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RESEARCH ARTICLE

Polemic on the Agricultural Land Conversion for Tourism Sector in the Province of Bali: Factors and Actors

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ABSTRACT

Agricultural land conversion is strongly influenced by economic transformation from the primary sector to the secondary and tertiary sectors. Likewise, in the Province of Bali (one of the most popular tourist destinations in the world), agricultural land conversion occurred massively, even though agricultural land greatly determines food security and is a way of life for the Balinese people. This study aims to analyze the factors and actors associated with the phenomenon of conversion of agricultural land for tourism in Bali, as well as how the polemic of interest occurs. Analysis was carried out through prospective analysis, MICMAC (Matrix of Crossed Impact Multiplications Applied to a Classification) and MACTOR (Matrix of Alliance Conflict: Tactic, Objective and Recommendation) methods, where data was collected through FGD (Focus Group Discussion). The results of the analysis showed that policies related to spatial planning and the community's economy are the most influential factors in agricultural land conversion for tourism in Bali. Furthermore, it was also found that the dominant actors in agricultural land conversion are the government and investors (industrial and tourism investors), where investors are also actors who have potential conflicts with farmers or traditional institutions; while those who are more dependent are business owners, sharecroppers, and agricultural land owners.

Keywords: Agricultural Land Conversion; Economic Transformation; Prospective Analysis; Tourism Sector

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1. Introduction

Natural population growth and migration lead to high demand for land and real estate, especially in urban areas and industrial centers. On the other hand, an increase in population also requires an increase in the availability of basic needs, including food, clothing and shelter. These needs, especially food and clothing, are dominantly derived from agricultural production [1]. Land is the main agricultural input factor. The phenomenon of conversion of agricultural land is feared to threaten food security.

Indonesia is one of the countries with the fourth highest population in the world, after China, India and the USA [2]. Statistics Indonesia data shows that by mid-2024, Indonesia's population will reach 281.6 million people, with population growth 1.1% per year . As a consequence of this natural population growth, land conversion also continues to occur in Indonesia. Land conversion is also caused by the process of transforming the economic structure from the primary sector (agriculture) to the secondary or tertiary sector (industry, services and trade) [3]. Therefore, land conversion in developing countries is generally caused by this process.

Bali Province is one of the regions in Indonesia that has experienced a transformation of the economic structure from the primary sector to the tertiary sector [4], especially the tourism service sector [5]. Bali tourism began to develop with the existence of the Bali Beach Hotel in Sanur and I Gusti Ngurah Rai International Airport in Tuban, around 1950 and 1960. Bali tourism continues to grow and has even been named the best tourist destination in the world several times [6]. Even today, Bali's economy is still driven by the tourism sector even though it was hit by the Covid-19 pandemic (**Figure 1**). Throughout 2023, Bali has hosted 5,273,258 international tourists, showing an increase of +144.61% compared to 2022 visitation data.

The rapid development of tourism in Bali has had an impact on industrialization in various fields, such as tourist attractions, hotels, restaurants, travel agencies, transportation, souvenir shops, and so on [6]. The results of previous research from Sutantry and Wijaya [7] regarding the influence of tourism development on changes in agricultural land use in Ubud District, show that an increase in attractiveness (tourist objects)/tourism facilities/tourism infrastructure in Ubud has led to a decrease in the area of paddy fields in Ubud. The existence of various tourism supporting industries demands the availability of land, and triggers the conversion of land functions, including agricultural land. In 2020 the Head of the Bali Province Agriculture and Food Security Service stated that on average every year there is a conversion of 700 hectares of agricultural land in Bali.

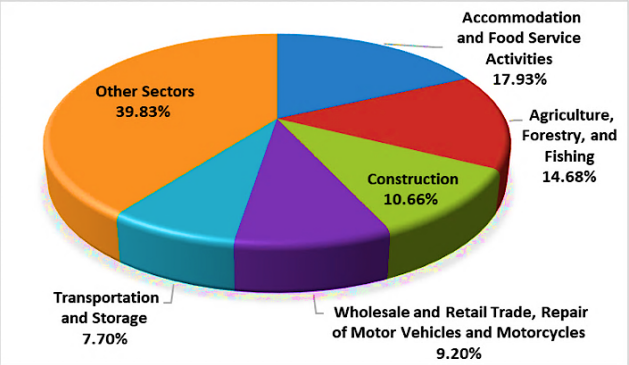

Figure 1. Main business sector contribution to Bali's economy in 2022.
Source: Own representation based on the statistical data from Statistics of Bali Province, 2022.

The Ministry of Agriculture of the Republic of Indonesia, at the Socialization and Technical Guidance for Determination of Sustainable Food Agricultural Land Protection (LP2B) in the Regency/City RTRW/LP2B Regional Regulation, Wednesday, 25 August 2021, presented a portrait of the balance sheet for food land needs in Bali, where in 2019 Bali has standard paddy field area (LBS) 70,996 ha. On the other hand, the land requirement to meet the food needs of the Balinese people ideally is 81,195 ha in 2019, which is estimated to increase to 87,639 ha in 2025, 93,541 ha in 2030 and 99,981 ha in 2035. With such calculations, Bali's balance of land needs for food since 2019 has experienced a deficit. To overcome this, Bali was asked to commit to increasing the standard paddy field area (LBS) for Sustainable Food Agricultural Land (LP2B) of 84,845 ha or 119.51 percent of the existing LBS in 2019. This can be done by creating new rice fields in Buleleng and Karangasem along with the completion of dam construction in the two districts.

The conversion of agricultural land functions is generally caused by internal factors, external factors, and also related to government policies [3]. There are two re-

search questions in this study, namely: First, what factors are the key factors in agricultural land conversion in Bali? Second, who are the actors and their relationship to their respective objectives related to agricultural land conversion. A review of the conversion of agricultural land in Bali is very important for the realization of sustainable development. Therefore, this study aims to analyze the factors and actors associated with the phenomenon of conversion of agricultural land for tourism in Bali, as well as how the polemic of interest occurs. This research can be expected to be a reference for relevant stakeholders in formulating regional spatial plans and regulations related to agricultural land conversion.

2. Materials and Methods

2.1. Land Conversion

Land conversion or change in land use is the result of interactions between physical, socioeconomic, and policy and legal settings in a geographic context [8, 9]. Location Theory of Alonso states that land location has an impact on agricultural land conversion, where land location is directly related to land prices and will have an impact on farmers' attitudes in maintaining agricultural land [10].

The phenomenon of land conversion cannot be separated from economic development which is colored by economic transformation (from the primary sector to the secondary and tertiary sectors), so this is also considered a consequence of development. Economic transformation has occurred in Indonesia, including Bali, namely the transformation from the agricultural sector to the industrial and service sectors. The difference is that the Indonesian economy is dominated by the processing industry sector; while the Balinese economy is dominated by the tourism industry. Moreover, the growth of economic activity in line with population growth has also resulted in an increase in the need for land for housing and supporting infrastructure for various industries [3].

Rusastra and Budhi [11] hold that land conversion of agricultural land is land consumption as a manifestation of demography and economic power. According to Karl Marx's theory of social change, economic factors are the most important factors in the occurrence of social change [12, 13]. Conceptually, several variables are causes, namely changes in population size, dominant economic sector, scale of the town, average residential land value, population density, geographic capability of land for agriculture [7, 14]. Several previous studies have also examined this. Fauzi [15] states that in addition to population growth, the number of non-agricultural households, the condition of the area around agricultural areas, and the distance to industrial areas also have an effect. In addition, land conversion of agriculture is exacerbated by the low farmers exchange rate and GDP per capita [16].

2.2. Research Design and Analysis

This study uses a qualitative approach which is also supported by quantitative techniques. As previously explained, there are two objectives in this study and the analysis was carried out through a prospective analysis. Regarding the first objective, which is to analyze key factors in the conversion of agricultural land to tourism in Bali, it is carried out using a prospective-MICMAC analysis. Whereas for the second objective, which is to describe polemic actors and interests, it is carried out through a prospective-MACTOR analysis. Prospective structural analysis is a method that is robust and is based on future scenarios based on historical trends of a system [17].

Data collection was carried out through literature studies, documentation, and Focus Group Discussions (FGD). Suasih et al. [18] stated that the ideal FGD should consist of 7–12 people. The FGD was conducted by involving 12 stakeholders related to the spatial and agricultural sector which is represented by the community (subak as farmers institution) as many as five people, the government as many as three people related to regional spatial planning and agriculture, academics as many as two people, and the village customs institution as many as two people. Data collection was also carried out through documentation, namely data collection from existing document sources, especially secondary data related to the research topic. The documents used are sourced from Statistics of Indonesia and/or Statistics of Bali Province. Furthermore, FGD was also carried out to obtain data which is input to prospective analysis (MIC-

MAC and MACTOR).

2.2.1. MICMAC Method

Strateigea (2013)[19] describes the evolution of MICMAC analysis as two main stages. The first stage is understanding the scope of the problem and the system to be studied with the involvement of experts, where experts through FGD will compile the Matrix of Direct Influence (MDI), as seen in **Table 1**.

Table 1. Pattern of Matrix of Direct Influence (MDI) for MICMAC analysis.

	Var 1	**Var 2**	**Var 3...**	**Var n**	**Influence (Y-Axis)**
Var 1	0	(V 1,2)	(V 1,3)...	(V 1,n)	$\sum_{j=1}^{n} (Var\ 1, j)$
Var 2	(V 2,1)	0			
Var 3	.				
.	.				
.	.				
Var n	(V n,1)			0	
Dependence (X-Axis)	$\sum_{j=1}^{n} (Var\ i, 1)$			...	

Source: Adapted from Fauzi[19].

In its implementation, filling in the MDI that describes the direct relationship between variables is done by quantifying the relationship between variables. Godet[20] uses a scale of 0 to 3 and P, where: 0 = non-existent; 1 = weak correlation; 2 = moderate; 3 = strong; P = potential influence. The results of the MDI will then enter the MICMAC module.

The operational principle of the MICMAC cross-matrix to filter the influence and dependent variables is done by linking all variables. For example, there are three variables interacting with each other, namely variables A, B, and C through different interaction patterns between the three. The relationship structure can be described with the Boolean Matrix as follows[19]:

$$M = \begin{array}{c} \\ A \\ B \\ C \\ \Sigma \text{ collum} \end{array} \begin{array}{c} \begin{array}{ccc} A & B & C \end{array} \\ \begin{bmatrix} 0 & 1 & 0 \\ 1 & 0 & 1 \\ 1 & 0 & 0 \end{bmatrix} \\ \begin{array}{ccc} 2 & 1 & 1 \end{array} \end{array} \begin{array}{c} \Sigma \text{ row} \\ 1 \\ 2 \\ 1 \end{array}$$

From the matrix M, if there is a relationship from A to B, the writing is represented by matrix element 1. It is also seen that the diagonal element will be zero at this stage, which means that the influence of the variable on itself is not taken into account. This matrix is called MDI.

2.2.2. MACTOR Method

Input for MACTOR is done through position matrix (known as 1MAO/Matrix Actor-Objective) and 2MAO) which uses the Salience variable from the actor to the objective. The third matrix is MID (Matrix of Influence Direct) which describes the influence variable. In MACTOR tools, input from the user only requires the MID matrix, 1MAO matrix and 2MAO, then it will be calculated by the software through a mathematical algorithm process.

Based on the MID matrix, MACTOR then calculates the direct and indirect influence of one actor to another actor which is known as the MIDI matrix (Matrix of Indirect and Direct Influence). The MIDI matrix from A to B is calculated using the formula:

$$\text{MIDI}_{\text{A}} = \text{MID}_{\text{A}\to\text{B}} + \Sigma_{\text{C}} \left[\min(\text{MID}_{\text{A}\to\text{C}}, \text{MID}_{\text{C}\to\text{B}})\right] \quad (1)$$

This matrix is then used in the next stage to determine the "balance of power", where the "balance of power" is very dependent on the position of the actor. To calculate the balance of power coefficient, the total direct and indirect influence of the actor must first be calculated. If M_A is interpreted as the total direct influence of actor A on others (for example B), then:

$$\text{M}_{\text{A}} = \Sigma_{\text{B}} \left(\text{MIDI}_{\text{A,B}}\right) - \text{MIDI}_{\text{A,A}} \quad (2)$$

If D_A is defined as the total direct and indirect in-

fluence received by a from other factors (in other words, the dependency of actor A), then:

$$D_A = \Sigma_B (MIDI_{B,A}) - MIDI_{A,A} \quad (3)$$

After knowing the two components with the balance of power coefficient, the calculation is then performed with the formula:

$$r_A = \left[\frac{(M_A - MIDI_{A,A})}{\Sigma_A (M_A)}\right] x \left[\frac{M_A}{M_A + D_A}\right] \quad (4)$$

Next, MACTOR calculates the 3MAO matrix which is the basis and important in the discussion of MACTOR. This 3MAO matrix is produced from the previous process or is a product of 2MAO and r_A , or:

$$3MAO_{A,i} = 2MAO_{Aj} x r_a \quad (5)$$

By knowing the 3MAO matrix, the mobilization coefficient can be known, which shows the reaction of each actor in one situation. This mobilization coefficient is produced through the formula:

$$Mob_A = \Sigma |3MAO| \quad (6)$$

The stages of MACTOR analysis are identical to the stages of MICMAC analysis. The first stage, of course, involves identifying the problem, followed by identifying the actor and its objectives. Furthermore, in the second stage, the inter-actor MDI is filled in (**Table 2**); while the previous MICMAC analysis focused on inter-variable (inter-factor) relationship.

Table 2. Pattern of Matrix of Direct Influence (MDI) for MACTOR analysis.

Actor i \ To actor j	A1	A2	A3	...	...	An
A1	0	(1,2)	(1,3)	...	...	(1,n)
A2	(2,1)	0				
A3	(3,1)		0			
...	...			0		
...	...				0	
An	(n,1)					0

Source: Adapted from Fauzi [19].

The filling of **Table 2** scores is done using Godet's [21] rule, where the influence of actor i on actor j is calculated based on a score of 0–4 with the following provisions: 0 = no influence; 1 = affects operational procedures; 2 = affects work; 3 = affects the actor's mission; 4 = affects the actor's existence. After **Table 2** is filled, the next stage is to fill in the Actor-Objective Table (2MAO) with the format as in **Table 3**.

Table 3. Pattern of Matrix of Actor-Objective (2MAO) for MACTOR analysis.

Actor i \ Objective	O1	O2	O3	...	...	On
A1	(A1,O1)	(A1,O2)	(A1,O3)	...	...	(A1,On)
A2	(A2,O1)					
A3	(A3,O1)					
...	...					
...	...					
An	(An,O1)					(An,On)

Source: Adapted from Fauzi [19].

Table 2MAO shows the influence of each actor on each objective and is filled with a score of 0–4, where: 0 = the objective has a bleak outcome; 1 = the objective interferes with the actor's procedure/vital to the actor's operational procedure; 2 = the objective interferes with the actor's work success/vital to the work success; 3 = the objective interferes with the achievement of the actor's mission/cannot be ignored for the actor's mission; 4 = the objective interferes with the actor's existence/cannot be ignored for the actor's existence.

The difference with the MDI Table is that the 2MAO Table can produce a negative score if the actor has a negative influence on an objective. After filling in the MDI and 2MAO tables through complete FGD, the next stage is for the MACTOR software to analyze the data.

2.3. Factor Identification

The analysis of key factors over the conversion of agricultural land for Bali tourism begins with identifying factors that are indicated to be related to the case. Based on the results of the literature study and FGD, the factors analyzed (**Table 4**) can be identified.

2.4. Actor Identification

Furthermore, for MACTOR analysis, actors and objectives have been identified which are then analyzed (**Tables 5** and **6**).

Table 4. Identification of factors related to conversion of agricultural land for tourism in Bali.

Code	Factor	Description
Agri.incom	Income from the agricultural sector	Income from the agricultural sector (especially small scale) includes both land cultivated by owners and cultivated by sharecroppers. Low income in the agricultural sector also often motivates land conversion [22, 23].
Own Job	Farm owner occupation	Socioeconomic factors of landowners are closely related to agricultural land conversion (Harini et al., 2012) [3], and agricultural land conversion is usually carried out by landowners who do not work in the agricultural sector [22].
Land Price	Trends in the price of agricultural land	The acceleration of agricultural land conversion is influenced by land market prices [24].
Tourism	Tourism development	The development of tourism, whichever grows rapidly or slowly, has resulted in agricultural land conversion, both by owners and the government [25, 26].
Policy	Spatial related policies	Policies related to spatial planning can regulate the use of land, so even if land changes ownership, its function must still refer to spatial planning policies [3].
Community	Community economy	External factors that affect agricultural land conversion are the economic conditions of the community, including GDP [16, 27].
Agri.Infra	Agricultural infrastructure	One focus that the government can do to reduce agricultural land conversion is to provide adequate agricultural infrastructure [28, 29].
NTP	Farmers terms of trade	The weak farmers exchange rate also causes the conversion of agricultural land to occur [30].

Table 5. Identification of actors related to conversion of agricultural land for tourism in Bali.

Code	Actor	Definition
Land owner	Agricultural land owner	The land owner is the determinant of the conversion of the function of his agricultural land [22].
Sharecropp	Sharecropper	If the agricultural land is not cultivated by the owner, then a collaboration is carried out with the sharecropper [22].
Indust inv	Industrial investor	Industrialization encourages agricultural land conversion, especially smallholder farmers in peri-urban [23].
Tourism in	Tourism investor	Investment in the tourism sector has resulted in the conversion of agricultural land, especially rice fields [29].
Government	Government	The government is a policy maker that can clarify rules and can also become an actor in agricultural land conversion [25, 31].
Own bus	Agribusiness owner	Agribusiness owner (especially financial condition) is related to agricultural land conversion [32].
Pro associa	Professional association	There are several farmer associations in Indonesia, which carry out the association function in fostering and developing agricultural activities [33].
Subak	Subak	In Bali, there is a customary institution of agricultural and irrigation called Subak, which plays an important role in traditional agricultural activities including those related to agricultural land conversion [34].
Society	Society	Society has a cultural structure and can influence life patterns and perspectives [3].

Table 6. Identification of objectives related to conversion of agricultural land for tourism in Bali.

Code	Objective	Definition
Farm prod	Farming productivity	Sustainable land management practices aim to increase crop productivity [35].
Farm inc	Farmers' income	The economic dimension which includes farmers' rationality related to agricultural land policy is income [36].
Agri sec inc	Agribusiness sector income	Agricultural land conversion is not only directly related to farmers' income, but also income from other agribusiness sectors [37].
Sustain	Agricultural sustainability	Land conversion is one of the challenges to realizing agricultural sustainability [38].
Envi sustai	Environment sustainability	The conversion of agricultural land is a global environmental issue that is considered to threaten the environment [39].
Tourism inc	Tourism income	One of the goals expected to be obtained by agricultural land conversion for tourism is tourism sector revenue [40].

3. Results

3.1. Results of Analysis of Key Factors Related to Conversion of Agricultural Land for Tourism in Bali (MICMAC Analysis)

MICMAC analysis presents output in the form of mapping the classification of variables or factors in **Table 4** into the MICMAC quadrants. The results of the analysis are presented in **Figure 2**.

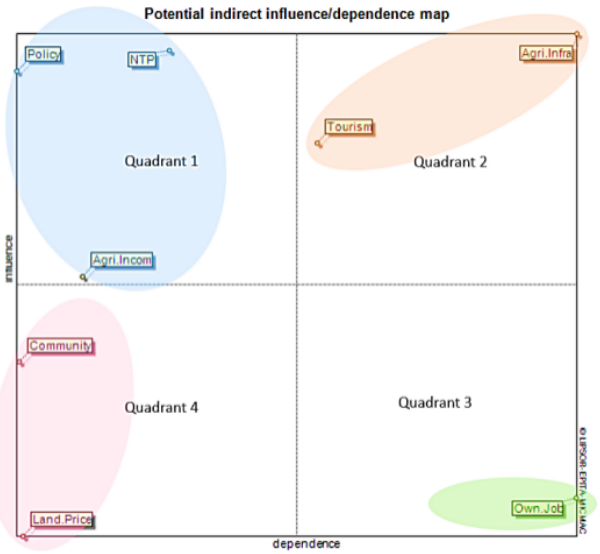

Figure 2. Influence and dependence map of agricultural land conversion factors.

Figure 2 shows the position of each factor in the following quadrants:

1) Factors of farmers exchange rate (NTP), government policies related to spatial planning, and income from the agricultural sector are factors that are in quadrant I. Since factors included in quadrant I are influential factors but with low dependency, they are called influence variables or key drivers. Variables in this category are considered crucial and very decisive in the system. Economic factors have been shown to be an important factor in the conversion of agricultural land, as per the social changes theory of Marx.
2) Then in quadrant II, there are agricultural infrastructure income factors and tourism development. Quadrant II shows factors that also have an effect but with high dependency, so they tend to be unstable. Given that the influence is high, the factors in quadrant II generally also affect other factors in the system. This shows the implications of Alonso's Location Theory that location determines the occurrence of agricultural land conversion, where much of the agricultural land in Bali is located in tourism areas.
3) Quadrant III presents factors with weak influence and high degree of dependency. The factors included in quadrant III are the work of agricultural land owners.
4) There are also factors with weak influence and dependence in quadrant IV, namely community economic factors and agricultural land price trends.

Each factor also has a relationship, and **Figure 3** shows the direct influence between factors related to agricultural land conversion. The policy factor seems to have the most influence on other factors, where the influence is very strong on the community, agricultural infrastructure, farmers exchange, and tourism.

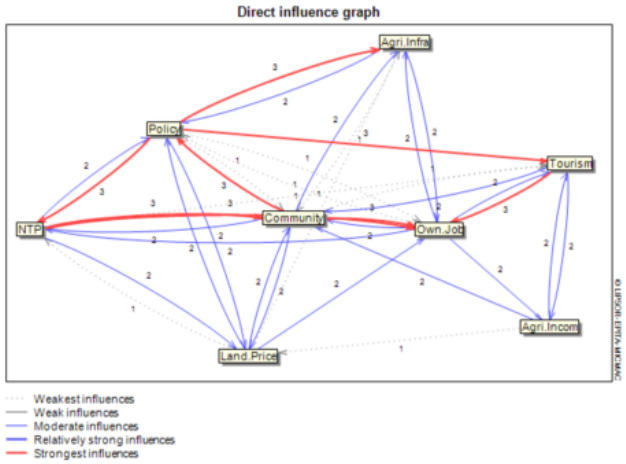

Figure 3. Direct effect between factors agricultural land conversion in Bali.

For more details, **Figure 4a,b** present the ranking of agricultural land conversion factors in Bali. **Figure 4a** shows the ranking based on the direct influence of one factor on another, as well as its shift when included with indirect effects. The most influential factors (rank 1) are policy, community (rank 2), and the occupation of the land owner (rank 3). Meanwhile, if we include indirect effects, there is a shift, where the most influential factors are the community (rank 1), policy (rank 2), and

farmers exchange (NTP) (rank 3). **Figure 4b** presents a ranking based on the dependence of a factor on other factors, as well as their shifts. Where the most dependent factors are the land owner's occupation (rank 1), community (rank 2), and policy (rank 3). There is no shift in the ranking of factors even though it includes indirect dependencies.

Rank	Variable
1	5 - Policy
2	6 - Community
3	2 - Own Job
4	8 - NTP
5	3 - Land.Price
6	4 - Tourism
7	1 - Agri.Incom
8	7 - Agri.Infra

Variable
6 - Community
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2 - Own Job
3 - Land.Price
4 - Tourism
7 - Agri.Infra
1 - Agri.Incom

(a)

Rank	Variable
1	2 - Own Job
2	6 - Community
3	5 - Policy
4	4 - Tourism
5	7 - Agri.Infra
6	8 - NTP
7	3 - Land.Price
8	1 - Agri.Incom

Variable
2 - Own Job
6 - Community
5 - Policy
4 - Tourism
7 - Agri.Infra
8 - NTP
3 - Land.Price
1 - Agri.Incom

(b)

Figure 4. Ranking of factors related to agricultural land conversion in Bali. (**a**) Ranking based on influence; (**b**) Ranking based on dependence.

3.2. Polemic Actors and Objectives of Agricultural Land Conversion for Tourism in Bali (MACTOR Analysis)

As previously explained, agricultural land conversion is prone to polemics in the form of conflicts of interest between the actors involved, so it is interesting to study. **Figure 5** presents the position of each actor on the influence and dependence map.

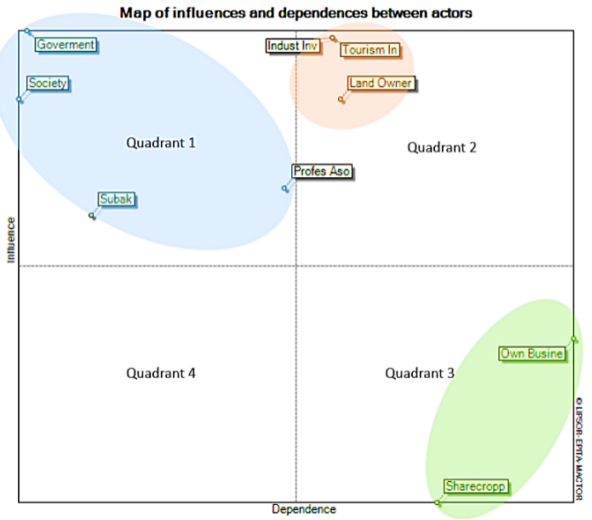

Figure 5. Map of influences and dependences between actors related to agricultural land conversion.

Actors in quadrant 1 are influential but not dependent, namely the government, community, and Subak. Whereas in quadrant 2 (actor with high influence and dependency), there are industrial investors, tourism investors, and agricultural land owners. Meanwhile, agribusiness owners and sharecroppers are actors who have high dependence and weak influence.

For more details, **Table 7** presents a summary of the accumulation degree of influence and dependence (direct and indirect), number of convergence, and actor's ambivalence.

Table 7 shows that cumulatively the dominant actors in agricultural land conversion are the government and investors. While those who are more dependent are business owners, sharecroppers, and agricultural land owners. While the convergence value shows the interest of each actor. The results of the MACTOR analysis show that agricultural land owners, subak, and sharecroppers have a higher interest than other actors. The degree of convergence rate of 53.6% indicates that the degree of convergence is below 53.6% indicating the potential for conflict between actors. Thus, the actors who have the potential for conflict are tourism investors and industrial investors.

Each actor certainly has different interests, and often conflict with one another. **Figure 6** presents the histogram of the values of the actors' agreement and disagreement with each objective.

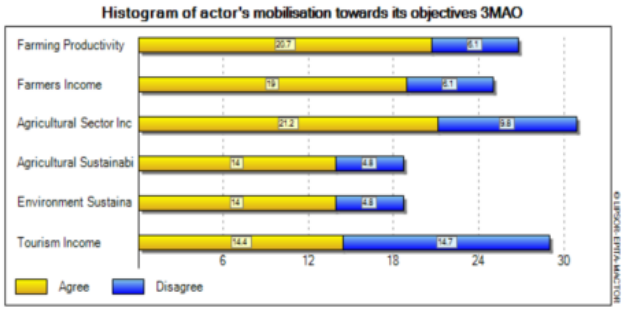

Figure 6. Map of influences and dependences between actors related to agricultural land conversion.

MACTOR also presents the actor's position in each objective. The following presents the actor's position specifically on agricultural land sustainability objectives (**Figure 7**). The "scales" of agricultural land sustainability show that the government, Subak, and the community have a positive interest in the sustainability of agricultural land; while other actors tend to be negative.

Table 7. Summary of analysis results of actor's influence, dependence, convergence, and ambivalence.

Actor	Net Direct and Indirect Influence (Ii)	Net Direct and Indirect Dependence (Di)	Number of Convergence	Actor's Ambivalence
Land owner	82	80	88.5	0.5
Sharecropp	23	92	84.5	0.6
Indust inv	91	79	34.5	0.4
Tourism in	91	79	26.0	0.3
Government	92	41	73.5	0.5
Agri owner	47	109	79.5	0.6
Pro associa	69	73	61.0	0.5
Subak	65	49	86.5	0.4
Society	82	40	74.0	0.5
Degree of convergence (%)			53.6	

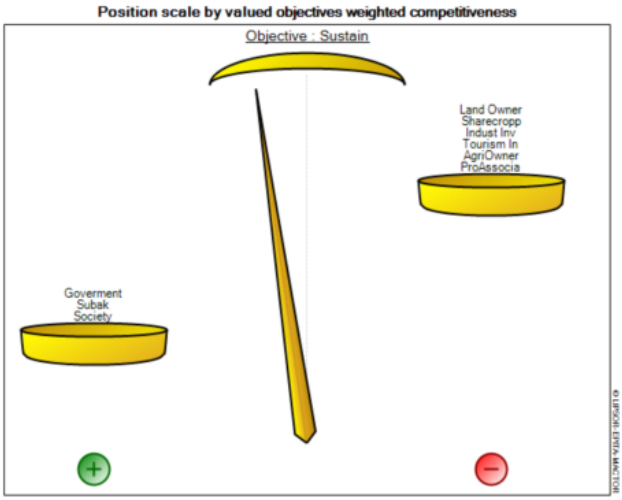

Figure 7. Position scale of actors by valued objectives (agricultural land austainability).

4. Discussion

The key factors of agricultural land conversion are spatial related policies, farmers terms of trade, and income from the agricultural sector. Key factors are factors that have high influence with low dependency. Policies about spatial planning, such as regional spatial planning are detailed in the document known as RTRW. Spatial policies (both state and local) will be the basis for spatial planning, including the impact on land conversion [41]. More specifically, Rantau [42] states that regional spatial planning policies have an influence on the sustainability of food agricultural land, especially if it is designated as an agricultural designation area.

Farmers terms of trade (as known as NTP) have also been proven to have a significant impact on agricultural land conversion in Indonesia [43]. More specifically, the NTP in the food sector has a significant influence on the conversion of paddy fields, where so far the NTP in Indonesia is still low, causing land conversion to occur [44]. The cause of low NTP in the food sector is increasingly expensive production prices and cheap selling prices for rice/ grain. This also shows that income from the agricultural sector is also a key factor in agricultural land conversion. Motivation for agricultural land conversion is generally divided into economic factors and social factors. Economic factors include production, pests and diseases, and selling prices; while social factors consist of labor, culture and secondary needs [45, 46].

Meanwhile, in quadrant II with high influence and high dependence, there are tourism development and agricultural infrastructure factors. This means that even though these two factors have a high influence, the level of dependence is also high. Several previous studies have stated that land conversion has occurred when an area in Indonesia develops into a tourist destination [40], including several areas in Bali [47]. The conversion of rice fields which continues to progress rapidly, including the construction of tourism facilities by the government, the private sector and changes in spatial planning, is accepted as an option or economic step and a reality of life in tourist areas [48].

Currently, agriculture is no longer the main livelihood of the Balinese people, due to the low income of farmers, which is considered not commensurate with their expenses [49]. So the work of agricultural land own-

ers is very dependent on agricultural products. Moreover, the Indonesian population in the Generation Z age group (aged 15–24 years) is less interested in entering the agricultural sector labor market[50]. Due to low income from the agricultural sector, agricultural and livestock businesses are often only used as side jobs[51].

Furthermore, in quadrant 4 are factors with low influence and dependence, or that tend to be unstable regarding the conversion of agricultural land in Bali. Macroeconomic conditions tend not to have a direct impact on decisions to convert agricultural land. Likewise with the price trend for rice fields, which also does not have much of an impact. Remembering that land prices in Bali are very varied.

Regarding the mapping of actors involved in the conversion of agricultural land, especially for the tourism sector, it is known that the main actors are the government, local people/society, Subak, and professional associations. As previously explained, the government has the authority to prepare spatial plans. Widhianthini et al.[34] also stated that the government and Subak are important actors in agricultural land conversion in Bali. Several subaks in Bali have created awig-awig (custom law) to reduce the conversion of rice fields. One of them stated that agricultural land may be sold, or change ownership, but its function must remain the same, namely wet agricultural land[52].

5. Conclusions

The development of the tourism sector has resulted in the conversion of agricultural land in Bali. There are several factors related to the land conversion phenomenon, namely income from the agricultural sector, employment of agricultural land owners, trends in agricultural land prices, tourism development, policies related to spatial planning, community economy, agricultural infrastructure, and farmers exchange (NTP). The results of the MICMAC analysis show that the key drivers that have a high impact are policies related to spatial planning, farmers exchange (NTP), and income from the agricultural sector. Meanwhile, although the development of tourism and agricultural infrastructure has a high influence, the level of dependency is also high (relay variables). While the work of agricultural land owners has a high dependence and weak influence (depending variable). The community's economy and land prices are factors with weak influence and dependence (excluded variables). In general, it can be said that policies related to spatial planning and the community's economy are the most influential factors in agricultural land conversion for tourism in Bali.

Actors related to agricultural land conversion include agricultural land owners, sharecroppers, industrial investors, tourism investors, government, agribusiness owners, professional associations, subaks (customary institutions of agriculture and irrigation), and society. MACTOR analysis results show that cumulatively the dominant actors in agricultural land conversion are the government and investors. While those who are more dependent are business owners, sharecroppers, and agricultural land owners. While the convergence value shows the interest of each actor. The results of the MACTOR analysis show that agricultural land owners, subaks, and sharecroppers have a higher interest than other actors. The degree of convergence rate of 53.6% indicates that the degree of convergence is below 53.6%, indicating the potential for conflict between actors. So the actors who have the potential for conflict are tourism investors and industrial investors.

Based on the results of this analysis, it is recommended that the government compile regulations related to spatial planning that regulate agricultural land conversion. Moreover, the government is an influential actor, and policy is also an influential factor. In addition, related to investment in the tertiary economic sector (both industry and tourism), the government also plays a role in issuing permits so that preventive measures need to be taken so that investment activities do not sacrifice the sustainability of agricultural land. It is necessary to consider clearly compiling a permit mechanism for converting agricultural land with the dualism of villages in Bali, namely official representatives of the government and customs, but still considering private ownership rights. However, agricultural land is very important in food security and is a way of life for the Balinese people. Further research needs to be done to formulate a strategy or pattern of cooperation between the tourism

and agricultural industries, so that they can be sustainable without eliminating each other.

Author Contributions

I Nyoman Mahaendra Yasa designed research objectives and developed the conceptual framework. Ni Nyoman Reni Suasih prepared FGD and ran the analysis. Ni Made Sinthya Aryasthini Mahaendrayasa interpretated the results of data analysis.

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Data Availability Statement

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Conflict of Interest

All authors disclosed no conflict of interest.

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