

Interpretive Structural Modeling in the Development of Arabica Coffee Agrotourism in Kintamani, Bangli Regency, Bali, Indonesia

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Abstract

Located in the highlands and has beautiful nature, Bangli Regency has a high potential for the development of agrotourism. One of the agro-tourisme developed in this area is agrotourism based on Arabica coffee located at Kintamani area which is known as Kintamani Arabica coffee agrotouism. Agrotourism in Bangli Regency has a land area and tracking path for tourists with safe and comfortable road conditions, beautiful natural panoramas of coffee plantations and there is a coffee processing business that produces specialty arabica coffee products of Kintamani. The purpose of this study is to create a planning structure (design) for the development of agrotourism based on arabica coffee in terms of structural relationships and inter-relationships between research elements. The research used the computerized arabica coffee agrotourism development method using Interpretative Structural Modeling (ISM) software. ISM analysis focuses on 4 (four) structural elements of Kintamani Arabica coffee agrotourism development in Bangli Regency, namely 1) institutional elements, 2) constraint elements, 3) objective elements, and 4) activity or program elements.

Keywords: interpretative structural modeling, Arabica coffee, agro-tourism

DOI: 10.7176/JBAH/13-10-03

Publication date: June 30th 2023

1. Introduction

In the manufacturing sector today, human capital is still essential for most factories to carry out a variety of manual operations, in spite of the rapid advancement of automation technology and robotics. Futuristic vision of “unmanned manufacturing” (Deen 1993) is forbiddingly expensive, because all its hardware components need to be computer controlled so as to freely communicate with each other; and yet, most of the outcomes are not promising (Sun & Venuvinod 2001). By and large, factories equipped with relatively simple machinery controls will require continuous attendance of human operators; for examples, textile mills, leather products, and medical appliances. With limited capital investments in production equipment, the main budget of their fixed costs lies on the workforce size (Techawiboonwong *et al.* 2006).

With regard to cost-effectiveness, labour planning always optimal for the minimum amount of workers needed to deal with the daily operations, as well as the probable rate of disturbance (Lim *et al.* 2008). The workforce disturbance is often ascribed to absenteeism and turnover, which may result in considerable loss of productivity for any labour-intensive division (Easton & Goodale 2002). Buffering with redundant skilled workers (Molleman & Slomp 1999) or relief workers (Redding 2004) might be a direct solution to absenteeism; however, the rising labour cost must be justifiable due to the fact that underutilisation of labour during low demand seasons is considered a waste of resources. Absenteeism is the measure of unplanned absences from workplace due to some reasons like personal emergency, accident, illness, etc. Turnover occurs when an active worker resigns from the company of his own accord, thus leaving a vacant post until a replacement is found. If such disturbance has caused a large number of tasks become unattended and overdue, the company is then vulnerable to overtime cost, shrunk capacity and productivity, extra queuing time, lost business income, etc. In order to prevent these deteriorative effects, optimising the number of workers can be helpful. As a fundamental branch of knowledge in manufacturing business, workforce management will never fall behind the times. Therefore, it is worth an attempt to incorporate a novel methodology, such as HMS, into the state of the art of workforce sizing.

2. Methodology

2.1. Time and location of the research

The research location is in Catur Village and Batur Tengah Village, Kintamani District, Bangli Regency, Bali. The location of this study was chosen on purpose since Kintamani has the biggest Arabica coffee plantation in Bangli Regency when compared to other districts, with a total area of 5,640.43 ha (Dinas Pertanian Tanaman Pangan Kabupaten Bangli, 2020).

The Arabica coffee agrotourism development technique in Bangli Regency was computerized using Interpretative Structural Modeling (ISM) software in this descriptive-analytical study with a quantitative analysis

methodology. In this study, the specialists participating in the development of Arabica coffee agrotourism in Bangli Regency were sampled using a purposive sampling approach.

This study made use of both primary and secondary data. The implementation of primary data to clarify the design of Arabica coffee agrotourism development strategies drawn from expert assessments of absolute decision-makers via a questionnaire is employed. The Bangli Regency Tourism and Culture Office, the Bangli Regency Agriculture and Plantation Office, the Bangli Regency Industry and Trade Office, the Bangli Regency Regional Planning Agency, academics from public and private universities, the chairman of *Subak*, the chairman of Pokdarwis (tourism activists groups), community leaders, and the coffee processing business were among those who responded.

2.2 Interpretive Structural Modeling (ISM)

Interpretative Structural Modeling (ISM) is a group learning process in which structural models are useful for photographing complex system matters, dealing with difficult habits, and changing long-term planners who frequently apply operational and/or application research techniques direct descriptive statistics (Marimin, 2004).

The ISM phases was separated into two sections, *i.e.* 1) hierarchical organization and 2) sub-element categorization (Eriyatno, 2003). The fundamental premise is the identification of structures inside a system that delivers high value for benefits in order to properly design the system and make better decisions. The following measures were taken:

1. Hierarch

- 1) The program under study was organized by separating it into elements, and each element was further subdivided into several sub-elements.
- 2) Establishing a contextual relationship between the sub-elements that includes a subordinate terminology direction that leads to pairwise comparisons (by experts). An examination of the contextual relationship in which one subelement (subelement I contribute to the existence of another subelement (subelement j). This contextual relationship between sub-elements I and j were acquired from experts who responded to a questionnaire using the symbols V, A, X, and O.
V = subelement I supports subelement j but not vice versa if $e_{ij} = 1$ and $e_{ji} = 0$.
A = subelement j supports subelement I but not vice versa if $e_{ij} = 0$ and $e_{ji} = 1$.
If $e_{ij} = 1$ and $e_{ji} = 1$, then X = subelements I and j support each other.
If $e_{ij} = 0$ and $e_{ji} = 0$, then O = subelements I and j are unrelated.

The value of $e_{ij} = 1$ indicates that there is a contextual link between the i-th and j-th sub-elements, but $e_{ji} = 0$ indicates that there is no contextual relationship between the i-th and j-th sub-elements.

- 3) The analyzed data was organized into a Structural Self Interaction Matrix (SSIM). SSIM was created as a Reachability Matrix (RM) table by substituting the letters V, A, X, and O with the numbers 1 and 0.

2. Sub-element Classification

The classification of supplements is often divided into four categories:

- 1) Sector I is an autonomous factor (weak driver – weak dependent variables). Sector I contains elements that have weak driving forces and dependencies. Elements that are not related to the system and may have little connection will be removed from the system. Subelements included in Sector I if; DP value $\leq 0.5X$ and D value $\leq 0.5X$. X is the number of subelements.
- 2) Sector II is a dependent factor (weak driver - strongly dependent variables). Elements included in this sector are elements that have weak driving forces and strong dependencies and are dependent. Subelement in Sector II if; DP value $\leq 0.5X$ and D value $> 0.5X$, where X is the number of subelements.
- 3) Sector III is the linkage factor (strong driver - strongly dependent variables). Elements belonging to this sector include elements that have strong driving forces and dependencies and must be studied carefully because the relationship between elements is unstable. Sub-elements included in Sector III, if ; DP value $> 0.5X$ and D value $\leq 0.5X$, where X is the number of subelements.
- 4) Sector IV is an independent factor (strong driver - weak dependent variables). Elements that are included in this sector are elements that have strong driving forces and weak dependencies as well as elements that are key factors in model development. Sub-elements included in Sector IV if ; DP value $> 0.5X$ and D value $\leq 0.5X$, where X is the number of subelements.

3. Results and Discussions

The ISM model's results are based on a study of expert perspectives obtained through in-depth interviews and compiled into a single structured interaction matrix, or Structural Self Interaction Matrix (SSIM). The Driver Power – Dependence (DP-D) matrix categorizes sub-elements into four (four) categories: 1) independent (autonomous), 2) dependent, 3) related (linkage), and 4) independent. These four categories define the status and role of the institutions and policies under consideration. The outcomes of contextual connections between sub-

elements in each element are expressed using subordinate terminology, which refers to pairwise comparisons between sub-elements and includes a relationship direction (Eriyatno, 2003).

The following four structural factors of Kintamani Arabica coffee agrotourism development in Bangli Regency were examined using Interpretive Structural Modeling (ISM) consisting of 1) institutional elements, 2) constraint elements, 3) objective elements and 4) activity or program elements. These four characteristics will be discussed in further depth in the next section.

1. Institutional Elements in Arabica Coffee Agrotourism Development

Institutions contain restricting and binding elements in the form of norms, codes of ethics, official and informal regulations for governing social conduct, and incentives to collaborate to achieve common goals (Djogo *et al.*, 2003). The identification of institutional elements in Kintamani agro-tourism development in Kabupaten Bangli resulted in the following sub-elements: 1) Bangli Regency Tourism and Culture Office (L1), 2) Bangli Regency Food Crops Agriculture Office (L2), 3) Bangli Regency Trade and Industry Office (L3), 4) Bangli Regency Regional Planning Board (L4), 5) *Subak* (L5), 6) *Pokdarwis* (tourism activists groups) (L8).

The sub-element categorization relates to the processed reachability matrix to calculate the value of dependence and driver power (Attri *et al.*, 2013). The elements of Arabica coffee agro-tourism development institutions are described in four categories, namely: 1) autonomous, 2) dependent, 3) linked, and 4) independent, and are organized based on the driving power and dependence matrix. These four categories define the status and role of the institutions and policies under consideration. Figure 1 depicts the power-dependence driving matrix for institutional factors.

The dependent sector has three institutional sub-elements: 1) Bangli Regency Tourism and Culture Office (L1), 2) Bangli Regency Industry and Trade Office (L3), and 3) Bangli Regency Regional Planning Agency (L4). According to the findings of this research, the three sub-elements of institutions in the dependent sector are significantly dependent on the system and lack a significant driving power.

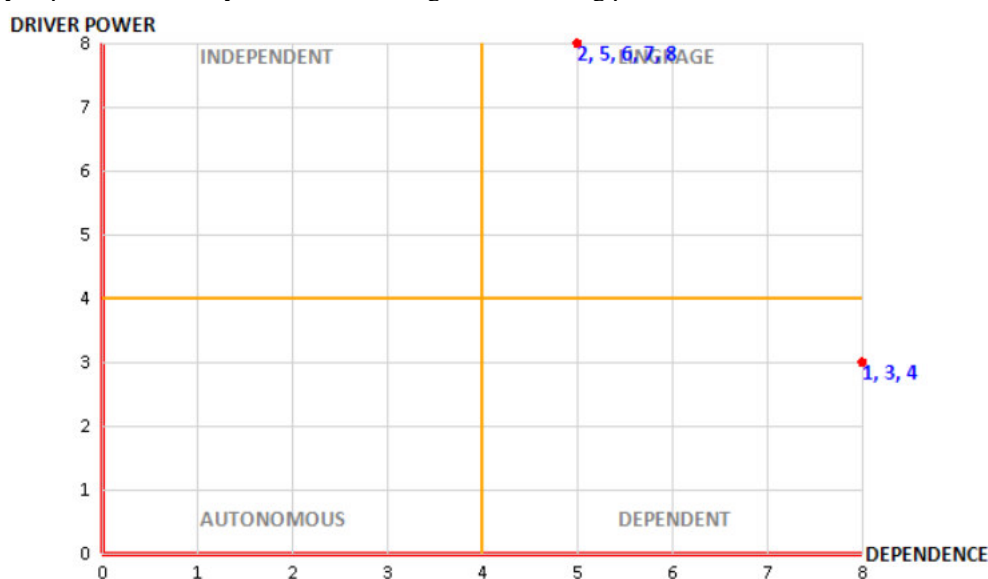


Figure 1. Matrix of Driver Power – Dependence Elements of Kintamani Arabica Coffee Agrotourism Development Institute in Bangli Regency

Source: primary data processing using exsimpro ISM

The linking sector is comprised of 5 (five) institutional sub-elements, which are as follows: 1) Bangli Regency Food Crops Agriculture Service (L2), 2) *Subak* (L5), 3) *Pokdarwis* (L6), 4) Community leaders (L7), and 5) Capital institutions (L8). Each of these five institutions is interconnected with the others and has a significant amount of influence on the development of Arabica coffee agrotourism in Kintamani. Because the linkage sector is a major driving force behind the success of a program, but because it is also heavily reliant on the success of the program, every action taken by the sub-elements of the institutions involved will have an impact on the success of the development of Arabica coffee agro-tourism in the region. In the other direction, failure to pay sufficient attention to this sub-element would fail the growth of Arabica coffee agro-tourism. When it comes to encouraging the growth of Kintamani Arabica coffee agrotourism in Bangli Regency, the five institutions are very dependent on the efforts of other organizations.

After conducting an ISM structural model analysis, the results showed that there was a hierarchical structure in place for the sub-elements of the Bangli Regency Kintamani Arabica coffee agrotourism development agency. This structure was represented by a diagram of the ISM structural model, as shown in

Figure 2. According to the findings of the ISM analysis, the structure of Arabica coffee agro-tourism development institutions in Kintamani, Bangli Regency is divided into two (2) levels, with the first level consisting of the Bangli Regency Food Crops Agriculture Office (L2), *Subak* (L5), *Pokdarwis* (L6), community leaders (L7), and capital institutions (L8). The Bangli Regency Food Crops Agriculture Office (L2) and the Bangli Regency Water Crops Agriculture Office (L8) comprise the second level. The five Arabica coffee agro-tourism development institutions will provide second-level support to the Bangli Regency Tourism and Culture Office (L1), the Bangli Regency Industry and Trade Office (L3), and the Bangli Regency Regional Planning Agency (L4) at the first and second levels of government, respectively.

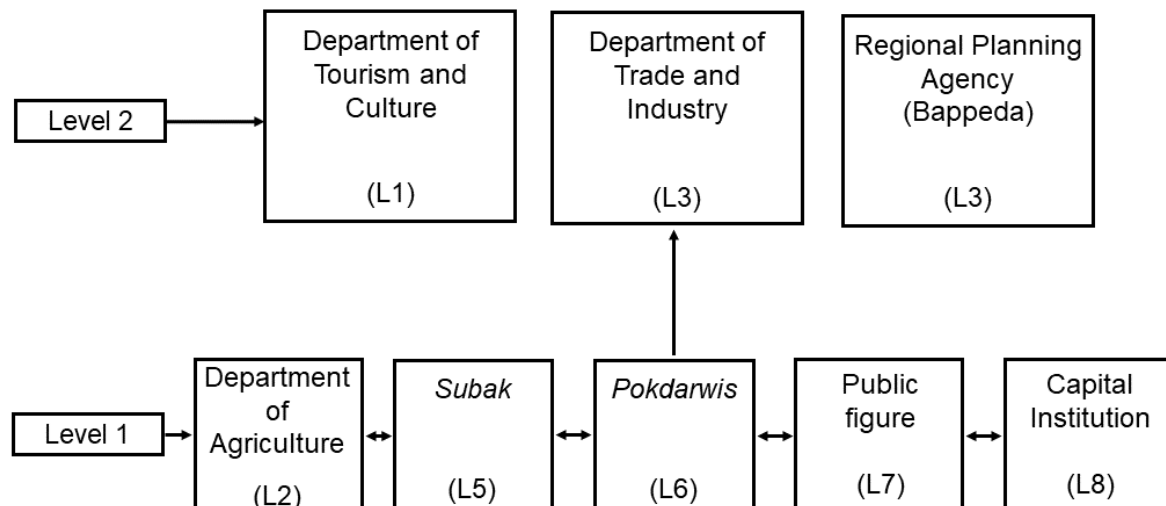


Figure 2: ISM Model of Arabica Coffee Agrotourism Development Institutions
 Source: primary data processing using exsimpro ISM

2. Constraints in Arabica Coffee Agrotourism

According to the findings of an expert opinion survey conducted using the Interpretative Structural Modeling (ISM) method, there are ten (ten) sub-elements of obstacles to overcome, which are as follows: 1) Limited capital (K1), 2) Low quality of human resources (K2), 3) Production facilities and infrastructure are still limited, and 4) Limited production facilities and infrastructure (K3), Marketing access for coffee products is still not optimal (K4), agro-tourism promotion is not optimal (K5), low participation of the surrounding community (K6), Arabica coffee postharvest processing technology is still inadequate (K7), a lack of programs training tour guides in supporting agro-tourism is still lacking (K8), a lack of agricultural extension workers, both in terms of quality and quantity (K9), and a lack of government support in coffee marketing and agro-tourism are all issues that need (K10).

When the constraint components are shown, the of sub-elements are described by four (four) categories, which are as follows: 1) autonomous, 2) dependent, 3) connected, and 4) independent. They are divided into four categories that describe the obstacles faced by all stakeholders who play a collective and cohesive role in the development of Kintamani coffee agrotourism in Bangli Regency. These four categories are then used to create a power-dependence driver matrix, which is then used to determine how much power each driver has. Figure 3 depicts a diagram of the diver power – dependency matrix, which investigates the constraint components. The diver power – dependence matrix, which examines the constraint elements, is displayed visually in the form of a diagram. The figure depicts the distribution of three (three) constraint sub-elements in a single region of the linkage quadrant, which includes the following elements: 1) Limited financial resources (K1), 2) The quality of human resources is still missing (K2), 3) Facilities and infrastructure are still lacking (K3), 4) Access to marketing coffee goods is not being maximized (K4), and 5) Promotion is not being maximized (K5) (K5), The linkage quadrant includes the following topics: 6) Low community participation (K6), 7) Inadequate post-harvest processing technology (K7), 8) Lack of tour guide training programs (K8), 9) Lack of agricultural extension workers (K9), and 10) Government support in coffee marketing and agro-tourism promotion (K10).

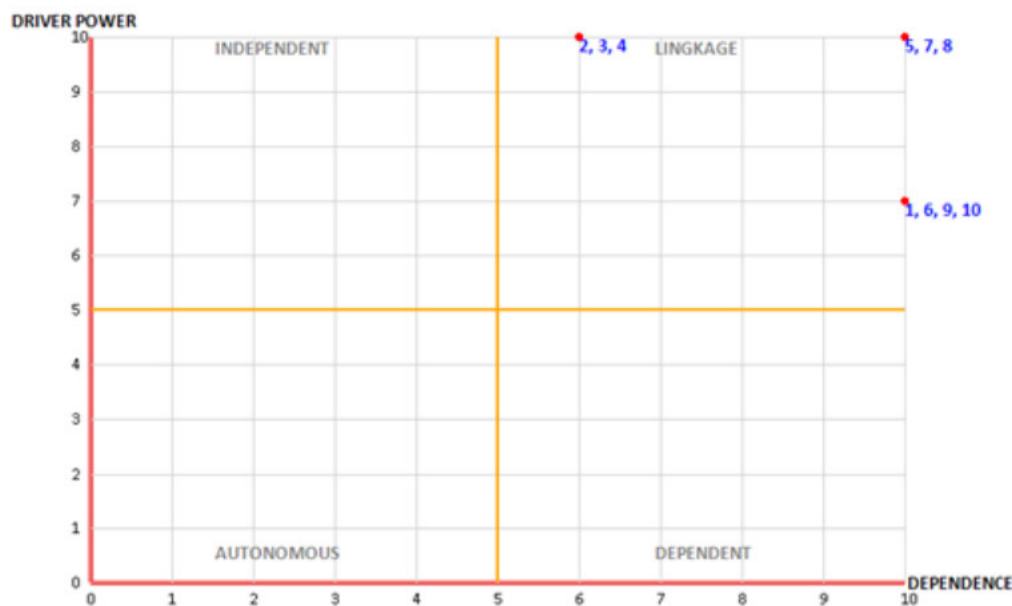


Figure 3. Driver Power – Constraint Elements Matrix in Kintamani Arabica Coffee Agrotourism Development in Bangli Regency

Source: primary data processing using exsimpro ISM

The ten sub-elements of these constraints have a high driving force (driver power) and a high level of dependence, in other words, they are highly reliant on other constraints in order to encourage the resolution of obstacles to the development of Arabica coffee agro-tourism in the region where they occur. However, the growth of Kintamani Arabica coffee agrotourism in Bangli Regency was not significantly influenced by the linking sector. After the Interpretive Structural Modeling (ISM) analysis was completed, the results produce a hierarchical structure of the constraint sub-elements consisting of three levels, where the first level was a key sector and the constraints on agro-tourism development were prioritized to be resolved in the first stage, namely: limited capital (K1), low participation of the community (K6), lack of agricultural extension workers (K9), and lack of government support in coffee marketing and distribution (K10) (K10). The resolution of these four hurdles will be able to promote the resolution of agro-tourism development limits at the second level if they are successfully addressed. The second level consists of the following elements: inadequate promotion (K5), insufficient post-harvest processing technologies (K7), and a lack of training programs for tour guides in order to promote agrotourism (K8). It will also be possible to encourage completion of the completion of the third level obstacles if the first and second level obstacles can be overcome. These third level obstacles are as follows: low quality of human resources (K2), limited production facilities and infrastructure (K3), and limited access to coffee product marketing (not maximized) (K4).

Using Interpretive Structural Modeling (ISM) on the constraint element, the researchers discovered a hierarchical structure of issue sub-elements that formed an impediment to the growth of Kintamani Arabica coffee agrotourism in Bangli Regency. The findings of the study revealed that for the progress and sustainability of agrotourism, it is critical that the sub-element constraints at level one be addressed immediately. Agrotourism has the potential to raise the image of Bangli Regency on a national and international level as an area that already possesses geographical indications (GIs) that are extremely valuable to the people of Kintamani, and it is imperative that these constraints be addressed immediately. According to Figure 4, the most important constraint sub-elements at level one is provided in the form of an Interpretive Structural Modeling (ISM) structural model diagram, which depicts the ISM structural model diagram.

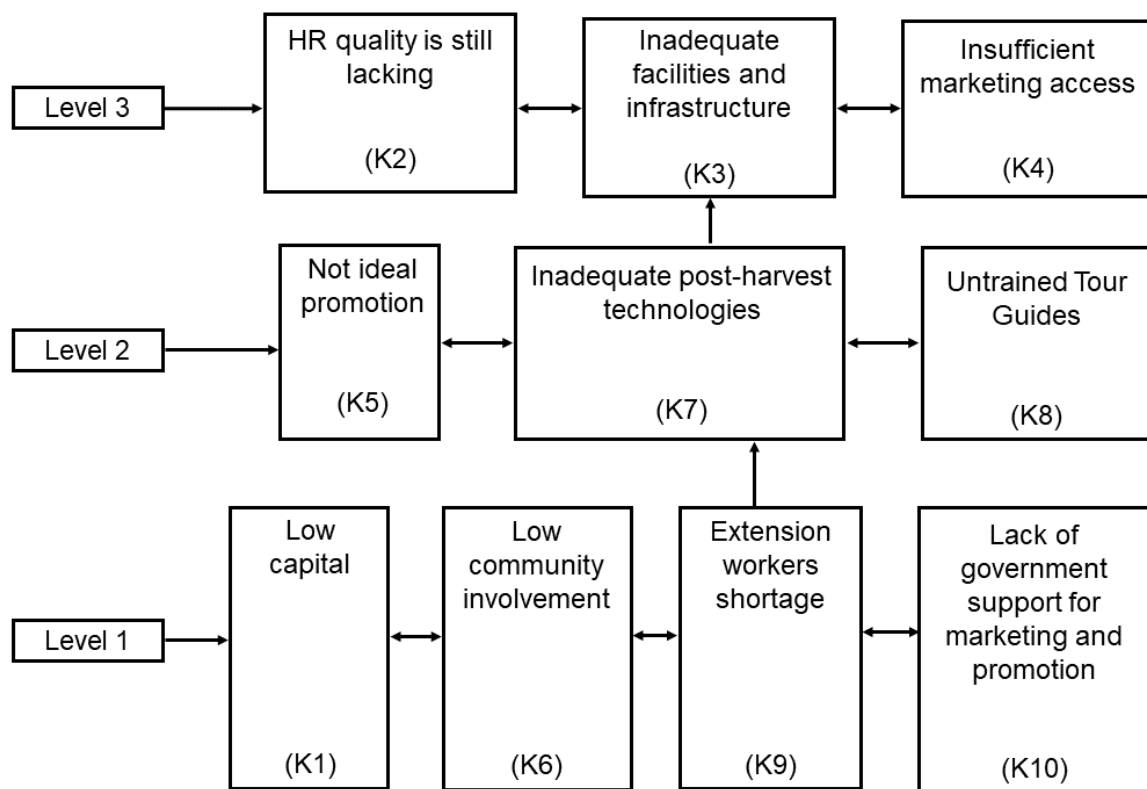


Figure 4: Agrotourism Development in Bangli Regency, Kintamani Arabica Coffee

Source: primary data processing using exsimpro ISM

The results of the analysis conducted using the ISM revealed that the constraints to the development of arabica coffee agro-tourism can be classified into three (three) levels, with the first level consisting of four (four) constraints, which are as follows: 1) capital limited (K1), 2) low community participation (K6), 3) lack of agricultural extension workers (K9), and 4) lack of government support (K9) (K10). If the four primary obstacles to developing agro-tourism are overcome, it will be possible to encourage the resolution of the secondary obstacles, which are as follows: 1) inadequate promotion (K5), 2) insufficient post-harvest processing technology (K7), and 3) a lack of tour guide training programs to support agro-tourism (K8). Furthermore, improving performance at the second level will be able to encourage the improvement of obstacles at the third level, which are as follows: 1) a lack of high-quality human resources (K2), 2) a lack of adequate production facilities and infrastructure (K3), and 3) a lack of access to coffee products marketing that is not fully utilized (K4). 4 (four) important sub-elements contribute to the development of Kintamani coffee agrotourism in Bangli Regency, and they are as follows: 1) limited capital; 2) low community participation; 3) a scarcity of agricultural extension workers; and 4) a dearth of government support for coffee marketing and agrotourism promotion.

3. Agrotourism Management of Arabica Coffee

The desired sub-elements of the development of Kintamani arabica coffee agro-tourism in Bangli Regency include: 1) increasing farmers' income (T1), 2) improving people's living standards (T2), 3) expanding employment opportunities (T3), 4) protecting the environment (T4), 5) improving the quality of human resources (T5), 6) increasing community participation (T6), 7) increasing the added value of Arabica coffee products (T7), 8) increasing the number of tourist visits (T9). The ISM approach was used to identify the nine sub-elements that were determined to be connected via an expert opinion poll.

As shown in Figure 5, the elements of Arabica coffee agrotourism development objectives are organized based on the driver power and dependence matrix. The classification of sub-elements into four (four) categories, namely autonomous, dependent, linked, and independent from the objective sub-element is based on the driver power and dependence matrix in Arabica coffee agro-tourism management in Bangli Regency can be seen in Figure 5.

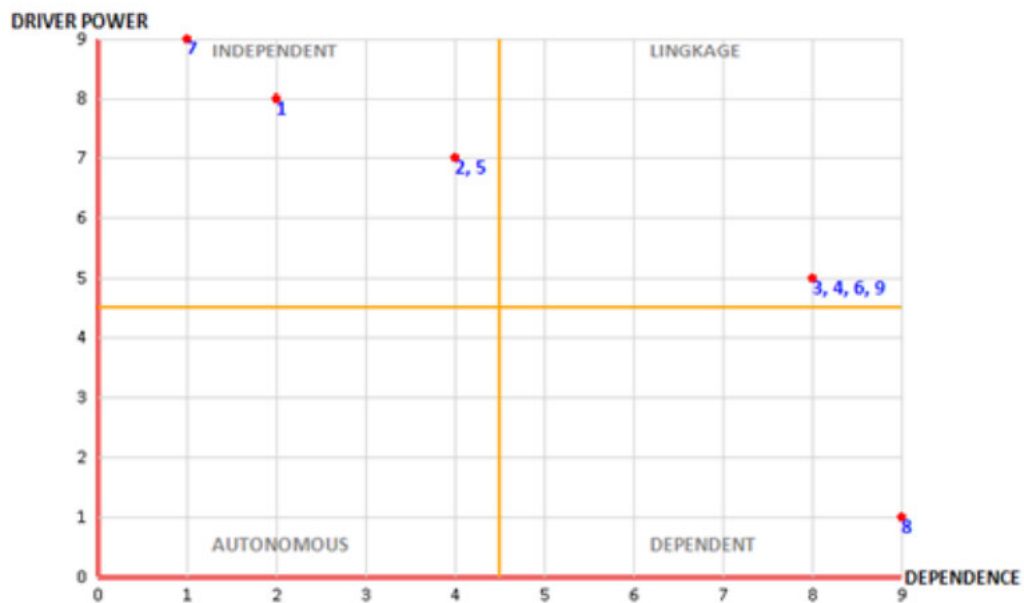


Figure 5: Objectives Power–Dependency Matrix for Kintamani Arabica Coffee Agrotourism in Bangli Regency
 Source: primary data processing using exsimpro ISM

It is noted that one desired and required sub-element in the development of Kintamani Arabica coffee agrotourism in Bangli Regency which is included in the dependent sector is represented by the distribution of points or notations for each destination sub-element: increasing the number of tourist visits to the agrotourism (T8). This sub-element has a low driving power and a high degree of dependency on other objectives in the development of arabica coffee agro-tourism, as a result of which it is ranked lower on the priority list of the goals for growing arabica coffee agro-tourism in Bangli Regency’s growth. Because it is heavily reliant on the system and lacks a significant driving force, the objective sub-element in the dependent sector is extremely dependent on the system.

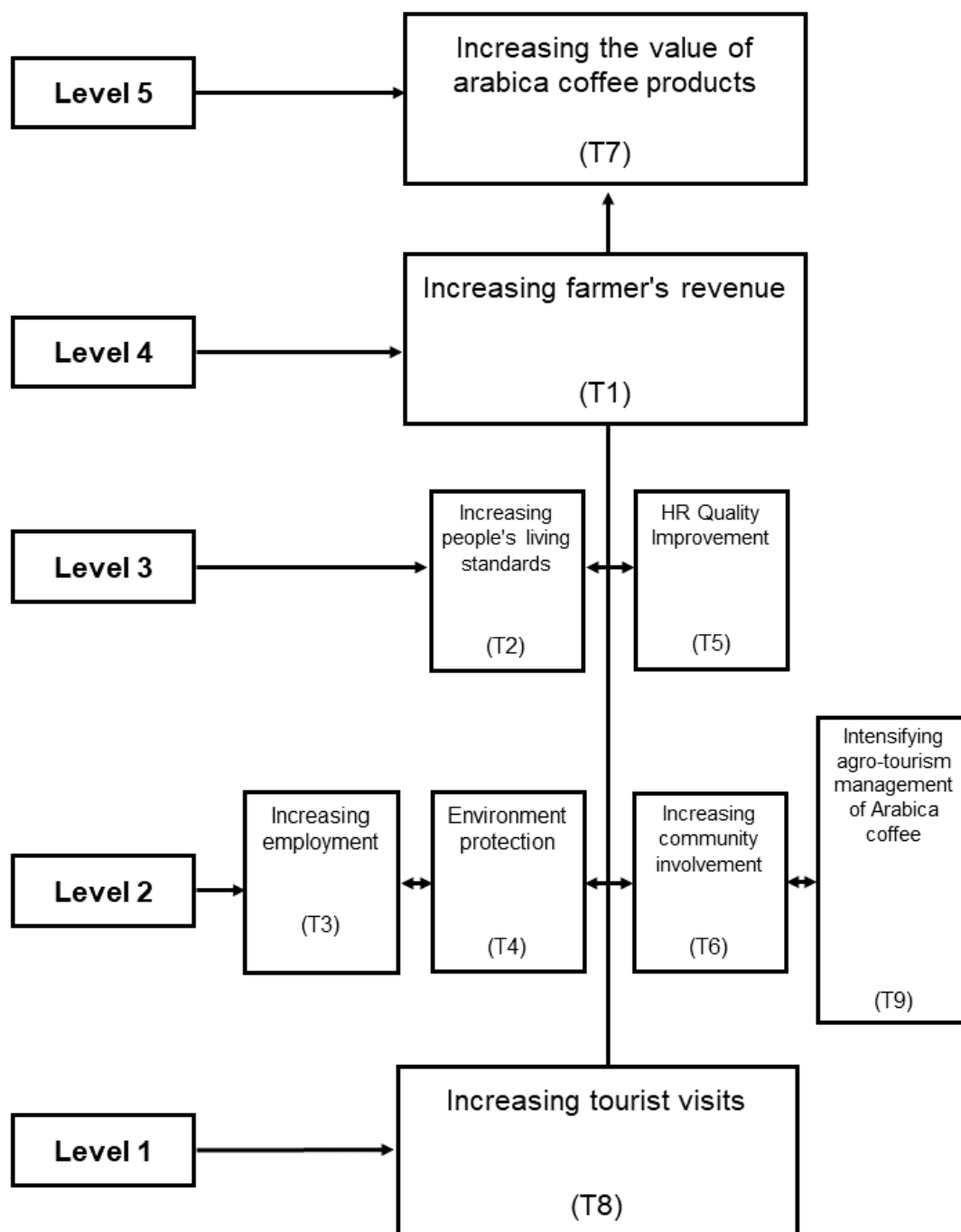


Figure 6: ISM Model Diagram of Destination Structuring in Kintamani Arabica Coffee Agrotourism Development in Bangli Regency

Source: primary data processing using exsimpro ISM

A structural model diagram of the ISM is used to illustrate the hierarchical structure of the goal of establishing Kintamani Arabica coffee agro-tourism in Bangli Regency. Figure 6 depicts the ISM's structural model diagram. In accordance with the findings of the Interpretive Structural Modeling (ISM) analysis, there are 4 (four) objective sub-elements that are included in the independent sector, which are as follows: 1) increasing the added value of Kintamani Arabica coffee products (T7), 2) increasing farmers' income (T1), 3) increasing the price and prestige of the community (T2), 4) improving the quality of human resources (valuable human resources) (T5). The four goal sub-elements are located in the independent sector, which means that they serve as a free variable with a significant driving force in the development plan of Arabica coffee agro-tourism in Bangli Regency, but are not reliant on the system. In respect to the four programs/activities, it comes out that the main sector in the power-dependence driver matrix is improving the added value of Arabica coffee products, which is the case for the first three programs/activities and the fourth program/activity (T7). The findings of data

processing utilizing Interpretive Structural Modeling (ISM) analysis demonstrate that the autonomous sector has no objective sub-elements, despite the fact that it includes all of the sectors specified in the Driver Power–Dependence Matrix. Thus, variables in the autonomous sector are not tied to the system and may only have a limited interaction with the system, even if the linkage may be considerable.

According to the findings of the ISM analysis, the desired goal structuring in the development of Kintamani Arabica coffee agrotourism in Bangli Regency consists of 5 (five) levels, with the first level focusing on the desired destination being a key sector in the development of Arabica coffee agrotourism, namely increasing the number of tourists visiting the destination. (T8). A stimulus can be provided by the sub-elements at the first level in order to move forward with the goals of the second level, which is comprised of four (four) sub-elements, namely: 1) employment expansion (T3), 2) environmental conservation (T4), 3) increasing community participation (T6), and 4) improvement of integrated and sustainable Arabica coffee agrotourism management (T9). Furthermore, this second level will support the improvement of people's living conditions (T2) as well as the improvement of the quality of human resources (T5), both of which are at the third level of development. As a result, the third level will stimulate the fourth level, which is the increase in farmer's revenue (T1). The growth in the added value of Arabica coffee goods (T7), which is the fifth level, will be spurred on by this fourth level, which will culminate in the fifth level.

It is the sub-element of increasing the number of tourist visits that is the most important aspect in the development of Kintamani Arabica coffee agrotourism in Bangli Regency as a destination element that becomes a priority in the development of Kintamani Arabica coffee agrotourism. The manager's role in promoting Kintamani Arabica coffee agrotourism in order to increase the number of tourist visits is carried out through the implementation of a strategy that includes the organization of an exhibition of Arabica coffee products as well as the selection of printed promotional media in the form of brochures and the use of the internet to spread the word. It is vital, according to Payangan (2014), to develop an integrated promotion strategy that may be applied to a specific geographic region.

4. Kintamani Arabica Coffee Agrotourism Program Elements

The findings of the research of expert viewpoints serve as the foundation for the establishment of benchmarks in program components or activities that will ensure the long-term success of the development of Kintamani Arabica coffee agrotourism in Bangli Regency. Eight (eight) sub-elements comprise the program elements, which are as follows: 1) qualified human resources (P1), 2) improvement of facilities and infrastructure (P2), 3) synergy between the government, coffee business managers, and academics (P3), 4) improved guidance counseling on Arabica coffee (P4), 5) increased training of tour guides (P5), 6) Regulations on agro-tourism management (P6), 7) improved postharvest coffee processing technology (P7), and (P8). The ISM approach was used to identify links between the eight sub-elements, which were discovered via an expert opinion poll.

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In this report, we provide an overview of the elements of the Kintamani Arabica coffee agrotourism development program/activity in Bangli Regency, which was compiled using the driver power and dependence matrix, and describes the classification of sub-elements into four (four) categories: 1) autonomous, 2) dependent, 3) related (linkage), and 4) independent from the program/activity sub-elements in the management of Kintamani Arabica coffee agrotourism in Bangli Regency. Figure 7 depicts the power and dependent matrix of the driver.

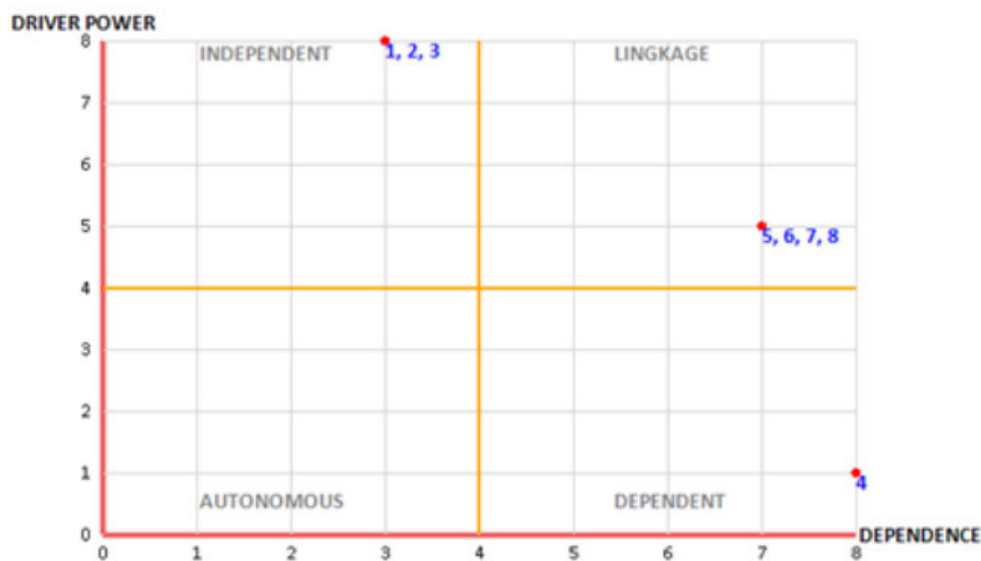


Figure 7: Driver Power – Dependence Matrix of Program/Activity Elements in Kintamani Arabica Coffee Agrotourism Development in Bangli Regency
 Source: primary data processing using exsimpro ISM

An additional sub-element has been added to the program/activity sub-element that is included in the dependent sector, and that is expanding counseling advice on Arabica coffee (P4). The fact that this sector has a low driving force and a high degree of reliance on other program activities means that it is not given the attention it deserves in the development of Arabica coffee agrotourism in Bangli Regency. According to the findings of this study, the projected program/activity sub-elements in the dependent sector (weak driver – substantial reliance) are extremely reliant on the system and do not have a significant driving power. It is common for variables to appear in the dependent sector in the form of dependent variables. According to the Arabica coffee agro-tourism development plan in Bangli Regency, the position of the sub-elements in the dependent sector will be determined in accordance with the position of the other components in the independent sector.

According to the findings of the analysis on the elements of this program/activity that are included in the independent sector, there are three (three) programs/activities that are expected to be implemented in the development of Kintamani Arabica coffee agrotourism in Bangli Regency, namely: 1) quality human resources (P1), 2) improvement of facilities and infrastructure (P2), and 3) synergy between the government, coffee business managers, and academics (P3). Three sub-elements of the program/activity that are expected to be in the independent sector mean that they will act as independent variables in the development strategy of Arabica coffee agrotourism in Bangli Regency, meaning that they will have a significant driving force but will not be influenced by the system overall.

Following the completion of the analysis on the elements of this program/activity that are included in the independent sector, there are three (three) programs/activities that are expected in the development of Kintamani Arabica coffee agrotourism in Bangli Regency, which are as follows: 1) quality human resources (P1), 2) improvement of facilities and infrastructure (P2), and 3) synergy between the government, coffee business managers, and academics (P3) (P3). It is expected that all three sub-elements of the program/activity will fall into the independent sector. This means that they will act as independent variables in the development strategy of Arabica coffee agrotourism in Bangli Regency, acting as large driving forces without being reliant on any other factors in the system.

In relation to the four activities/programs, the key sectors in the power-dependence driver matrix are quality human resources (P1), improvement of facilities and infrastructure (P2), synergy between the government, coffee processing businesses, and academics (P3), and the improvement of facilities and infrastructure (P4) (P3). Using Interpretive Structural Modeling (ISM), the findings of the study revealed a hierarchical structure for the sub-elements inside Bangli regency Kintamani Arabica coffee agrotourism development agency, which was presented in the form of an ISM structural model diagram, as shown in Figure 8.

As shown in Figure 8, based on the findings of the study conducted using Interpretive Structural Modeling (ISM), the predicted program/activity structure in the development of Arabica coffee agrotourism in Bangli Regency is three (three) levels in complexity. the sub-element of increasing counseling guidance on Arabica coffee (P4), which cannot be provided optimally due to a lack of extension workers assigned to the Kintamani area, particularly in the agro-tourism area, is the most important key sector to pay attention to at the first level of

program/activity elements. arabica coffee Level one program/activity sub-elements will encourage increased training of tour guides (P5), improved coffee post-harvest processing technology (P7), and the availability of capital (P8) at the second level. Level two program/activity sub-elements will encourage increased training of tour guides (P6), improved coffee post-harvest processing technology (P7), and the availability of capital (P8). The third level, which consists of quality human resources (P1), improvement of facilities and infrastructure (P2), synergy between the government, coffee business managers, and academics (P3) that are mutually cohesive as stakeholders who play an important role in the development of Kintamani arabica coffee agrotourism in Bangli Regency will be encouraged at the second level as well.

The growth in counseling advice on Arabica coffee is a critical aspect in the achievement of the target element, which has been designated as a priority in the development of Kintamani Arabica coffee agrotourism in Bangli Regency. To generate excellent farmers, it is necessary for extension workers and farmer organizations to work together cohesively and in mutual collaboration. Extension agents serve as organizers and dynamists for farmer organizations, guiding them through the process of establishing agrobusiness systems. According to Najib and Rahwita (2010), agricultural extension workers play a critical role in advising and training farmers in order to deliver the best possible farming management practices to their customers. Furthermore, the formation of farmer organizations is intended to aid in the exploration of potential and the more effective resolution of agricultural difficulties (Ministry of Agriculture, 2007).

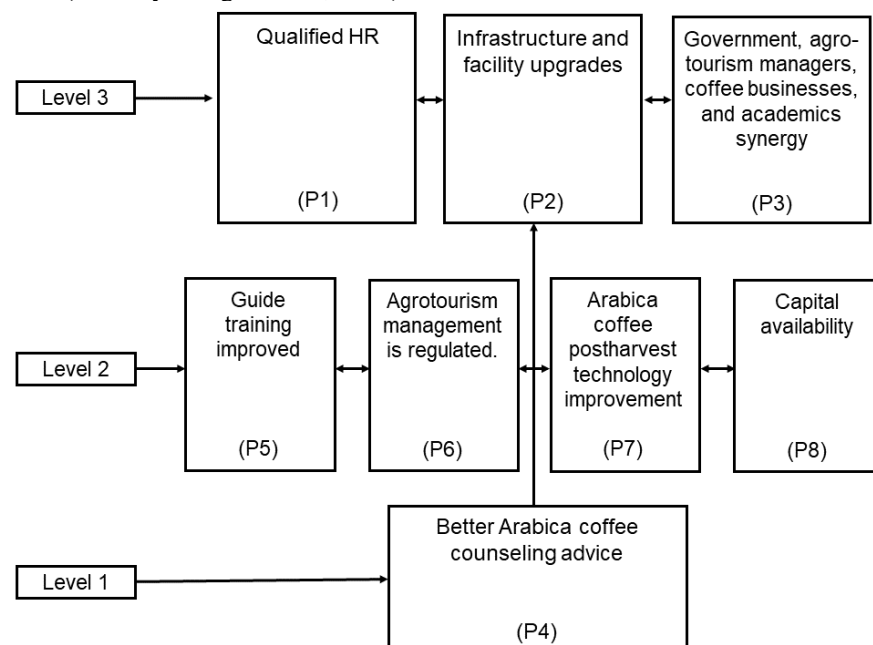


Figure 8: Diagram of Kintamani Arabica Coffee Agrotourism Development Programs/Activities under ISM Model

Source: primary data processing using exsimpro ISM

4. Conclusion

It can be stated that ISM analysis was used to identify the hierarchy and categorization of supplements for the development of Kintamani arabica coffee agrotourism in Bangli Regency.

a. Institution Element

- (2) In the dependent sector, there are three (three) institutional sub-elements, namely: 1) Bangli Regency Tourism and Culture Office (L1), 2) Bangli Regency Industry and Trade Office (L3), and 3) Bangli Regency Regional Planning Agency (L4).
- (3) The linking sector is comprised of 5 (five) institutional sub-elements, which are as follows: 1) Bangli Regency Food Crops Agriculture Service (L2), 2) *Subak Abian* (L5), 3) *Pokdarwis* (L6), 4) Community Leaders (L7), and 5) Capital institutions (L8).
- (4) The Department of Agriculture, Food Crops, Bangli Regency, *Subak*, *Pokdarwis*, community leaders, and capital institutions are all important aspects in the institutional elements.

b. Constraint Element

- (1) Every element of the barriers to entry into the linkage sector includes: 1) Limited Capital (K1), 2) Lack of high-quality human resources (K2), 3) Lack of facilities and infrastructure (K3), 4) Inadequate access to coffee product marketing (K4), 5) Inadequate promotion (K5), 6) Low community participation (K6), 7) Inadequate post-harvest processing technology (K7), 8) Lack of agricultural extension workers (K9), and 10)

Lack of agricultural extension (K10).

- (2) Limitations in capital, poor community engagement, a lack of agricultural extension workers, and lack of government assistance in coffee marketing and tourist promotion are the primary barriers to the establishment and expansion of Arabica coffee-based agriculture tourism.

c. Purpose Element

- (1) Increasing the number of tourist visits to agrotourism is the only destination sub-element included in the dependent sector, and it is the only one that is included in the dependent sector (T8).
- (2) A total of 4 (four) objective sub-elements are included in the linkage sector, which are as follows: 1) increasing employment opportunities (T3), 2) protecting the environment (T4), 3) increasing community participation (T6), and 4) increasing integrated and sustainable Arabica coffee agro-tourism development efforts (T9).
- (3) The independent sector is comprised of four (four) objective sub-elements, which are as follows: increasing the added value (value added) of Kintamani Arabica coffee goods (T7), increasing farmers' income (T1), and increasing the level of farmers' income (T3) (T1). 4) Improving the quality of human resources (valuable human resources) in order to improve community life (pride and prestige) (T2) (T5).
- (4) The increase in the number of tourists visiting the area is a critical component of achieving the anticipated aim of implementing agro-tourism development in the area.

d. Program/Activity Elements

- (1) There is just one (single) program/activity sub-element that is included in the dependent sector, and that is improving counseling advice on Arabica coffee, which is included in the dependent sector (P4).
- (2) It is comprised of three (three) program/activity sub-elements, namely: 1) high-quality human resources (P1), 2) improved facilities and infrastructure (P2), and 3) synergy between the government, coffee company management, and academics (P3) (P3).
- (3) Among the program/activity sub-elements covered in the linking sector are: 1) raising the training of tour guides (P5); 2) the presence of legislation on agro-tourism management (P6); 3) developing postharvest coffee processing technology (P7); and 4) the availability of financing (P8) (P8).
- (4) This program/activity aspect is predicted to have the greatest impact on the growth of agrotourism because of a rise in the intensity of counseling and advice on Arabica coffee, which is a crucial component in the development of agrotourism.

References

- Saputra, B.G., Muksin, Muspita, M. 2018. Agrotourism Development In Ledokombo District, Jember Regency. *Jurnal Ekonomi Pertanian Dan Agribisnis (JEPA)* volume 2 nomor 4 hal 325-331.
- Yudhari, I D.A.S., Darwanto, D.H., Waluyati, L.R., Mulyo, J.H. (2020). The Development of Agro-Tourism Based on Arabica Coffee Plantation in Bali. *Journal of Environmental Management and Tourism*, (Volume XI, Spring), 1(41): 104 - 112. DOI:10.14505/jemt.v11.1(41).12
- Yudhari, I.D.A.S., Darwanto, D.H., Waluyati, L.R., Mulyo, J.H. (2020). Multidimensional Scaling: Sustainability of Arabika Coffee Agro -Tourism in Kabupaten Bangli Bali. *Journal of Environmental Management and Tourism*, (Volume XI, Fall), 6(46): 1455 - 1465. DOI:10.14505/jemt.v11.6(46).16
- Nuringsih, Lismawati, Nuddin, Trimulato. 2019. Pengembangan Desa Wisata Berbasis Ekonomi Rumah Tangga Di Kawasan Konservasi Taman Wisata Leijja Kabupaten Soppeng Sulawesi Selatan. *Jurnal Hukum Ekonomi Syariah*. 2 (2).
- Dinas Pertanian Tanaman Pangan, Hortikultura dan Perkebunan Kabupaten Bangli, 2020. Laporan Statistik Pertanian, perkebunan dan Perhutanan Kabupaten Bangli.
- Marimin.2004. Teknik dan Aplikasi Pengambilan Keputusan Kriteria Majemuk. Jakarta : Grasindo
- Eriyatno, 2003. Ilmu Sistem Meningkatkan Mutu dan efektifitas. Manajemen IPB Press Bogor.
- Djogo, T., Sunaryo, D.Suharjito dan M Sirait. 2003. Kelembagaan dan Kebijakan dalam Pengembangan Agroforestri. World Agroforestry Centre (ICRAF) Southeast Asia Regional Office.
- Attri, R., Grover, S., Dev, N., Kuma,r D. 2013. An ISM approach for modelling the enablers in the implementation of Total Productive Maintenance (TPM).*International Journal of System Assurance Engineering and Management*. 4(4):313–326
- Payangan, O. 2014. Pemasaran Jasa Pariwisata. Kampus IPB Taman Kencana: PT Penerbit IPB Press.
- Najib, M. Rahwita, H. 2010.Peran Penyuluhan Petani Dalam Pengembangan Kelompok Tani Di Desa Bukit Raya Kecamatan Tenggarong. *Jurnal Ziraah*. Vol 28. Hal:116-127. Universitas Mulawarma
- Peraturan Pemerintah Nomor 51 tahun 2007 tentang Perlindungan Indikasi Geografis Kopi arabika, Kintamani dengan nama produk Kopi Kintamani Bali