could be done by carefully reviewing the horizontal dimension of the rotated component matrix. First, we expects to find the coefficient of association that greater than 0.70—having very strong association—, but if it is not available we should go for smaller—the highest available coefficients—figures but it is not less than 0.30.

There are three variables having small coefficient of association or moderate to low association ($0.7 > \text{factor coefficient} > 0.3$) between variables and factors. In the case of ECACT variables, Var00034 (Source of Livelihood Most People in the Village) is represented by Factor 1 and Factor 2, each of which is 0.447 and 0.608 respectively that is smaller coefficients than 0.70. By going down for each variable, we could observe that there are only three variables represented by several factors with small coefficient of correlation. In general, structure of the ECACT factors is relatively simpler than the LU factors.

In the following sections, representative indices will be constructed for each of the 15

factors out of 22 variables of Economic Activity (EACT). The factors include several variables, which every variable consists of different values both in terms of value units or ranges. Therefore, it is needed to assign single value for each factor, in this case a factor index. For example, EACT Factor 1 (SERVHH) or *Proportion of the HH in Service Activity*) represents three different variables, HHAGR (Proportion of HH engage primarily in Agriculture), HHSERVIC (Proportion of HH engage primarily in Service), and HHAGWRK (Proportion of HH engage primarily in Agricultural sector), however two agricultural variable are with negative correlation. So that, index of SERVHH is the average of standardized values of the all three variables, noted that the two agricultural variables with negative signs. Using the same logic, we assign the unique index for each of the 3 factors as shown in Table 3.

Table 3. Representative Index of EACT Factors

Factors	Factor Name		Factor Index Composition
	Long form	Short form	
EACT Factor 1	Service-engaged Households	SERVHH	$(zHHAGR + zHHSERVIC + zHHAGWRK) / 3$
EACT Factor 2	Households in Trade and Service Activities	HHNTRSV	$(zVAR00357 + zVar00360) / 2$
EACT Factor 3	Households in Agricultural Sector	HHNAGS	$(zVar00352 + zVar00362) / 2$

Notes : z-sign indicates the standardized value of the variable.

Based on the calculation presented in Table 3, the three economic activity factors consist of entirely new set of data, which all values are the standardized ones, and they are available now for subsequent analysis, in this case the path analysis.

6. Independent Variables

Factor Analysis identifies as many as 29 factors that can be used as independent variables in this analysis, as shown in Appendix 3. Independent variables cover 8 (eight) dimensions, which are :

1. Economic Institution (Ecost) consists of 4 variables.
2. Education Access (Eduax) consists of 4 variables
3. Financial and market access (FinMkt) consists of 5 variables
4. Medical access (Medax) consists of 3 variables
5. Socio-Cultural access (Socult) consists of 3 variables
6. Transportation and communication (Trcom) consists of 1 variable

7. Village government (Vilgov) consists of 7 variables, and

8. Topography and demographic aspects (TopDem) consists of 2 variables.

Based on the output of the Factor Analysis, then the calculation of each factor index could be done using the similar methods of the ones used for intermediate as well as dependent variables. Therefore the 29 independent variables or factors consist of entirely new set of data, which all values are the standardized ones, and they are available for structural causal relationship analysis, in this case the path analysis.

7. Structural Causal Relationship

Structural causal relationship is formulated by identifying the regressive relationship between Consumption Rate of Durable Goods and Services (CONSDGS) as dependent variable and the intermediate as well as independent variables. Then, correlation coefficients among intermediate variables are calculated to identify the association across these variables. Both regression and correlation analysis using significant level of $\alpha=0.05$. As a result it is shown in Table 4.

Table 4 shows that among 38 intermediate and independent variables, only 20 variables (4 intermediate variables and 16 independent variables) are significant at $\alpha=0.05$. Similarly, for every intermediate variable, it has different significant independent variables. Vegetable farm area (LU 4) for instance, consists of as many as 17 significant independent variables, Ecact 2 has 20 significant variables, but for LU 6 only 11 variables. However, it is important to notice that not all of these significant factors/variables could be considered important since there are so many variables with very small coefficients.

The next step is calculation of impact of intermediate and independent variables on the dependent variable Consumption Rate of Durable Goods and Services (CONSDGS). 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 CONSDGS multiple regression as a function of intermediate and independent variables. However the indirect impacts of the independent variables go through the intermediate variables. The results of the direct and indirect impact calculation of the variables are presented in Table 5.

The Consumption Rate of Durable Goods and Services (CONSDGS) receives as many as 20 significant variables, however only 4 (four) variables are regarded as important ones ($\beta > 0.1$), that is which provide impact at least 10% to the independent variables. These four important variables are as follows :

Table 4. Structural Causal Relationship of the Intermediate Variables and Independent Variables for the Durable-Good and Service Consumption (CONSDGS)

No.	Intermed. and Independ. Variables	Dep. Var.	INTERMEDIATE VARIABLE								
		CONS DGS	LU 1	LU 2	LU 3	LU 4	LU 5	LU 6	ECACT 1	ECACT 2	ECACT 3
1	LU1	—	1.000								
2	LU2	—	0.633	1.000							
3	LU3	—	0.542	0.698	1.000						
4	LU4	0.014	—	—	—	1.000					
5	LU5	0.066	−0.038	—	—	0.104	1.000				
6	LU6	—	—	—	—	0.042	0.025	1.000			
7	Ecact1	0.011	−0.031	—	—	−0.122	0.307	−0.105	1.000		
8	Ecact2	0.577	−0.026	—	—	−0.048	0.254	—	−0.491	1.000	
9	Ecact3	0.077	0.053	—	—	0.124	0.045	0.105	−0.120	−0.064	1.000
10	Ecinst1	0.074				−0.047		−0.033	0.151	0.142	−0.120
11	Ecinst2	—					0.029	0.043			0.027
12	Ecinst3	—							−0.027	0.034	0.052
13	Ecinst4	—	0.056			−0.045	−0.049		−0.026		
14	Eduax1	0.013							−0.082	0.015	
15	Eduax2	−0.013	0.036				−0.027	−0.035			
16	Eduax3	−0.014					−0.034		0.049	0.048	
17	Eduax4	0.023								0.089	0.038
18	FinMkt1	—							0.028		
19	FinMkt2	—									
20	FinMkt3	—									0.025
21	FinMkt4	—				−0.083				0.046	
22	FinMkt5	0.010					0.061	−0.037	0.059	0.016	
23	Medax1	0.149					0.206		0.221	0.280	−0.138
24	Medax2	0.016		0.040					0.149	0.037	
25	Medax3	—				−0.312	−0.308	−0.154	0.103	−0.020	0.078
26	Socult1	—				−0.044	−0.049	−0.027			
27	Socult2	−0.014				−0.217	−0.245	−0.159	0.094	0.024	−0.039
28	Socult3	−0.011	0.029			0.052	−0.058	−0.078	0.147	0.037	−0.053
29	Trcom1	—				−0.045			−0.044	−0.025	0.060
30	VilGov1	—				−0.050	−0.068		−0.111	−0.029	−0.103
31	VilGov2	—	−0.037			0.039			0.058		0.077
32	VilGov3	0.011	0.046		0.025	0.065	0.046	0.032	−0.031	−0.028	0.087
33	VilGov4	−0.024				−0.030			−0.038	0.018	−0.083
34	VilGov5	−1.635								−3.513	
35	VilGov6	—									
36	VilGov7	−0.027				0.027	0.031	0.025	0.038	−0.054	0.308
37	TpDem1	1.651								3.551	
38	TpDem2	—				0.082	0.050		0.022	−0.017	
No of Sign. Vars.		20	5	0	1	14	14	11	19	20	15
R ²		0.843	0.007	0.000	0.002	0.206	0.229	0.059	0.282	0.642	0.228

Notes : Calculated by multiple regression analysis and bivariate correlation from the variable indices.

Table 5. Structural Causal Direct and Indirect Impacts of the Intermediate Variables and Independent Variables for the Durable-Good Consumption (CONSDGS)

Intermediate and Independent Variables		Direct Impact on CONSDGS	INDIRECT IMPACT										Total Impact
			LU 1	LU 2	LU 3	LU 4	LU 5	LU 6	ECACT 1	ECACT 2	ECACT 3	Sub Total	
INTERMEDIATE VAR.	LU1	—	1.000										
	LU2	—	0.633	1.000									
	LU3	—	0.542	0.698	1.000								
	LU4	0.014	—	—	—	1.000							
	LU5	0.066	−0.038	—	—	0.104	1.000						
	LU6	—	—	—	—	0.042	0.025	1.000					
	Eact1	0.011	−0.031	—	—	−0.122	0.307	−0.105	1.000				
	Eact2	0.577	−0.026	—	—	−0.048	0.254	—	−0.491	1.000			
	Eact3	0.077	0.053	—	—	0.124	0.045	0.105	−0.120	−0.064	1.000		
INDEPENDENT VARIABLES	Ecinst1	0.074							−0.035	0.083	−0.012	0.036	0.110
	Ecinst2	—											
	Ecinst3	—											
	Ecinst4	—											
	Eduax1	0.013											0.013
	Eduax2	−0.013											−0.013
	Eduax3	−0.014											−0.014
	Eduax4	0.023											0.023
	FinMkt1	—											
	FinMkt2	—											
	FinMkt3	—											
	FinMkt4	—											
	FinMkt5	0.010											0.010
	Medax1	0.149					0.027		−0.051	0.164	−0.014	0.126	0.275
	Medax2	0.016							−0.034			−0.034	−0.018
	Medax3	—				−0.030	−0.040	−0.006	−0.024			−0.099	−0.099
	Socult1	—											
	Socult2	−0.014				−0.021	−0.032	−0.006				−0.059	−0.073
	Socult3	−0.011							−0.034			−0.034	−0.045
	Trcom1	—											
	VilGov1	—							0.026		−0.010	0.015	0.015
	VilGov2	—											
	VilGov3	0.011											0.011
	VilGov4	−0.024											−0.024
	VilGov5	−1.635								−2.054		−2.054	−3.689
	VilGov6	—											
	VilGov7	−0.027									0.031	0.031	0.004
	TpDem1	1.651								2.076		2.076	3.727
	TpDem2	—											
Total Impact			0.000	0.000	0.000	−0.051	−0.046	−0.012	−0.153	0.269	0.009	0.018	0.227

Notes : Calculation is based on the Table 4 by using path coefficient calculation.

1. Households in Trade and Service Activities (Ecact 2), $\beta = 0.577$
2. Medical Availability (Medax1), $\beta = 0.149$
3. Village Size (Vilgov5), $\beta = -1.635$, and
4. Population and Household Size (Tpdem1), $\beta = 1.651$.

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 ($\rho \geq 0.10$) 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 Ecact 1 and Ecact 2 with coefficient of correlation ρ equals to -0.491 .

The dominant determinants however are Households in Trade and Service Activities (Ecact 2) with a coefficient equals to 0.577, Medical Availability (Merdx 1) with the coefficient equals to 0.149, Village Size (Vilgov 5) with the coefficient equals to -1.635 and Population and Household Size (Topdem 1) with the coefficient equals to 1.651. Specific attention needs to be attributed to the Village Size, because its coefficient is negative, therefore it has negative association with the consumption rate of durable goods and services, while the others provide positive association.

The Medical Availability (Medax 1), Village Size (Vilgov 5) and Population and Household Size (Topdem 1) in fact, beside contribute directly to the Consumption Rate of Durable Goods and Services (CONSDGS), they also provide indirect impacts through intermediate factors. For instance, Medical Availability contributes important impact through Households in Trade and Service Activities (Ecact 2) with coefficient 0.164, means that about 16% change in Ecact 2 is some thing to do with the change in Medax 1. On the other hands Village Size (Vilgov 5) provide negative impact on Ecact 2 while Population and Household Size (Topdem 1) contribute positive impact to the Households in Trade and Service Activities (Ecact 2).

Another important finding is the existence of relatively strong negative association between Households in Trade and Service Activities (Ecact 2) and Service Household Proportion (Ecact 1). The coefficient of correlation is -0.491 . This indicate that when the number of household engaged in trades and services increases, the proportion of service households goes down, so that it indicates that within Ecact 2, the households in trade activities could be the main players.

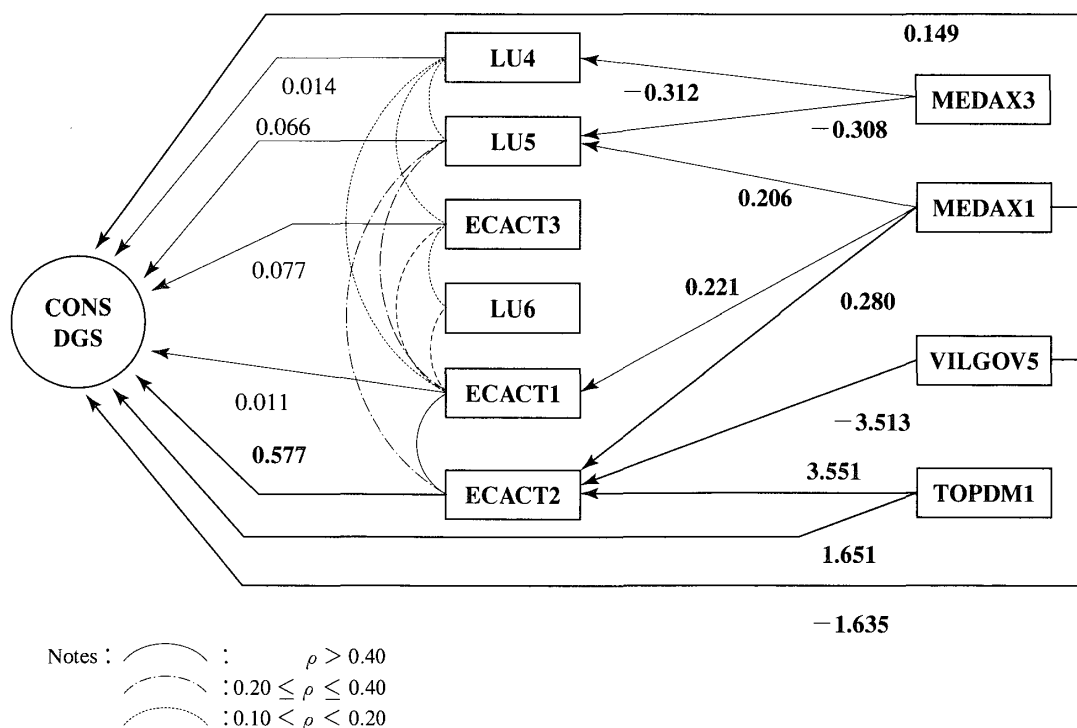
Based on the total impact, it is obvious that Population and Household Size (Topdem 1) is the most important contributor to the Consumption Rate of Durable Goods and

Services (CONSDGS). The second important factor is Village Size but in negative sense, the next is Households in Trade and Service Activities (Eact 2) and the last one is Medical Availability (Medax 1). However, Households in Trade and Service Activities (Eact 2) possesses a substantial position due to the fact that all other influencing factors also have indirect impact through Eact 2 as intermediate variable.

9. Structural Causal Model

Structural causal model for Consumption Rate of Durable Goods and Services (CONSDGS) is a diagrammatic presentation of the structural causal relationship that is previously explained. Therefore, based on the performance of the intermediate and independent variables in terms of their impacts, then the structural causal model of the Consumption Rate of Durable Goods and Services in Sulawesi Region, Indonesia can be formulated as shown in Figure 1.

Figure 1. Structural Causal Model for Consumption Rate of Durable Goods and Services in Sulawesi Region



The structural model shows that there are five intermediate variables provide direct impacts to the Consumption Rate of Durable Goods and Services (CONSDGS) in Sulawesi Region. Those variables are Vegetable Farm (LU 4), Non-Agricultural Areas (LU 5), Households in Trade and Service Activities (Eact 2), Service Household Proportion (Eact 1), Households in Trade and Service Activities (Eact 2) and Households in Agricultural

Sector (Eact 3). The matter of fact, Eact 2 is the highest contributor in this regard, with coefficient equals to 0.577. It means that every 5,77% change of Eact 2 would bring about 10% change for the consumption rate. Each of the other four factors contributes less than 10% only to the change in the consumption rate.

In the case of independent variables, there are only three of them have impact both directly and indirectly to the durable and service consumptions. The three are Medical Availability (Medax 1), Village Size (Vilgov 5) as well as the Population and Household Size (Topdem 1), each of which with the coefficient equals to 0.149, -1.635 and 1.651. Village size has negative sign, when the other two have positive signs, which means that the village size has negative association with the consumption rate. In other words, the larger the village sizes the smaller the consumption rate.

Based on the indirect impacts from the independent variables, there are ten independent variables contribute to the consumption rate indirectly, as shown in Table 5. However, by observing the total indirect impact, it can be identified as many as three important variables in this matter. They are Medical Availability (Medax 1), Village Size (Vilgov 5) as well as Population and Household Size (Topdem 1), with the impact coefficients are at least equals to 0.10 or 10%. Therefore, it seems that these three factors occupy a very strategic role in this structural model because these factors are not only provide significant direct impacts but also indirect ones.

Finally, with regard to the way the indirect impact providers go through to the dependent variable in this case the consumption rate, it is very obvious that the role of Households in Trade and Service Activities (Eact 2) as an intermediate variable is very essential. The important three independent variables deliver their indirect impacts, in fact through the Eact 2. Thus, in this structural relationship model, there are 4 (four) very important variables or factors as follows, Households in Trade and Service Activities (Eact 2), Medical Availability (Medax 1), Village Size (Vilgov 5) as well as Population and Household Size (Topdem 1). Structurally speaking, the Eact 2 plays the most strategic roles, and the other three contribute both directly and indirectly to the consumption rate of durable goods and services in Sulawesi region.

10. Conclusion

Structural causal relationship of the Consumption Rate of Durable Goods and Services (*CONSDGS*) in Sulawesi Region of Indonesia consists of important intermediate and independent variables. The most important intermediate variable is Households in Trade

and Service Activities (Ecact 2), not only because it provides direct impact on the consumption rate but also facilitates indirect impacts of the important independent variables. There are three important independent variable in this structure, which are Medical Availability (Medax 1), Village Size (Vilgov 5) as well as Population and Household Size (Topdem 1), coincidently all these three variables deliver their impact to the consumption rate through the Ecact 2. In addition to these important variables, there are four other intermediate factors also involve in the structure, they are Vegetable Farm (LU 4), Non-Agricultural Areas (LU 5), Service Household Proportion (Ecact 1) and Households in Agricultural Sector (Ecact 3). These factors correlate each other beside contribute directly to the consumption variable. Therefore, the structural relationship tend to be more complex “in the middle” rather than in the outset of the independent variables. Finally, the consumption rate of the durable goods and services is structurally determined by four predominant factors that are Households in Trade and Service Activities, Medical Availability, Village Size as well as Population and Household Size. Households in Trade and Service Activity occupies a unique and central position in this model because it contributes directly to the dependent variable as well as functions as a prime intermediate factor. This model signifies the important of these factors in dealing with the poverty situation especially for Sulawesi Region in Indonesia.

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Appendix 1.A. Representative Factors and Variable Represented of Level of Living at Household Level (LHH) Variables

Factors	Factor Name	Represented Variables	Factor Coef.	Description
LHH Factor 1	Consumption Rate of Durable Goods and Services	Var00041 Var00068 Var00069 Var00229 Var00235 Var00237 Var00363 Var00367	0.781 0.817 0.787 0.701 0.867 0.816 0.858 0.731	Number of HH with high education enrollment Number of non stack houses Number of permanent houses Number of HH with telephone Number of HH with television Number of HH with radio Number of HH with electricity Number of HH with 4 wheel vehicles
LHH Factor 2	Village Prosperity	HHPROS3X PROS HHNEEDX	0.941 0.774 -0.948	Percentage of HH in Prosperity Level II Village Prosperity Level Percentage of HH Need Help/Aid
LHH Factor 3	Water Source	Var00203 Var00204	0.927 0.937	Water source for drink and cook Water source for bath and wash
LHH Factor 4	Rate of Lux- Goods Possession	HHWTELP HHWTV HHCAR	0.817 0.742 0.818	Percentage of HH with telephone Percentage of HH with television Percentage of HH with 4 wheel vehicles

Appendix 1.B. Representative Index of LHH Factors

Factors	Factor Name		Factor Index Composition
	Long form	Short form	
LHH Factor 1	Consumption Rate of Durable Goods and Services	CONSDGS	$(zVar00041 + zVar00068 + zVar00069 + zVar00229 + zVar00235 + zVar00237 + zVar00363 + zVar00367)/8$
LHH Factor 2	Village Prosperity	VILPROS	$(zHHPROS3X + zPROS - HHNEEDX)/3$
LHH Factor 3	Water Source	WTRSRCE	$(zVar00203 + zVar00204)/2$
LHH Factor 4	Rate of Lux- Goods Possession	RTLXGPOS	$(zHHWTELP + zHHWTV + zHHCAR)/3$

Notes : z-sign indicated the standardized value of the variable.

Appendix 2.A. Intermediate Factor Land Utilization and Their Represented Variables, 2002

Factors	Factor Name	Represented Variables	Factor Coef.	Description
LU Factor 1	Non-Agricultural Area	VAR00240	.827	Village total area
		VAR00248	.903	Total area of non rice field
		VAR00249	.881	Total area of non rice field utilized for Agriculture
		VAR00251	.879	Plantation/Estate
		VAR00252	.752	Forest owned by community
		VAR00255	.828	Area for housing and settlement
		VAR00256	.871	Area for others buildings (industry, offices, shop center)
LU Factor 2	Seasonal Crop Areas	VAR00241	.711	Total area of rice field
		VAR00242	.752	Total area of rice field utilized
		VAR00243	.943	for Agriculture
		VAR00250	.867	Technical irrigation
LU Factor 3	Non-irrigated Rice-fields	VAR00244	.729	Non-technical irrigation
		VAR00246	.895	Tidal, polder, lebak, rembesan, swamp planted by rice
LU Factor 4	Vegetable Farm	VEGEDEPT	.951	Proportion of Vegetable area to total village area
		VEGEDEPN	.979	Proportion Vegetable to non rice areas
LU Factor 5	Non-Agricultural Areas	NAGRDEPT	.956	Non-agricultural Areas proportion to total village area
		AGRDEPN	.973	Non-agricultural Areas Proportion to non rice areas
LU Factor 6	Community Forest	COMFRSTT	.994	Community forest area proportion to total village area
		COMFRSTN	.994	Community forest Proportion to non rice areas

Appendix 2.B. Intermediate Factor Economic Activities (EACT) and Their Represented Variables, 2002

Factors	Factor Name	Represented Variables	Factor Coef.	Description
EACT Factor 1	Service-Household Proportion	HHAGR	-0.905	Proportion of Agriculture HH
		HHSERVIC	0.787	Proportion of Service HH
		HHAGWRK	-0.891	Proportion of HH in Agr. Sector
EACT Factor 2	Households in Trade & Service Activities	VAR00357	0.736	Number of Trade HH
		VAR00360	0.708	Number of Service Household
EACT Factor 3	Households in Agricultural Sector	VAR00352	0.974	Number of Agriculture HH
		VAR00362	0.975	Number of households working in Agriculture sector

Appendix 3. Independent Factors and Their Represented Variables, 2002

1. Economic Institution

Factors	Factor Name	Represented Variables	Factor Coef.	Variable Description
ECINST Factor 1	Copy and Phone service	VAR00292 VAR00347 VAR00348	0.702 0.809 0.748	Photo copy service Public telephone (coin) Public telephone (card)
ECINST Factor 2	Industry	VAR00100 VAR00337 VAR00338	0.978 0.983 0.957	Number of processing industries Industry (large, medium and small scaled) Industry enterprise with man power less than 20 people
ECINST Factor 3	Non-motor repair shop	VAR00293	0.768	Repair of non-motored vehicle
ECINST Factor 4	Group Enterprises	VAR00304 VAR00305	0.919 0.918	Number of Group Number of member per group

2. Educational Access

Factors	Factor Name	Represented Variables	Factor Coef.	Description
EDUAX Factor 1	High Education	VAR00135 VAR00136 VAR00137 VAR00138	0.756 0.961 0.864 0.954	Public Univ/College with Building Public Univ/College without Building Private Univ/College with Building Private Univ/College without Building
EDUAX Factor 2	Vocational School	VAR00139 VAR00140 VAR00148 VAR00149	0.735 0.726 0.783 0.722	Skill Education for Mechanic Skill Education for Electronics Skill Education for Craftsman/Furniture Skill Education for Handicraft
EDUAX Factor 3	School Access	VAR00117 VAR00127 VAR00133 VAR00134	0.728 0.753 0.741 0.813	Distance to Nearest Kinder-Garden Distance to Junior-high School Distance to Nearest High School Traveling Time to nearest High School
EDUAX Factor 4	<i>Private Middle School with Building</i>	VAR00125 VAR00131	0.817 0.827	Private Junior High School with Building Private High School with Building

3. Financial and Market Access

Factors	Factor Name	Represented Variables	Factor Coef.	Variable Description
FINMKT Factor 1	Market Availability	Var00270 MARKET MRKTAXS	0.977 0.981 0.942	Non-permanent Building Market Total Number of Market Market-Population Ratio
FINMKT Factor 2	Shop Availability	Var00265 Var00266	0.738 0.916	Shopping Center Distance Shopping Center Traveling-time

		Var00269	0.859	Permanent Market Traveling-time
FINMKT Factor 3	Agriculture Input Shop	VAR00278 AGINPMKT AGINPAXS	0.885 0.906 0.896	Non-KUD Agroinput Kiosks Total Agroinput Kiosks Agr. Kios-Population Ratio
FINMKT Factor 4	Shop Accessibility	Var000227 Var000228	0.918 0.884	Easiness to Permanent Market Easiness to Shopping Center
FINMKT Factor 5	Market for Agroproducts	AGMRKT AGMKTAXS	0.886 0.804	Agriculture Product Market Agr. Market-Population Ratio

4. Medical Service Access

Factors	Factor Name	Represented Variables	Factor Coef.	Variable Description
MEDAX Factor 1	Medical Availability	Var00188 Var00190 Var00192	0.849 0.814 0.828	Number of Doctor Practice Palace Number of Pharmacies Number of Male Doctor
MEDAX Factor 2	Hospital Access	Var00181 Var00225	-0.740 0.862	Distance to the Hospital Hospital
MEDAX Factor 3	Medical Services	MDDRAXS MOMDAXS	0.902 0.814	Total Medic Availability Well trained Medic

5. Social-Cultural Access

Factors	Factor Name	Represented Variables	Factor Coef.	Variable Description
SOCULAX Factor 1	Administration and Recreation	Var00164 Var00165 RECAXS	0.943 0.902 0.937	Distance to Desa Office Traveling Time to Desa Office Recreational Access
SOCULAX Factor 2	Historical Facility	Var00159 Var00170	0.954 0.954	Old Folk Home Museum
SOCULAX Factor 3	Social Facility	SOCATIV	0.728	Social activity and facility

6. Transportation and Communication Access

Factors	Factor Name	Represented Variables	Factor Coef.	Variable Description
TRCOM Factor 1	Transportation Infrastructure	Var00206 Var00207 Var00214 Var00219	0.789 0.832 0.869 0.724	Kind of Road Surface Road Liability for 4-Wheel Vehicles Number of Four-wheel Vehicle Main Transportation Means

7. Village Government

Factors	Factor Name	Represented Variables	Factor Coef.	Variable Description
VILGOV Factor 1	Village Budget	BUDGET	0.941	Revenue-Population Ratio
		CGAID	0.837	Central Government Aid and Population Ratio
		GOVAID	0.857	Total Government Aid and Population Ratio
		RTEXP	0.721	Routine Expenditure and Population Ratio
		DEVBDG	0.907	Development Expenditure and Population Ratio
		EXPBDG	0.940	Total Expenditure and Population Ratio
VILGOV Factor 2	Social Budget	Var00376	0.850	Total Revenue
		Var00379	0.856	Swadaya of Community
		Var00392	0.881	Development Expenditure
		Var00397	0.786	Expenditure for Social Facility
VILGOV Factor 3	Village Expenses	Var00384	0.897	Routine Expenditure
		Var00386	0.733	Employee Expenses
		Var00387	0.738	Goods Expenses
VILGOV Factor 4	Poor Village Assistance	Var00402	0.964	IDT Recipient
		IDTCGRTO	0.964	IDT Community Group Ratio
VILGOV Factor 5	Village Size	RKSIZE	0.999	Population-RK Ratio
		RTSIZE	0.999	Population-RT Ratio
VILGOV Factor 6	Village Status	Var00007	-0.923	Status of Village/Desa
		Var00008	0.910	Existence of Village Consultative Council or LMD
VILGOV Factor 7	Village Organization Structure	Var00012	0.905	Number of RK or RW
		Var00013	0.879	Number of RT

8. Topography and Demography

Factors	Factor Name	Represented Variables	Factor Coef.	Variable Description
TOPDEM Factor 1	Population and Household Size	Var00037	0.995	Total Population
		Var00038	0.993	Total Woman Population
		HHSIZE	0.995	Household Size
TOPDEM Factor 2	Household and Population Density	Var00039	0.836	Number of Household
		POPDENS	0.707	Population Density

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