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# Modeling the Categorical Patterns of Maggot Cultivation Knowledge Based on Correspondence Analysis in the Balangan Environmental Awareness Group in Kalurahan Wukirsari.

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**ABSTRACT**

Organic waste management remains a major environmental challenge in Kalurahan Wukirsari, Sleman Regency, Special Region of Yogyakarta Province, Indonesia. The cultivation of Black Soldier Fly (BSF) maggots has been implemented by Environmental Awareness Group as a sustainable solution. The success of this program is closely related to the knowledge level of its members. This study aims to model the categorical patterns of maggot cultivation knowledge using Correspondence Analysis and to identify the dominant influencing factors. Primary data were collected through questionnaires from 50 group members. The analysis included descriptive statistics, validity and reliability tests, chi-square tests, and correspondence analysis. The results show that most respondents have good to very good knowledge levels. Significant relationships were found between knowledge level and respondents characteristics, especially age, education, and occupation (p-value < 0.05). Correspondence analysis indicates that younger respondents (≤35 years) tend to have lower knowledge, while older respondents (>55 years) are associated with very good knowledge. Higher education and certain occupations, such as village officials and employees, are also linked to higher knowledge levels. The mapping results provide a clear basis for designing targeted training and empowerment programs.

**Keywords:** Correspondence Analysis; Environmental Awareness Group; Knowledge Modeling; Maggot Cultivation.

## 1. Introduction

Organic waste management is still a significant environmental issue in Kalurahan Wukirsari. In practice, waste is often not handled properly, and over time this leads to a series of familiar problems, ranging from environmental pollution and unpleasant odors to potential health risks for the surrounding community. These issues indicate that existing waste management efforts have not yet reached an optimal level. One alternative that has started to gain attention is the use of Black Soldier Fly (BSF) larvae, commonly known as maggots. These maggots are known for their ability to accelerate the decomposition of organic waste. At the same time, the process produces useful outputs, such as organic

fertilizer (kasgot) and animal feed [12]–[15]. Previous studies have shown that BSF maggot cultivation effectively improves the efficiency of organic waste bioconversion and supports the implementation of a zero-waste concept [1], [12]–[14].

In social and environmental studies, the type of data involved are often categorical, such as age, education level, occupation, and knowledge level. This means that conventional numerical-based analysis is not always appropriate. Instead, methods that are specifically designed for categorical data are needed to properly capture the relationships among these variables. One method that is often used in this context is Correspondence Analysis. This approach allows relationships between categories to be visualized in a low-dimensional space, making patterns easier to observe [16], [17]. Several research has demonstrated that this method is effective in identifying patterns of relationships in various contexts, including disaster analysis and socio-economic studies, to reveal underlying associations within categorical data [2], [3].

The main advantage of Correspondence Analysis lies in its ability to simplify complex categorical data without requiring strict statistical assumptions, such as normal distribution or interval scale measurements. Furthermore, it provides a visual representation that facilitates interpretation of the relationships among categories within a single analytical framework [1], [4], [16]–[18]. Therefore, this method is highly suitable for analyzing the association between respondent's characteristics, such as age, education, and occupation, and their level of knowledge regarding maggot cultivation.

Despite numerous studies on maggot cultivation and the application of Correspondence Analysis, there is still a research gap in integrating social aspects, particularly community knowledge levels, with a comprehensive statistical approach. Therefore, this study aims to analyze the level of knowledge of members of Environmental Awareness Group regarding maggot cultivation and to identify the dominant factors influencing it using Correspondence Analysis. The findings of this study are expected to provide a strategic basis for designing targeted training and community empowerment programs in sustainable organic waste management.

## 2. Theoritical Framework

### *2.1. Descriptive Statistics*

Descriptive statistics is used to summarize and present data in a meaningful way through measures such as frequency, percentage, mean, median, and mode. It provides an overview of respondent characteristics and data distribution patterns [3].

According to [5], descriptive statistics aim to describe data without making generalizations beyond the observed sample. In this study, descriptive statistics are used as an initial step to understand the distribution of respondents based on variables such as age, education level, and occupation.

### *2.2. Validity and Reliability Testing*

#### *2.2.1. Validity Test*

Validity refers to the ability of an instrument to measure what it is intended to measure [19].. The validity test is conducted using the Pearson Product Moment correlation using Equation (1):

$$r = \frac{n\sum XY - (\sum X)(\sum Y)}{\sqrt{[n\sum X^2 - (\sum X)^2][n\sum Y^2 - (\sum Y)^2]}} \quad (1)$$

An item is considered valid if the calculated correlation coefficient exceeds the critical value [4].

#### *2.2.2. Reliability Test*

Reliability measures the consistency of an instrument [20]. It is evaluated using Cronbach's Alpha using Equation (2):

$$\alpha = \frac{k}{k-1}\left(1 - \frac{\sum \sigma_i^2}{\sigma_t^2}\right) \quad (2)$$

where $k$is the number of items, $\sigma_i^2$is the variance of each item, and $\sigma_t^2$is the total variance. A value of $\alpha > 0.70$ indicates acceptable reliability [4], [20].

### *2.3. Correspondence Analysis*

Correspondence Analysis (CA) is employed as the main analytical method to explore relationships between categorical variables [16], [17]. The analysis begins with the construction of a contingency table $N = [n_{ij}]$, representing the joint distribution of row and column categories.

To evaluate the association between variables, the chi-square statistic is computed as follows in Equation (3).

$$\chi^2 = \sum_{i=1}^{r} \sum_{j=1}^{c} \frac{(n_{ij} - e_{ij})^2}{e_{ij}} \tag{3}$$

where $e_{ij}$represents the expected frequency under the independence assumption [6].

The contingency table is then transformed into a correspondence matrix using Equation (4).

$$p_{ij} = \frac{n_{ij}}{n} \tag{4}$$

Row and column masses are calculated from marginal proportions and used to construct row and column profiles, which describe the relative distribution of categories [7].

To extract the underlying structure, singular value decomposition (SVD) is applied to the standardized residual matrix as follows in Equation (5).

$$Z = U\Sigma V^T \tag{5}$$

The eigenvalues $\lambda_k = \sigma_k^2$represent the inertia explained by each dimension, while the total inertia is defined as follows in Equation (6).

$$I = \frac{\chi^2}{n} \tag{6}$$

which reflects the overall level of association between variables [7], [8].

The results of CA are visualized in a low-dimensional space, where the proximity between category points indicates the strength of their association. This proximity is measured using the Euclidean distance between coordinates in Equation (7).

$$d_{ij} = \sqrt{\sum_{k=1}^{q} (f_{ik} - g_{jk})^2} \tag{7}$$

where $f_{ik}$and $g_{jk}$are the coordinates of row category $i$and column category $j$ on dimension $k$, and $q$is the number of retained dimensions. Smaller distances indicate stronger relationships between categories.

## 3. Methods

### *3.1. Research Location*

This study was conducted at the Balangan Environmental Awareness Group located in Kalurahan Wukirsari, Cangkringan District, Sleman Regency, Special Region of Yogyakarta. The research was carried out from August 2025 to September 2025.

### *3.2. Data Collection Method*

The data used in this study are primary data collected through a structured questionnaire distributed to members of the Balangan Environmental Awareness Group. The questionnaire was designed to measure respondents' knowledge of maggot cultivation as well as their demographic characteristics. Questionnaires are widely used in social research as an effective tool for collecting categorical and perception-based data [4], [19].

### *3.3. Research Variables*

The variables used in this study consist of independent variables (X) and a dependent variable (Y), as follows:

1. Age Variable

   This variable classifies respondents into age groups: ≤ 35 years, 36–45 years, 46–55 years, and > 55 years. It is used to examine its relationship with the level of knowledge.

2. Education Level Variable

   This variable categorizes respondents based on their highest educational attainment: elementary school (SD), junior high school (SMP), senior high school (SMA/SMK), and diploma/bachelor degree (D3–S1). It is analyzed to determine its association with knowledge of maggot cultivation.

3. Occupation Variable

   This variable identifies respondents' occupational backgrounds, including student, housewife, farmer, entrepreneur/employee/labor, village official, and teacher, and examines their relationship with knowledge level.

4. Maggot Cultivation Knowledge Level

   This is the main dependent variable, measured based on questionnaire scores. The knowledge level is categorized as follows:

   - Score > 70: Very Good
   - Score 50–70: Good
   - Score < 50: Poor

### *3.4. Research Procedure*

The research procedure consists of several systematic steps, starting from problem identification, questionnaire design, data collection, data processing, analysis, and conclusion drawing. The overall process is illustrated in a research flowchart to ensure clarity and systematic implementation.

### *3.5. Data Analysis Method*

The data analysis in this study was carried out through the following stages:

1. **Data Input**

   The collected questionnaire data were entered into Microsoft Excel and processed using SPSS software to ensure proper data organization and readiness for analysis.

2. **Descriptive Analysis**

   Descriptive statistics were used to summarize the characteristics of respondents and the distribution of variables, such as age, education level, occupation, and knowledge scores. This analysis provides an initial overview of the data [9], [10].

3. **Validity and Reliability Testing**

   The validity of each questionnaire item was tested using the Pearson Product Moment correlation, while reliability was measured using Cronbach's Alpha. These tests ensure that the instrument is both accurate and consistent in measuring the intended variables [4].

4. **Correspondence Analysis**

   Correspondence Analysis (CA) was employed to examine and visualize the relationships between categorical variables, particularly between knowledge level and factors such as age, education, and occupation. This method transforms a contingency table into a low-dimensional graphical representation, making patterns of association easier to interpret [2], [3], [11], [16]–[18]. Through this analysis, categories that are closely related will appear near each other in the graphical map, allowing the identification of dominant factors influencing knowledge levels.

5. **Conclusion**

   Conclusions were drawn based on the results of descriptive analysis, validity and reliability testing, and correspondence analysis. These findings were used to answer the research questions and provide insights into the factors influencing maggot cultivation knowledge.

## 4. Results and Discussion

The author must present the research results in the form of analysis results and hypothesis testing results, without needing to describe the data analysis process, such as statistical calculations and the

hypothesis testing procedures. The discussion should include the findings or novelty of the research and compare these findings with the results of relevant previous studies published in earlier articles. Data in the results section should preferably be presented in the form of graphs or tables to make it more engaging. Table captions should be placed above the table, while figure captions should be placed below the figure. Tables and graphs can be used to clarify the discussion of the results.

### *4.1. Descriptive Statistics of Respondent Characteristics and Knowledge Assessment*

**Figure 1** shows that most respondents are in the 46-55 age group (34%), followed by those aged 36-45 and >55 years (each 26%), while respondents aged ≤35 years make up the smallest proportion (14%). This suggests that the respondents are generally in a mature age group, which may influence their experience and knowledge levels in maggot cultivation.

**Figure 2** indicates that most respondents have a senior high school background, followed by associate and bachelor's degree, while those with elementary and junior high school education are fewer. Overall, this reflects a moderate level of educational attainment, which potentially supports their understanding of maggot cultivation practices.

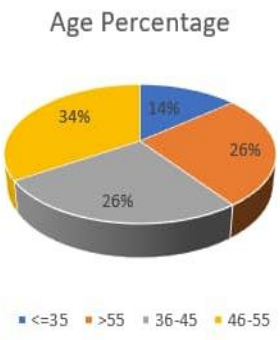


**Figure 1.** Respondent Age Distribution
Source: Data analysis results

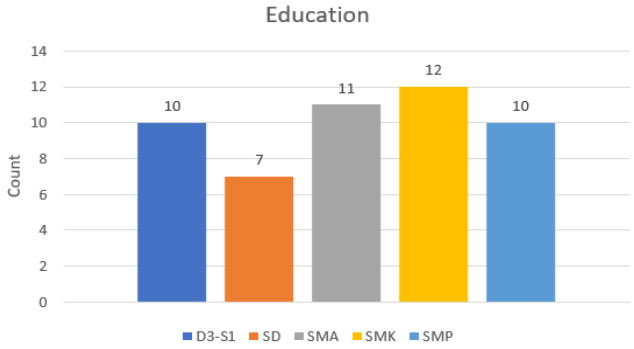


**Figure 2.** Respondent Education Level
Source: Data analysis results

**Figure 3** reveals that most respondents work as entrepreneurs/employees /laborers (36%) and village officials (32%), with smaller proportions of farmers, teachers, students, and housewives. This shows a diverse occupational background, dominated by economically and socially active groups.

**Figure 4** illustrates the distribution of respondent's knowledge levels. The results show that most respondents fall into the good category (19 individuals), followed by very good (17 individuals) and poor (14 individuals). This indicates that, overall, members of Environmental Awareness Group possess a relatively good level of knowledge regarding maggot cultivation, although a proportion of respondents still remains in the poor category [15], [21].

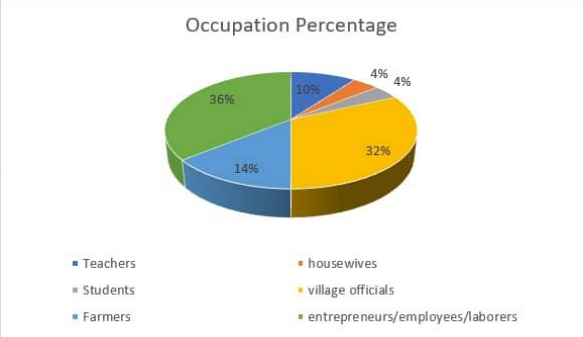


**Figure 3.** Respondent Occupation Distribution
Source: Data analysis results

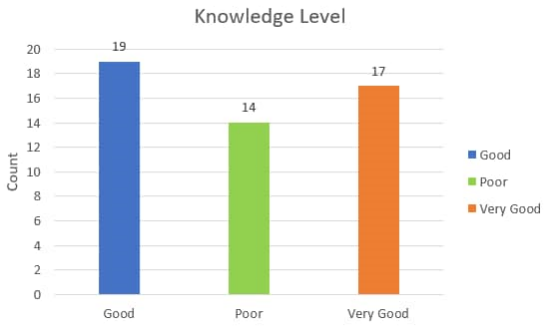


**Figure 4.** Respondent Knowledge Levels
Source: Data analysis results

### *4.2. Validity and Reliability Testing*

**Table 1** presents the results of the validity test using the Pearson Product Moment correlation with a significance level of $\alpha = 0.05$ and a critical value of $r_{(0.05;32)} = 0.3388$. All questionnaire items

(P1–P7) have correlation coefficients greater than the critical value, indicating that all items are valid. Therefore, $H_0$ is rejected, meaning that all questionnaire items are appropriate for measuring the intended variables at a 95% confidence level.

**Table 1.** Validity Test Results

| Variable | Questionnaire | Correlations | $r_{(0.05;32)}$ | Information |
|---|---|---|---|---|
| The level of knowledge of environmental awareness group regarding maggot cultivation | P1 | 0.715 | 0.339 | Valid |
| | P2 | 0.567 | | |
| | P3 | 0.731 | | |
| | P4 | 0.823 | | |
| | P5 | 0.562 | | |
| | P6 | 0.540 | | |
| | P7 | 0.458 | | |

**Table 2** presents the results of the reliability test using Cronbach's Alpha. The analysis produced a value of 0.738, which exceeds the threshold of 0.70, indicating that the instrument is reliable. Therefore, $H_0$ is rejected, meaning that the questionnaire demonstrates good internal consistency and is suitable for further analysis. The data can thus proceed to correspondence analysis.

**Table 2.** Reliability Test Results

| Variable | Cronbach's Alpha | Information |
|---|---|---|
| Characteristics of the Balangan Environmental Awareness Group | 0.738 | Reliable |

### *4.3. Correspondence Analysis*

#### *4.3.1. Correspondence Analysis of Age and Knowledge Level*

**Table 3** presents the results of the Correspondence Analysis between age and knowledge level. The results show that two main dimensions explain 100% of the total inertia. Dimension 1 contributes 74.3% of the variation, indicating that it is the dominant dimension in explaining the relationship between variables. The chi-square value of 44.913 with a p-value < 0.05 indicates a statistically significant association between age and knowledge level. Therefore, age is identified as a significant factor influencing knowledge of maggot cultivation.

**Table 3.** Summary of Correspondence Analysis (Age Variable)

| Dimension | 1 | 2 | Total |
|---|---|---|---|
| Singular Value | 0.820 | 0.480 | |
| Inertia | 0.670 | 0.230 | 0.890 |
| Chi Square | | | 44.910 |
| P Value | | | 0 |
| Proportion of Inertia Accounted for | 0.740 | 0.260 | 1 |
| Cumulative | 0.740 | 1 | 1 |

**Table 4** and **Table 5** present the distribution and association between age groups and knowledge levels. The results indicate that poor knowledge is more prevalent among younger respondents (≤35 and 36–45 years). Meanwhile, the good knowledge category is predominantly found in the 46–55 years age group. In contrast, very good knowledge is mainly associated with respondents aged >55 years. These findings reveal a clear trend of increasing knowledge levels with age, suggesting that older individuals tend to have better understanding and experience in maggot cultivation.

**Table 4.** Row Profile of Age Variable

| Knowledge Level | Age (Years) | | | | |
|---|---|---|---|---|---|
| | <=35 | 36-45 | 46-55 | >55 | Active Margin |
| 1 (Poor) | 0.500 | 0.429 | 0.071 | 0 | 1 |
| 2 (Good) | 0 | 0.368 | 0.526 | 0.105 | 1 |
| 3 (Very Good) | 0 | 0 | 0.353 | 0.647 | 1 |
| Mass | 0.140 | 0.260 | 0.340 | 0.260 | |

**Table 5.** Column Profile of Age Variable

| Knowledge Level | Age (Years) | | | | |
|---|---|---|---|---|---|
| | <=35 | 36-45 | 46-55 | >55 | Mass |
| 1 (Poor) | 1 | 0.462 | 0.059 | 0 | 0.280 |
| 2 (Good) | 0 | 0.538 | 0.588 | 0.154 | 0.380 |
| 3 (Very Good) | 0 | 0 | 0.353 | 0.846 | 0.340 |
| Active Margin | 1 | 1 | 1 | 1 | |

**Table 6** presents the Euclidean distance between age groups and knowledge levels. The results show that the smallest distances occur between poor knowledge and respondents aged ≤35 years, good knowledge and those aged 36-45 and 46-55 years, as well as very good knowledge and respondents aged >55 years. These findings confirm that knowledge levels are closely associated with age categories, where each age group tends to correspond to a specific level of knowledge in maggot cultivation.

**Table 6.** Euclidean Distance (Age Variable)

| Knowledge level | Age (Years) | | | |
|---|---|---|---|---|
| | ≤35 | 36–45 | 46–55 | >55 |
| 1 (Poor) | 0.59 | 1.18 | 2.01 | 2.37 |
| 2 (Good) | 2.52 | 0.84 | 0.43 | 1.91 |
| 3 (Very Good) | 2.63 | 2.02 | 1.33 | 0.17 |

**Table 7** presents the frequency distribution between age groups and knowledge levels. The results show that the highest frequency is observed in the >55 age group with very good knowledge (11 respondents), indicating a strong dominance of this category. This finding reinforces that older respondents tend to have higher levels of knowledge in maggot cultivation.

**Table 7.** Contingency Table (Age Variable)

| Knowledge Level | Age (Years) | | | | |
|---|---|---|---|---|---|
| | <=35 | 36-45 | 46-55 | >55 | Active Margin |
| 1 (Poor) | 7 | 6 | 1 | 0 | 14 |
| 2 (Good) | 0 | 7 | 10 | 2 | 19 |
| 3 (Very Good) | 0 | 0 | 6 | 11 | 17 |
| Active Margin | 7 | 13 | 17 | 13 | 50 |

**Figure 5** illustrates the correspondence analysis biplot between age groups and knowledge levels. The plot shows that younger respondents tend to be associated with poor knowledge, while older respondents are closely related to very good knowledge. Meanwhile, middle-aged groups are positioned near the good category, indicating relatively stable and adequate knowledge levels. Overall, this pattern suggests that age plays an important role in shaping knowledge levels, with increasing age associated with higher levels of knowledge in maggot cultivation.

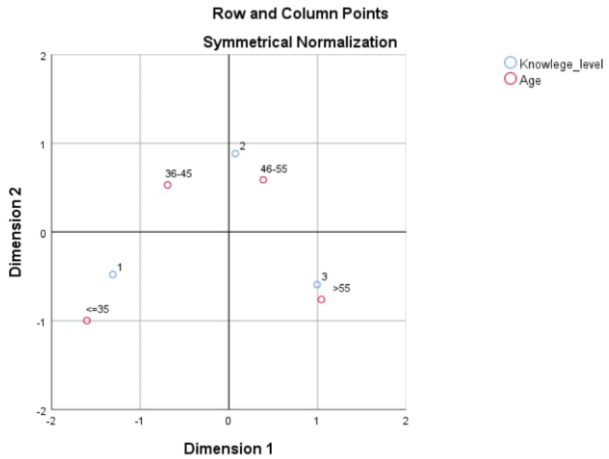


**Figure 5.** Biplot of Age and Knowledge Level

Source: Data analysis results

### *4.3.2. Correspondence Analysis of Education and Knowledge Level*

**Table 8** presents the results of the Correspondence Analysis between education level and knowledge level. The analysis shows a significant relationship, with a chi-square value of $\chi^2 = 70.720$ and $p < 0.05$, indicating that education level is significantly associated with knowledge level. Furthermore, Dimension 1 explains 59.5% of the total variation, highlighting its dominance in capturing the primary structure of the relationship between variables.

**Table 8.** Summary of Correspondence Analysis (Education Variable)

| Dimension | 1 | 2 | Total |
|---|---|---|---|
| Singular Value | 0.917 | 0.757 | |
| Inertia | 0.841 | 0.573 | 1.414 |
| Chi Square | | | 70.720 |
| P Value | | | 0 |
| Proportion of Inertia Accounted for | 0.595 | 0.405 | 1 |
| Cumulative | 0.595 | 1 | 1 |

**Table 9** and **Table 10** present the relationship between education levels and knowledge categories. The results indicate that respondents with elementary and junior high school education tend to be associated with poor knowledge. Meanwhile, respondents with senior high school education are predominantly associated with the good category. In contrast, those with associate and bachelor's degree are closely related to very good knowledge. These findings suggest that higher levels of education are associated with higher levels of knowledge in maggot cultivation.

**Table 9. Row Profile (Education)**

| Knowledge level | Education | | | | | |
|---|---|---|---|---|---|---|
| | Elementary School | Junior High School | Senior High School | Vocational High School | Associate to Bachelor's Degree | Active Margin |
| 1 (Poor) | 0.500 | 0.500 | 0 | 0 | 0 | 1 |
| 2 (Good) | 0 | 0.158 | 0.579 | 0.263 | 0 | 1 |
| 3 (Very Good) | 0 | 0 | 0 | 0.412 | 0.588 | 1 |
| Mass | 0.140 | 0.200 | 0.220 | 0.240 | 0.200 | |

**Table 10. Column Profile (Education)**

| Knowledge level | Education | | | | | |
|---|---|---|---|---|---|---|
| | Elementary School | Junior High School | Senior High School | Vocational High School | Associate to Bachelor's Degree | Mass |
| 1 (Poor) | 1 | 0.700 | 0 | 0 | 0 | 0.280 |
| 2 (Good) | 0 | 0.300 | 1 | 0.417 | 0 | 0.380 |
| 3 (Very Good) | 0 | 0 | 0 | 0.583 | 1 | 0.340 |
| Active Margin | 1 | 1 | 1 | 1 | 1 | |

**Table 11** presents the Euclidean distance between education levels and knowledge categories. The results **indicate** that poor knowledge is closest to respondents with elementary education, good knowledge is most closely associated with senior high school, and very good knowledge is nearest to respondents with higher education. These proximity patterns confirm that education level has a strong influence on knowledge levels in maggot cultivation.

**Table 11. Euclidean Distance (Education)**

| Knowledge level | Education | | | | |
|---|---|---|---|---|---|
| | Elementary School | Junior High School | Senior High School | Vocational High School | Associate to Bachelor's Degree |
| 1 (Poor) | 0.229 | 0.600 | 2.537 | 2.187 | 2.563 |
| 2 (Good) | 2.480 | 1.654 | 0.356 | 1.242 | 2.350 |
| 3 (Very Good) | 2.564 | 2.178 | 2.412 | 0.855 | 0.257 |

**Table 12** presents the frequency distribution between education levels and knowledge categories. The **results** show that the largest group is respondents with senior high school education who fall into the good knowledge category (11 respondents). This finding indicates that individuals with a moderate educational background tend to possess a good level of knowledge in maggot cultivation.

**Table 12. Contingency Table (Education)**

| Knowledge level | Education | | | | | |
|---|---|---|---|---|---|---|
| | Elementary School | Junior High School | Senior High School | Vocational High School | Associate to Bachelor's Degree | Active Margin |
| 1 (Poor) | 7 | 7 | 0 | 0 | 0 | 14 |
| 2 (Good) | 0 | 3 | 11 | 5 | 0 | 19 |
| 3 (Very Good) | 0 | 0 | 0 | 7 | 10 | 17 |
| Active Margin | 7 | 10 | 11 | 12 | 10 | 50 |

**Figure 6 illustrates** the correspondence analysis biplot between education level and knowledge categories. The plot shows that respondents with lower levels of education tend to be associated with poor knowledge, while those with higher educational attainment are closely related to very good knowledge. Respondents with intermediate education levels are generally positioned near the good category, indicating a moderate level of knowledge. Overall, this pattern demonstrates that education is a key determinant of knowledge level, where higher educational attainment is associated with better understanding of maggot cultivation.

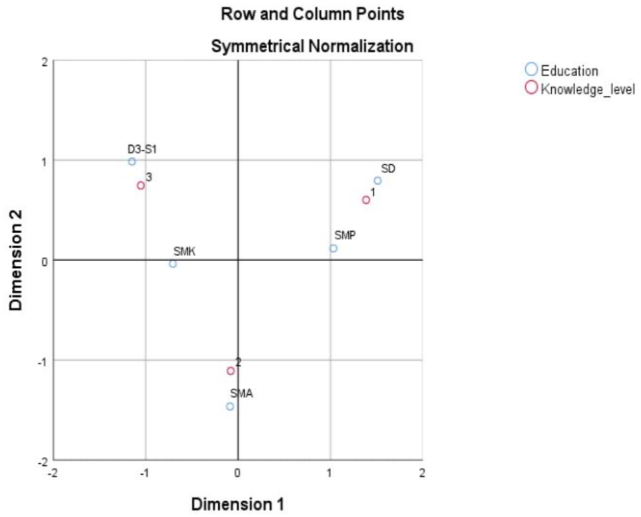


**Figure 6.** Biplot of Education and Knowledge Level
Source: Data analysis results

### *4.3.3. Correspondence Analysis of Occupation and Knowledge Level*

**Table 13 presents** the results of the Correspondence Analysis between occupation and knowledge level. The chi-square value ($\chi^2 = 53.289$) with $p < 0.05$indicates a statistically significant relationship between occupation and knowledge level. Furthermore, Dimension 1 explains 93.8% of the total variation, demonstrating a very strong dominance in capturing the primary structure of the relationship between variables.

**Table 13.** Summary of Correspondence Analysis (Occupation Variable)

| Dimension | 1 | 2 | Total |
|---|---|---|---|
| Singular Value | 1 | 0.256 | |
| Inertia | 1 | 0.066 | 1.066 |
| Chi Square | | | 53.289 |
| P Value | | | 0 |
| Proportion of Inertia | | | |
| Accounted for | 0.938 | 0.062 | 1 |
| Cumulative | 0.938 | 1 | 1 |

**Table 14** and **Table 15** present the relationship between occupation and knowledge categories. The results indicate that students, farmers, and teachers tend to be associated with poor knowledge. Meanwhile, respondents working as entrepreneurs/employees are predominantly associated with the good category. In contrast, village officials are closely related to very good knowledge. These findings suggest that occupation plays an important role in influencing knowledge levels, particularly for individuals with greater involvement in organizational or community activities.

**Table 14.** Row Profile (Occupation)

| Knowledge Level | Occupation | | | | | | |
|---|---|---|---|---|---|---|---|
| | Students | Housewives | Farmers | Entrepreneurs /employees /laborers | village officials | Teachers | Active Margin |
| 1 (Poor) | 0.143 | 0 | 0.500 | 0 | 0 | 0.357 | 1 |
| 2 (Good) | 0 | 0.105 | 0 | 0.526 | 0.368 | 0 | 1 |
| 3 (Very Good) | 0 | 0 | 0 | 0.471 | 0.529 | 0 | 1 |
| Mass | 0.040 | 0.040 | 0.140 | 0.360 | 0.320 | 0.100 | |

**Table 15.** Column Profile (Occupation)

| Knowledge Level | Occupation | | | | | | |
|---|---|---|---|---|---|---|---|
| | Students | Housewives | Farmers | Entrepreneurs /employees /laborers | village officials | Teachers | Mass |
| 1 (Poor) | 1 | 0 | 1 | 0 | 0 | 1 | 0.280 |
| 2 (Good) | 0 | 1 | 0 | 0.556 | 0.438 | 0 | 0.380 |
| 3 (Very Good) | 0 | 0 | 0 | 0.444 | 0.563 | 0 | 0.340 |
| Active Margin | 1 | 1 | 1 | 1 | 1 | 1 | |

**Table 16** presents the Euclidean distance between occupation categories and knowledge levels. The results indicate that poor knowledge is closest to students, farmers, and teachers, while good knowledge is most closely associated with entrepreneurs/employees. In contrast, very good knowledge is nearest to village officials. These proximity patterns confirm that occupation is closely related to knowledge levels, with more socially and organizationally engaged roles tending to exhibit higher levels of knowledge in maggot cultivation.

**Table 16.** Euclidean Distance (Occupation)

| Knowledge Level | **Occupation** | | | | | |
|---|---|---|---|---|---|---|
| | Students | Housewives | Farmers | Entrepreneurs /employees/laborers | village officials | Teachers |
| 1 (Poor) | 0 | 2.944 | 0 | 2.238 | 2.278 | 0 |
| 2 (Good) | 2.305 | 1.636 | 2.305 | 0.436 | 0.986 | 2.305 |
| 3 (Very Good) | 2.305 | 2.832 | 2.305 | 0.760 | 0.210 | 2.305 |

**Table 17.** Contingency Table (Occupation)

| Knowledge Level | Occupation | | | | | | |
|---|---|---|---|---|---|---|---|
| | Students | Housewives | Farmers | Entrepreneurs /employees/laborers | village officials | Teachers | Active Margin |
| 1 (Poor) | 2 | 0 | 7 | 0 | 0 | 5 | 14 |
| 2 (Good) | 0 | 2 | 0 | 10 | 7 | 0 | 19 |
| 3 (Very Good) | 0 | 0 | 0 | 8 | 9 | 0 | 17 |
| Active Margin | 2 | 2 | 7 | 18 | 16 | 5 | 50 |

**Table 17** presents the frequency distribution between occupation and knowledge categories. The results show that the largest group is respondents working as entrepreneurs/employees who fall into the good knowledge category (10 respondents). This finding indicates that individuals engaged in entrepreneurial, or employment activities tend to possess a good level of knowledge in maggot cultivation. **Figure 7** illustrates the correspondence analysis biplot between occupation and knowledge levels. The plot indicates that lower levels of knowledge are associated with less socially and economically active occupations, while higher levels of knowledge are closely related to roles with greater social and organizational involvement. This pattern suggests that active participation in community and economic activities contributes to higher levels of knowledge in maggot cultivation.

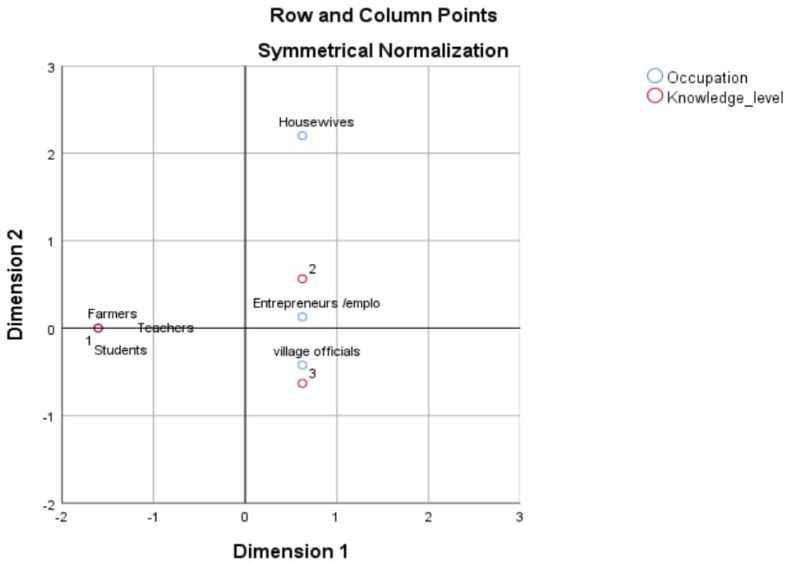


**Figure 7.** Biplot of Occupation and Knowledge Level

## 5. Conclusion

This study concludes that the knowledge level of the Balangan Environmental Awareness Group regarding maggot cultivation is generally adequate, but still uneven across respondents. The findings highlight that education level plays a central role in shaping knowledge, supported by age and occupational background. The use of correspondence analysis successfully reveals clear patterns of association between respondent characteristics and knowledge levels, making it a suitable approach for analyzing categorical data in environmental and social studies. These findings imply that improving knowledge should focus on targeted educational and training strategies, particularly for groups with lower educational backgrounds to achieve more effective and sustainable maggot cultivation practices [15], [21].

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