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Integration Cluster and Path Analysis Based on Science Data in Revealing Stunting Incidents

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Abstract

The purpose of this research is to utilize big data to explore the factors that influence the prevalence of stunting in Wajak Regency, model these factors using integrated cluster analysis and` path analysis model, and develop an information system for stunting incidence modeling. This study uses a descriptive and explanative approach, namely using Discourse Network Analysis, cluster analysis, path analysis, and integration of cluster and path analysis. The sample of this research is children under five in Wajak District who were selected using stratified random sampling. The distance measure that has the highest model goodness value R^2 in modeling using the integration of cluster analysis with path analysis is the Mahalanobis distance measure. The cluster analysis with Mahalanobis distance produces 3 clusters where cluster one is a toddler who has a low stunting category, cluster two is a group of toddlers who has a moderate stunting category, and cluster three is a group of toddlers who has a high stunting category. The originality of this study is the application of Discourse Network Analysis analysis to obtain new variables followed by a comparison of three distances namely euclidean, manhattan, and mahalanobis in modeling using cluster integration and parametric paths.

1. INTRODUCTION

Stunting is a disease in the form of growth disorders in children. The WHO framework published in 2013 states that there are many causes of stunting in children under five. Maternal factors and the environment near the home are the main causes of child developmental disorders. According to a UNICEF report, stunting cases reach up to 7.8 million children in Indonesia. As a result, Indonesia is listed by UNICEF as one of the five countries with the highest child stunting rates. By putting forward various initiatives to address the stunting problem in Indonesia, the Indonesian government has also shown its concern. However, a significant obstacle to solving the stunting problem in Indonesia is the understanding of parents, especially mothers. In connection with this, the urgency of this study is based on the lack of awareness of parents about the problem of stunting.

Indonesia is a country with the fourth largest population in the world. According to the Indonesian Central Statistics Agency [24], the population reaches more than 270 million people. Indonesia's population will also increase, with a fixed birth rate of 2.10 in 2020 [24]. Unfortunately, Indonesia still has a high stunting rate. The stunting rate in Indonesia remains at 27.67% in 2019. This number is still much higher than the WHO target, which is a stunting rate of no more than 20 percent [25]. Furthermore, according to World Bank data, stunting survivors make up 54% of Indonesia's current workforce. According to the statement, the high stunting rate in Indonesia requires immediate attention because it can limit the potential of community resources in the future. Indonesia's human resources must also be qualified in the era of globalization to be able to compete internationally.

Malang Regency is one of the regions in Indonesia that is very serious in dealing with stunting. The Malang Regency Bappeda has determined that 32 priority villages are a means of accelerating stunting prevention in Malang Regency by 2021. The 32 villages that are included in the stunting prevention priority scale are thought to be directly proportional to the poverty rate. Codo Village, Dadapan Village, and Bringin Village in Wajak Regency are some of the 32 priority villages for the acceleration of stunting prevention.

Therefore, it is necessary to study the determinants of the causes of stunting, especially in Wajak District. The purpose of this study is to use big data to find the factors that influence the prevalence of stunting in Wajak Regency,

to model these factors using integrated cluster analysis and path analysis model, and to develop an information system for stunting incidence modeling. The benefits of this research are expected to be in the form of an information system that can provide comprehensive information about stunting in Wajak District. Local governments and other relevant organizations can use this information to develop strategies or policies to stop stunting in the Wajak District in the future.

2. THEORETICAL REVIEW

2.1 Mother's Knowledge

Notoadmodjo expressed his opinion about knowledge which can be interpreted as a result of someone's curiosity and often occurs after sensing (can be sight, hearing, smell, taste, and touch) an object through its senses. Several factors that influence knowledge include education, work, experience, beliefs, and socio-culture [15].

Knowledge is a strong basis for the formation of one's actions [8]. However, although various studies have found a close relationship between knowledge and education, low education does not guarantee that a mother does not have enough knowledge about family nutrition. The existence of high curiosity has the potential to influence mothers in obtaining information about proper nutrition for families, especially children [19].

2.2 Economic level

Economics, in Greek: oikonomia which consists of the words oikos and nomos with the meaning of household rules is the rules and human activities in meeting their needs [18]. Economic status is the position of a person or family in society based on monthly income. Economic status can be seen from income adjusted for the price of the underlying commodity [9]. Economic status is likely to be a determinant of family lifestyle. The availability of facilities will determine a person's economic status required for certain activities so this economic status will affect a person's status [23].

The economic level is a socially regulated position and places a person in a certain position in society [9]. The granting of the position is accompanied by a set of rights and obligations that are accounted for by the bearer of the status. The economic level can also be interpreted as a condition that shows the family's financial ability and material equipment owned, this situation can be of good, sufficient, and insufficient level [2] The socio-economic level can affect the degree of knowledge, lifestyle, and access to information and health services [4]. Children in families with low economic levels are more at risk of stunting because of their low ability to fulfill nutrition, increasing the risk of malnutrition [5].

2.3 Parenting

Epistemologically the word "pattern" is defined as a way of working, and the word "nurturing" means maintaining, caring for, educating, guiding, helping, and training children who are oriented towards independence. In terminology, parenting is the best way for parents to educate their children as a manifestation of responsibility to children [1]. Parenting is a parenting pattern for children, namely how parents treat children, educate, guide and discipline and protect children in reaching the maturity process to shaping children's behavior by good norms and values and by community life [12]. It can be concluded that parenting is a description of the attitudes and behavior of parents in interacting with children during parenting activities to form good child behavior.

If the parenting pattern is not good, then the child will be 8 times more at risk of experiencing stunting compared to children who get good parenting [21]. Previous studies that examined parenting through parental feeding to toddlers that were not by the subject's nutritional needs could cause stunting, including non-exclusive breastfeeding, giving MP-ASI too early to subjects before 6 months [13].

2.4 Socio-cultural

According to the Big Indonesian Dictionary (KBBI), Social is matters relating to society or social characteristics that pay attention to the public interest. Understanding from a language perspective, the word culture or culture comes from Sanskrit, namely buddhayah, which is the plural form of buddhi (mind or reason) defined as matters relating to the human mind and reason [10]. In a broad sense, Edward Bunnet stated that culture can be interpreted as a

technology which includes science, belief, art, morals, law, customs, and various other abilities and habits acquired as members of society [14].

From the statement above, it can be concluded that socio-cultural is all things created by humans with their thoughts and conscience in social life. In other words, the socio-cultural system is a whole of elements of values, social order, and human behavior that are interrelated and each element works independently and together with each other to support each other to achieve the goals of human life in society [16].

2.5 Stunting

Stunting is the effect of growth retardation on the final genetic potential caused by inadequate nutrition, health, and parental roles. So that shows the long-term impact on health affects productivity in various factors [20]. Stunting in offspring is associated with the following determinants in Indonesia: male gender, premature birth, short birth length, non-exclusive breastfeeding for the first 6 months, short maternal height, low maternal education, poor household socioeconomic status low, living in an unhealthy household, unavailability of latrines and untreated drinking water, poor access to health services, and living in rural areas [3]. Stunting children have low mortality, morbidity, and cognitive and motor development [22].

Stunting is a cyclical process as women who are stunted in their childhood are more likely to have stunted offspring, creating intergenerational cycles and diminishing human resources that are difficult to break, even though potential windows of opportunity have been identified [6]. Although stunted children are identified by comparing their height with the appropriate population for age and sex, short stature is usually not a problem in itself. [17].

3. RESEARCH METHODS

This study uses a descriptive and explanatory approach with a mixed method. In the first stage, a qualitative approach is used to explore variables using Discourse Network Analysis. Furthermore, a quantitative approach is used to determine the factors that influence stunting.

In the quantitative approach in this study, variable measurements were made to obtain primary data and then analyzed using statistical methods [11]. Based on data analysis, this study is confirmatory study because it analyzes sample data with inductive statistics and descriptive statistics, generalizing to population conclusions [8]. The data collected is cross-sectional data obtained by respondents in response to indicators set in the form of a questionnaire about variables that can affect the occurrence of stunting. The variables in this study are latent variables, measured using a research instrument in the form of a questionnaire. Variables were obtained from previous research and through DNA analysis. The survey was carried out by giving questionnaires to the respondents. Data analysis was carried out using statistical methods, namely the cluster method which was integrated with path analysis.

The sample in this study were mothers who have children under five in Wajak District. The population in this study were all mothers who had children under five in Wajak District. Sampling in this study was carried out using a probability sampling technique, namely stratified random sampling. Probability sampling is a sampling technique that provides equal opportunities for each element (member) of the population to be selected as a member of the sample. Stratified random sampling is a technique used when the population has members/elements that are not homogeneous and proportionally stratified. In this technique, the population is grouped or categorized which is called strata (stratified). Calculation of the sample size using the Slovin formula. This slovin formula is commonly used in survey research where the number of samples is usually very large, so a formula is needed to get a small sample but can represent the entire population. The research model can be seen in Figure 1.

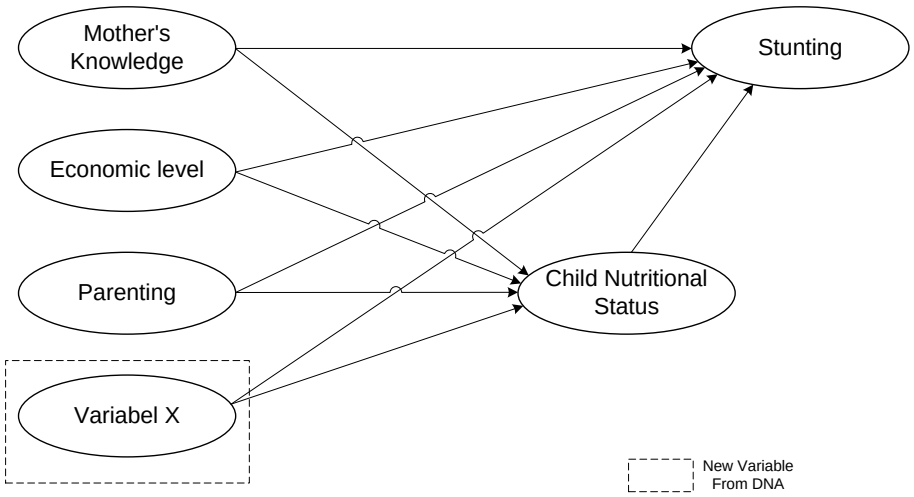

Figure 1. Research Model

Research Hypothesis:

H1 : Mother's Knowledge of Stunting
H2 : Mother's Knowledge of Child Nutritional Status
H3 : Economic Level of Stunting
H4 : Economic Level to Child Nutritional Status
H5 : Parenting against Stunting
H6 : Parenting Patterns for Child Nutritional Status
H7 : Variable X on Stunting
H8 : Variable X on Child Nutritional Status
H9 : Child Nutritional Status against Stunting

4. RESULTS AND DISCUSSION

4.1. Discourse Network Analysis Results

Issues and Actors

Based on the results of the Discourse Network Analysis (DNA) obtained two things, namely issues and actors related to the factors that cause stunting. The results of DNA analysis on content obtained from cyberspace are presented in the form of a chart as shown in Figure 2 below.

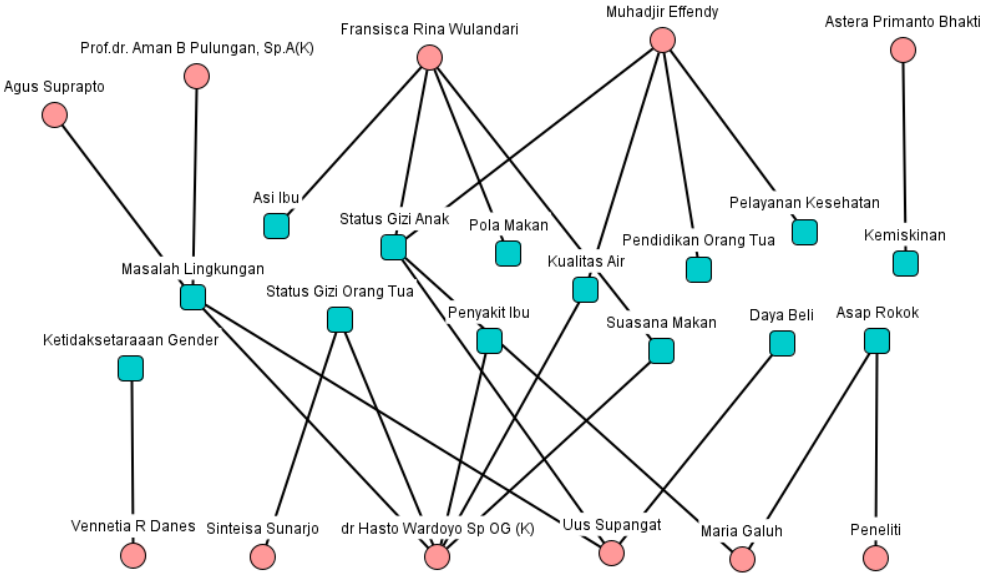

Figure 2. Actors and Issues Related to Stunting Factors in Indonesia

In figure 4.1. shows the results between actors and issues related to the factors that cause stunting in Indonesia. After the news is collected, it can be analyzed using the Discourse Network Analysis program and the results from the graph can be shown with the Visone program. The news collected is as many as 15 news. The results obtained are that there are 14 issues with 11 actors expressing their opinions regarding the factors causing stunting. Furthermore, the black lines show the relationship between the stated actors and the positive issues stated regarding stunting. The results of DNA analysis did not find any negative issues related to the factors causing stunting.

Actor

Based on the search for themes in cyberspace related to PT Pertamina's customer service segmentation, several stakeholders were identified and gave their views on this matter. After that, the actors are divided into several actor themes. The themes related to actors are shown in Table 1 following.

Table 1. Actors and Organizations

Actor Position	Actor Theme	Sentiment
Chairman of the Indonesian Pediatric Association	Doctor	Positive
Deputy for Coordination for Health Quality Improvement and Population Development, Coordinating Ministry for Human Development and Culture	Government	Positive
Director General of Fiscal Balance, Ministry of Finance		Positive
Pediatrician at UNS Hospital		Positive
Coordinating Minister for Human Development and Culture		Positive
Head of the Tasikmalaya Health Service		Positive
Deputy for Community Participation, Ministry of Women's Empowerment and Child Protection		Positive
Head of BKKBN Dr (HC)		Positive
researcher with Imperial College London	Researcher	Positive
Grants Manager Tanoto Foundation	Company	Positive
Group Business Unit Head Woman Nutrition Kalbe Nutritionals		Positive

In Table 1. The above shows the actors who expressed their opinions on the factors that cause stunting, namely 11 actors who can be grouped into 4 major actors, namely doctors, government, researchers, and companies related to children and stunting, namely Tanoto and Woman Nutrition Kalbe Nutritionals.

New Variable Formation

Furthermore, the results of the issues and actors will be identified as new variables needed to support the factors that cause stunting in children in Indonesia. Table 2 shows the issue, the concept of the issue with the newly formed variables.

Table 2 shows that there are several issues raised regarding the news that mentions the factors that cause stunting. There are many issues, namely poverty, exposure to cigarette smoke which is not good for children, environmental problems such as water problems that are not clean and a dirty and uncomfortable environment for children, lack of health workers from the children's area, parental education, and others. After finding several issues, the issues are grouped into issue concepts to make it easier to group new variables. After the 16 issue concepts are found, the next step is to make the concept of the issue a new variable for modeling the factors causing stunting. Concept issues are grouped with variables that are suitable for the modeling. The results show that there are 5 new variables obtained from the Discourse Network Analysis (DNA) analysis, namely Children's Dietary, Environment, Health services, Parent's Nutritional Status, and Social welfare. Figure 3 shows the relationship of the concept of the issue, the new variable with stunting.

Table 4.2. Formation of New Variables Formed After DNA Analysis

Issue	Issue Concept	New Variable
Poverty	Poverty	**Social welfare**
Exposure to cigarette smoke	Cigarette smoke	**Environment**
Environmental problems	Environmental Issues	**Environment**
Water quality	Water quality	**Environment**
Lack of health workers in monitoring the growth and development of children under five	Health services	**Health services**
Parent's education	Parental Education	**Social welfare**
Water quality	Water quality	**Environment**
Environmental problems	Environmental Issues	**Environment**
Early-age marriage	Environmental Issues	**Environment**
The decline in people's purchasing power	Purchasing power	**Social welfare**
The low level of parental education	Parental Education	**Social welfare**
Anemic mother	Mother's Disease	**Social welfare**
Food portion	Children's Diet	**Children's Diet**
Giving snacks	Children's Diet	**Children's Diet**
Dining atmosphere	Eating Atmosphere	**Children's Diet**
Nutritional problems	Parents Nutritional Status	**Parents Nutritional Status**
Malnutrition before and during pregnancy	Parents Nutritional Status	**Parents Nutritional Status**

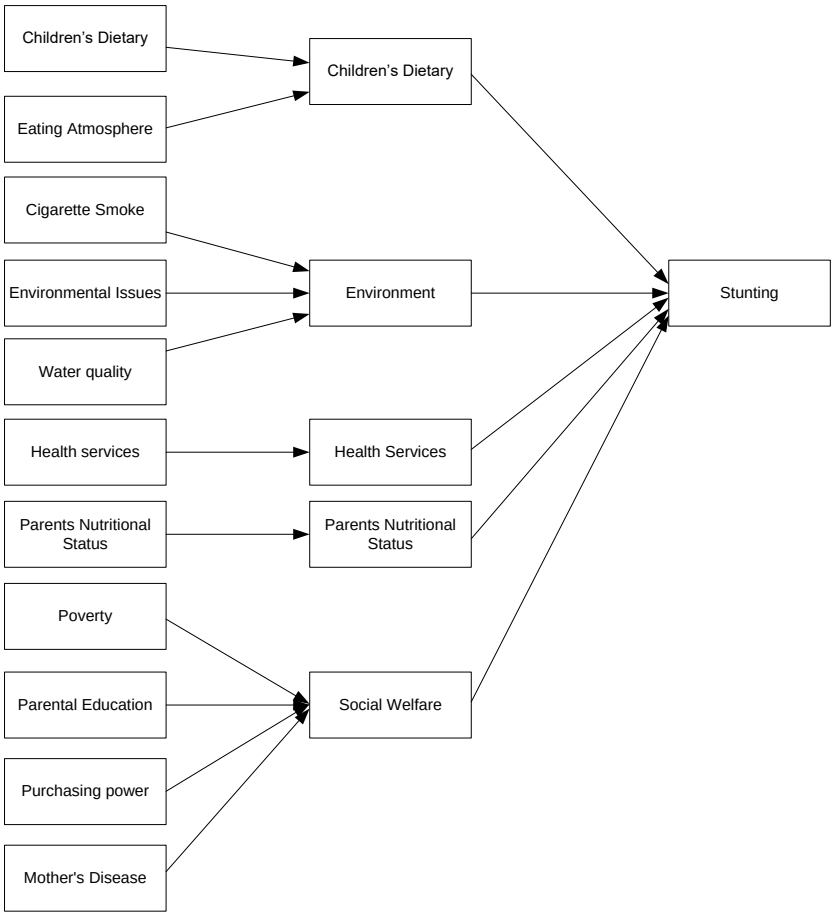

Figure 3. Concept Modeling Issues. New Variables Related to Stunting

After obtaining several new variables, these variables are included in the initial modeling that is intended to address the problems causing stunting factors.

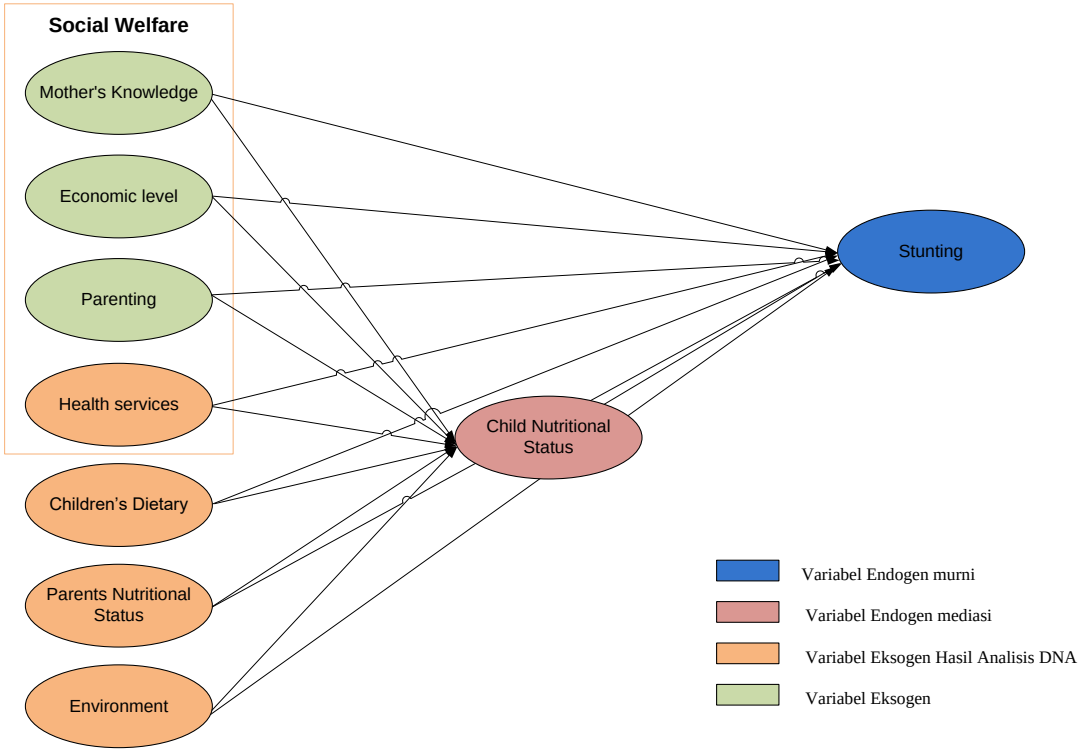

Figure 4. New Modeling After Addition of DNA Result Variables

New variables resulting from DNA analysis were entered into the modeling. The new variables are Health Services, Children's Diet, Parent's Nutritional Status, and Environment. Furthermore, the modeling continued with the integration of cluster analysis with path analysis.

4.2. Results of Integration of Cluster Analysis with Path Analysis

4.2.1. Linearity Assumption Test

Testing the assumption of linearity using the Ramsey Reset Test method. Linearity test results are one of the assumptions that need to be tested before modeling the integration of cluster analysis with path analysis. The results of the linearity assumption test are shown in Table 3.

Table 3. Linearity Test Results

Influence	p-value	Connection
X_1 to Y_1	0.574	Linear
X_1 to Y_2	0.998	Linear
X_2 to Y_1	0.674	Linear
X_2 to Y_2	0.765	Linear
X_3 to Y_1	0.998	Linear
X_3 to Y_2	0.755	Linear
X_4 to Y_1	0.678	Linear
X_4 to Y_2	0.825	Linear
X_5 to Y_1	0.830	Linear
X_5 to Y_2	0.999	Linear
X_6 to Y_1	0.698	Linear
X_6 to Y_2	0.769	Linear
X_7 to Y_1	0.999	Linear
X_7 to Y_2	0.999	Linear
Y_1 to Y_2	0.998	Linear

In Table 4 shows that all the relationships between the independent variables on the dependent variable have a p-value of more than 0.05, so the decision from testing the hypothesis is to accept H_0. Based on the 5% significance level, it can be concluded that all relationships between exogenous and endogenous variables are linear.

4.2.2. Residual Normality Assumption Test

The assumption that needs to be tested next is the assumption of residual normality. Table 4 shows the results of testing the assumption of residual normality using R software.

Table 4. Results of Testing Remaining Normality Assumptions

Endogenous Variables	p - value for Euclidean Distance	p - value for Manhattan Distance	p - value for Mahanalobic Distance
Child Nutritional Status (Y_1)	0.2045	0.255	0.477
Stunting (Y_2)	0.1661	0.246	0.476

Based on Table 4 it can be seen that the p-values for each of the remainders in the equation with Y_1 and Y_2 and at the three distances have a value that exceeds 0.05. Based on the 5% significance level, it can be concluded that all residuals have a normal distribution.

4.2.3. Test the Assumption of Homogeneity of Residual Variety

The third assumption that needs to be tested is the assumption test for the homogeneity of the residual variance. The residual variance must be constant. Table 4.5. shows the results of the homogeneity test of residual variance.

Table 5. Result of Homogeneity Test of Residual Variety

Endogenous Variables	p-value for Euclidean Distance	p-value for Manhattan Distance	p-value for Mahanalobis Distance
Child Nutritional Status (Y_1)	0.023*	0.005*	0.005*
Stunting (Y_2)	0.3978*	0.324	0.004*

Based on Table 5 it can be seen that the p-values for each of the remainders in the equation with Y_1 and Y_2 and the three distances, there are values less than 0.05. It can be concluded that the assumption of homogeneity has not been met. Therefore, in overcoming the violation of the homogeneity assumption, it is necessary to have a Weight Least Square (WLS). After doing WLS, all relationships at each distance show that the variance of the residual is homogeneous or the assumption of homoscedasticity is met.

4.3. Cluster Integration with Dummy Variables with Path Analysis Approach

Cluster integration with path analysis using Weighted Least Square on modeling that does not meet the assumption of homogeneity of residual variance. Modeling using Weighted Least Square.

4.3.1. Cluster Integration Model on Path Analysis Ward linkage Method with Euclidean Distance

Cluster analysis using ward linkage and the Euclidean distance gives the result of 2 clusters. Furthermore, cluster analysis is integrated with path analysis. The model formed is as follows.

$$Z_{Y_1} = 0,245Z_{X_{1i}} + 0,367Z_{X_{2i}} + 0,389Z_{X_{3i}} + 0,434Z_{X_{4i}} + 0,498Z_{X_{5i}} + 0,578Z_{X_{6i}} + 0,867Z_{X_{7i}} + 0,141D_{1i}Z_{X_{1i}} + 0,245D_{1i}Z_{X_{2i}} + 0,214D_{1i}Z_{X_{3i}} + 0,279D_{1i}Z_{X_{4i}} + 0,204D_{1i}Z_{X_{5i}} + 0,172D_{1i}Z_{X_{6i}} + 0,109D_{1i}Z_{X_{7i}}$$

$$Z_{Y_2} = 0,410Z_{Y_{1i}} + 0,005D_{1i}Z_{Y_{1i}}$$

Low Cluster ($D = 1$) can be seen in the following.

$$Z_{Y_1} = 0,386Z_{X_{1i}} + 0,612Z_{X_{2i}} + 0,603Z_{X_{3i}} + 0,713Z_{X_{4i}} + 0,702Z_{X_{5i}} + 0,750Z_{X_{6i}} + 0,976Z_{X_{7i}}$$

$$Z_{Y_2} = 0,415Z_{Y_{1i}}$$

High Cluster ($D = 0$) can be seen in the following equation.

$$Z_{Y_1} = 0,245Z_{X_{1i}} + 0,367Z_{X_{2i}} + 0,389Z_{X_{3i}} + 0,434Z_{X_{4i}} + 0,498Z_{X_{5i}} + 0,578Z_{X_{6i}} + 0,867Z_{X_{7i}}$$
$$Z_{Y_2} = 0,410Z_{Y_{1i}}$$

4.3.2. Cluster Integration Model in Path Analysis Ward linkage Method with Manhattan Distance

Cluster analysis using ward linkage and the Manhattan distance gives the results of 2 clusters. Furthermore, cluster analysis is integrated with path analysis. The model formed is as follows.

$$Z_{Y_1} = 0,345Z_{X_{1i}} + 0,263Z_{X_{2i}} + 0,210Z_{X_{3i}} + 0,512Z_{X_{4i}} + 0,324Z_{X_{5i}} + 0,512Z_{X_{6i}} + 0,213Z_{X_{7i}} + 0,276D_{1i}Z_{X_{1i}} + 0,409D_{1i}Z_{X_{2i}} + 0,056D_{1i}Z_{X_{3i}} + 0,132D_{1i}Z_{X_{4i}} + 0,210D_{1i}Z_{X_{5i}} + 0,012D_{1i}Z_{X_{6i}} + 0,321D_{1i}Z_{X_{7i}}$$
$$Z_{Y_2} = 0,314Z_{Y_{1i}} + 0,213D_{1i}Z_{Y_{1i}}$$

Low Cluster ($D = 1$) can be seen in the following.

$$Z_{Y_1} = 0,621Z_{X_{1i}} + 0,672Z_{X_{2i}} + 0,266Z_{X_{3i}} + 0,644Z_{X_{4i}} + 0,534Z_{X_{5i}} + 0,524Z_{X_{6i}} + 0,534Z_{X_{7i}}$$
$$Z_{Y_2} = 0,527Z_{Y_{1i}}$$

High Cluster ($D = 0$) can be seen in the following equation.

$$Z_{Y_1} = 0,345Z_{X_{1i}} + 0,263Z_{X_{2i}} + 0,210Z_{X_{3i}} + 0,512Z_{X_{4i}} + 0,324Z_{X_{5i}} + 0,512Z_{X_{6i}} + 0,213Z_{X_{7i}}$$
$$Z_{Y_2} = 0,314Z_{Y_{1i}}$$

4.3.3. Cluster Integration Model in Path Analysis with Ward Linkage Method with Mahanalobis Distance

Cluster analysis using ward linkage and the mahalanobis distance gives the results of 2 clusters. Furthermore, cluster analysis is integrated with path analysis. The model formed is as follows.

$$Z_{Y_1} = 0,234Z_{X_{1i}} + 0,307Z_{X_{2i}} + 0,412Z_{X_{3i}} + 0,315Z_{X_{4i}} + 0,275Z_{X_{5i}} + 0,501Z_{X_{6i}} + 0,142Z_{X_{7i}} + 0,274D_{1i}Z_{X_{1i}} + 0,172D_{1i}Z_{X_{2i}} + 0,193D_{1i}Z_{X_{3i}} + 0,312D_{1i}Z_{X_{4i}} + 0,219D_{1i}Z_{X_{5i}} + 0,124D_{1i}Z_{X_{6i}} + 0,298D_{1i}Z_{X_{7i}} + 0,312D_{2i}Z_{X_{1i}} + 0,417D_{2i}Z_{X_{2i}} + 0,098D_{2i}Z_{X_{3i}} + 0,178D_{2i}Z_{X_{4i}} + 0,129D_{2i}Z_{X_{5i}} + 0,315D_{2i}Z_{X_{6i}} + 0,098D_{2i}Z_{X_{7i}}$$
$$Z_{Y_2} = 0,219Z_{Y_{1i}} + 0,008D_{1i}Z_{Y_{1i}} + 0,317D_{2i}Z_{Y_{1i}}$$

Low Cluster ($D_1 = 1$) and ($D_2 = 0$) can be seen in the following equation.

$$Z_{Y_1} = 0,508_{X_{1i}} + 0,479Z_{X_{2i}} + 0,605Z_{X_{3i}} + 0,627Z_{X_{4i}} + 0,494Z_{X_{5i}} + 0,625Z_{X_{6i}} + 0,440Z_{X_{7i}}$$
$$Z_{Y_2} = 0,227Z_{Y_{1i}}$$

Medium Cluster ($D_1 = 0$) and ($D_2 = 0$) can be seen in the following equation.

$$Z_{Y_1} = 0,234Z_{X_{1i}} + 0,307Z_{X_{2i}} + 0,412Z_{X_{3i}} + 0,315Z_{X_{4i}} + 0,275Z_{X_{5i}} + 0,501Z_{X_{6i}} + 0,142Z_{X_{7i}}$$
$$Z_{Y_2} = 0,219Z_{Y_{1i}}$$

High Cluster ($D_1 = 0$) and ($D_2 = 1$) can be seen in the following equation.

$$Z_{Y_1} = 0,546Z_{X_{1i}} + 0,724Z_{X_{2i}} + 0,510Z_{X_{3i}} + 0,493Z_{X_{4i}} + 0,404Z_{X_{5i}} + 0,816Z_{X_{6i}} + 0,240Z_{X_{7i}}$$
$$Z_{Y_2} = 0,536Z_{Y_{1i}}$$

4.4. Selection of the Best Distance from the Validity of the Cluster Integration Model with Path Analysis

The selection of the best distance and the validity of the model is by choosing the model that has the R^2 largest total, as shown in the equation, which can be briefly seen in Figure 5 as follows.

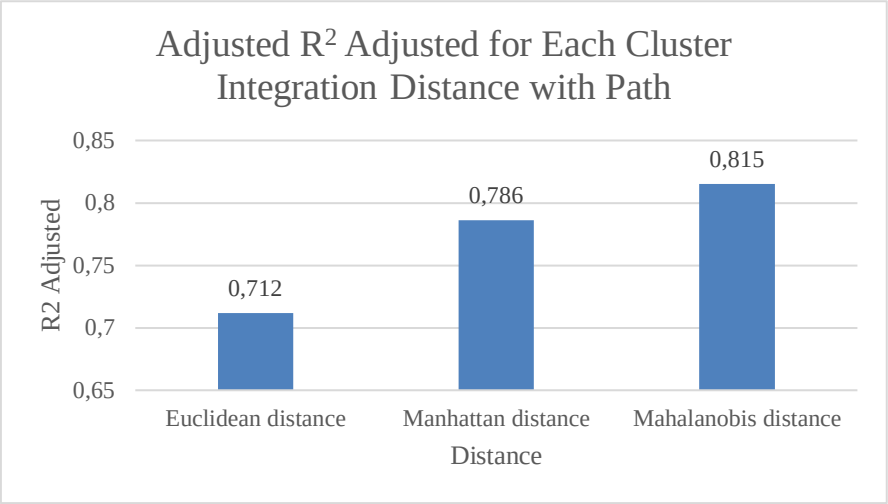

Figure 5. Adjusted Value R^2 for Each Distance

Based on Figure 5, the path analysis model using cluster integration and Mahalanobis distance has the R^2 highest total value, which is 0.815. This means that the variables of mother's knowledge, economic level, parenting, access to health services, children's eating habits, parents' nutritional status, environment, and child's nutritional status can explain the diversity of stunting variables by 81.5 percent, while the remaining 18.5 percent are not fully explained. The model of cluster integration uses Euclidean, Manhattan, and Mahalanobis distances, with path analysis being a good model. Cluster integration using Mahalanobis distance with path analysis is the best result used in stunting modeling in Wajak.

5. CONCLUSION

5.1. Conclusion

Conclusions that can be given based on the results of the analysis are:

1. The results of DNA analysis sourced from news relevant to the causes of stunting factors state that they are health services, children's dietary, parent's nutritional status, and environment.
2. The distance measure that has the highest model goodness value R^2in modeling using the integration of cluster analysis with path analysis is the Mahalanobis distance measure.
3. The application of Cluster integration to path analysis with various distance measures results in many different Clusters and Cluster members causing the dummy variables that are formed to be different, thus affecting the value of R^2.
4. The cluster analysis with Mahalanobis distance produces 3 clusters where cluster one is a toddler who has a low stunting category, cluster two is a group of toddlers who has a moderate stunting category, and cluster three is a group of toddlers who has a high stunting category.

5.2. Suggestion

Suggestions that can be given are the use of simulation data for modeling by integrating cluster analysis with path analysis to obtain R^2 maximum results and produce R^2 significantly different values.

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