Investigating Farm Land Ownership: Farm Land Owner's Response to Regional Growth and Sustainable Agriculture in Indonesia

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Abstract

In the modern era, regional growth and sustainable agriculture have aroused as prominent issues. Indonesia, those issues has affected land use change. In order to facilitate regional growth, farmland has been converted. Now days, sustainable agriculture are being implemented by government to reduce the impact of land use change, and, indeed, to reach self-sufficient of rice demands. Moreover, import restriction has made condition more challenging. Farmland as production capital is demanded to be preserved with any cost. Driving forces of farmland ownership change has been found but none observes mapping personal cognition of the respondents as good as Repertory Grid Technique, developed by Kelly (1955), This study was applied RGT to indigenous farm owners of Indonesia by eliciting own driving forces (construct) of six given decisions (elements). The constructs were limited to land owner profile, sustainable agriculture (community and social condition), spatial aspects (farmland conversion and accessibility), and economic aspects. By using principal component analysis, first component relates to buying and converting. Leasing is closely located to joint farming. Further, component plot shows that group of long-lasting farmland (i.e. buying, and keep farming) is in the first quadrant while vulnerable farmland (i.e. joint farming, converting, selling, and leasing) is in the fourth quadrant. It implies that passive farmers would work as trigger of land use change.

Keyword: decisions, PCA, farmland owner, RGT

Introduction

In 2010, population of Indonesia has reach 231 million with 1.3% average population growth each year since 2000 to 2005. It made the increasing of food demand especially rice as staple food. Meanwhile, rice production has not shown good performance. In the last 10 years, rice production reach 57,000 thousand ton (BPS, 2013) or about 23% of total agricultural production (WPF, 2008). This condition has become challenging when the Ministry of trade of Republic Indonesia was coming up with import act amendment in to achieve self-sufficient and food security (Ministry of Trade, 2009).

Meanwhile, farmland conversion emerges to be prominent issue. As recorded National Statistical agency, farmland conversion during 1983 to 2003 had surpassed 1.2 million hectare (Central Bureau of Statistics, 2003) and regional growth contributed to farmland conversion as well as transportation (Leinbach, 1989), and economic growth (Irawan, 2004). Moreover, land use changes possibly trigger the land use pattern change in the surrounding area as specially increasing built up area (Hidayat, 2010).

In order to secure food production especially rice, national government not only preserve farmland, but also expands new farmland (Bappenas, 2010). They projected 1.5 million new farmland in the end of 2015 to support rice production. As important as farmland protection, sustainable agriculture was invented in 1980's. Numerous studies have been conducted to define sustainability in agriculture (Conway and Barbier, 1990; RFA, 2005). Main concept of sustainable agriculture is to maintain productivity by managing production factors (e.g. soil, input, and machinery). In order to increase productivity rate, sustainable agriculture has been adopted by many countries including Indonesia. By adopting sustainable agriculture, farmers do not only preserve environment but also sustaining socio-economic aspects.

For the last 10 years, scholars have found driving forces of farmland ownership change (Poeta et al, 2012; Tan et al, 2009; Azadi, 2010). Honestly, those ignore the personal driving forces. Bearing this content in mind, this study examines land owner decision regarding regional growth and sustainable agriculture by using Repertory Grid Technique (RGT) where this technique is able to deeply explain personal point of view of the subjects. In the end of this research, personal driving forces can be explained and refined for multipurpose related to land use policy and planning**.**

Methodology

Repertory Grid technique is derived from personal constructs psychology theory by George A. Kelly. This technique originally was used as an aid for psychotherapy. Its main applications being in clinical, counseling and educational settings (Beail, 1985). In fact, repertory grid analysis has also been used in studying human response to urban (Harrison and Sarre, 1971), architectural (Honikman, 1976), tourism (Fenton and Pearce, 1988) and natural environments (Fenton, 1988). Repertory Grid (RepGrid) is a cognitive mapping technique that attempts to describe how do people think about phenomena in their world (Tan and Hunter, 2002). RepGrid is widely used by scholars for studying personal and interpersonal information of the respondents in many subjects (e.g. economy, psychology, education, and engineering) because of its flexibility and adaptability. Personal information (e.g. respond, opinions) from the respondents are drawn into grid so it will easy to understand. RepGrid theory is established by element and constructs, those are linked by links.

Shaw and McKnight (1981) stated that RGT reliable for in decision making process. The elements represent the alternative decisions. Constructs are represent the criterion or consideration of alternative decisions. And links represent the importance of those criterion. In some cases, decision making process consider the outcomes that possibly come after taking certain decision. In the RGT, the technique do not consider the after effect. It is trying to deliver which consideration or construct that affect to certain alternative decision base on their importance value or "link" score.

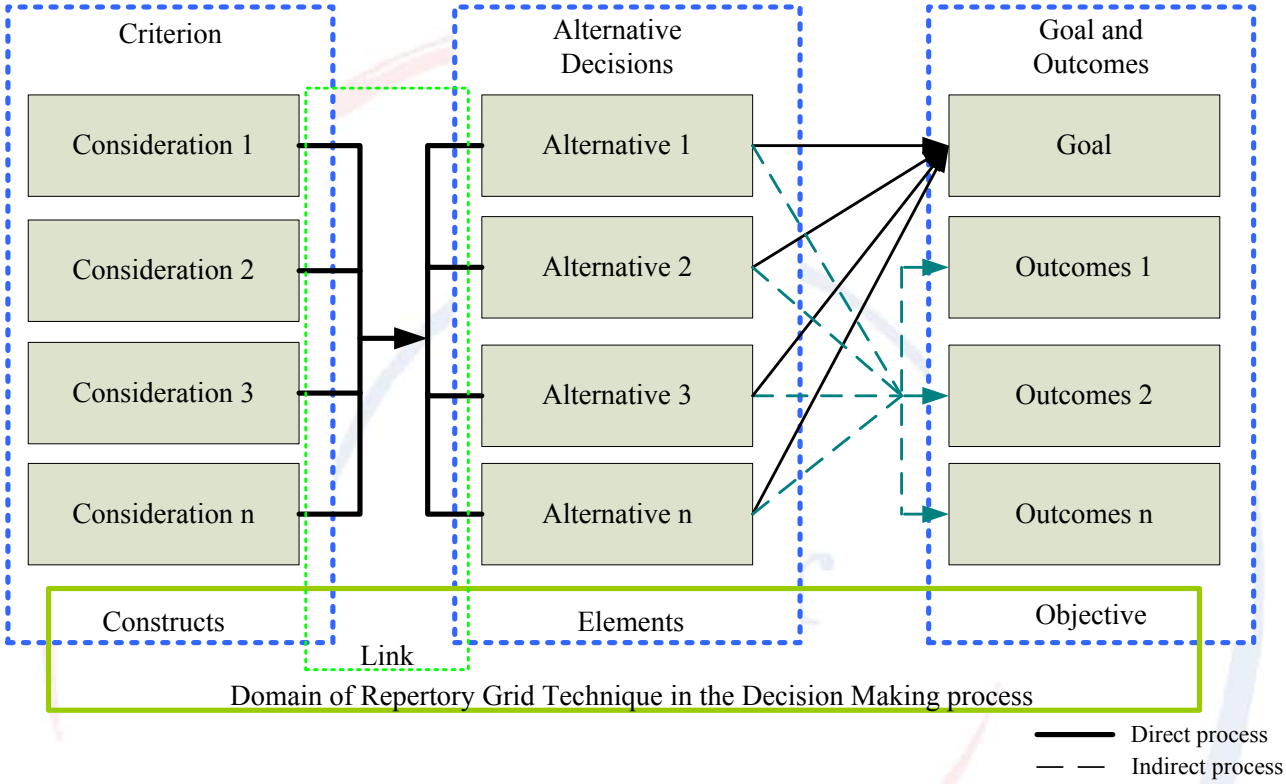


Figure 1. Decision making process by using Repertory Grid Technique

Elements are the things or event which are abstracted by construct and are seen as one of the formal aspects of a construct (Kelly, 1955/1991, p.137/volume 1, p.35). Elements are the objects of attention within the domain of investigation (Tan and Hunter, 2002). The type of element used in the grid will have determine the type of elicited constructs (Wright, 2007). Wright (2007;p.755) mentioned four keys of element. Those are homogeneous (i.e. made up of all object, events, and situations but not a combination of different groups), representative (i.e. represent of area being investigated, Fransella, Bell, and Bannister, 2004, p.18), discrete (i.e. not be a subset of other elements), and supplied or elicited (i.e. the way to get elements depending the research purpose, elements can be provided by researcher or elicited from the respondent).

In this research, the elements were supplied and derived from community itself and options may be chosen by landowner regarding regional growth and sustainable agriculture issues (Dorfman et,al.2003; Pouta et, al. 2011; Alamsyah, 2010; Subali, 2005). Those are buying, selling, leasing (to other farmer), joint farming (with other farmer), keep farming, and converting (to other land use). The definition of decision is explained as follows:

a. Buying: Farmland owner tends to buy farmland and still to be farmer.
b. Selling: Farmland owner tends to sell their farmland and give up being farmer.
c. Leasing: Partially or all of farmland is leased to other farmer and no longer as farmer.
d. Keep farming: status quo, nothing change.
e. Joint farming: other farmer looks after the farmland. As exchange, land owner gets some share from the harvest.
f. Converting : Converting farmland to other land use, no longer a farmer. Their farmland will convert to other land use

Construct is a way in which two or more things are alike and thereby different from third or more things (Kelly, 1957). Construct represent interpretations of the element and has own attributes. a way of seeing two or more things or persons as similar, and at the same time different from the third. Those are described as dichotomy corollary and bipolar, where each pole represents the extreme of particular observation (Niu and Easterbrook, 2006). Bipolar represent importance of the constructs. In term of decision making process, constructs were defined as consideration that drive to alternative decisions or elements.

Elicited constructs should be accommodated the respondent's thinking. And, it also encourages respondents to be able to see themselves among the elicited constructs. Group of variables were selected prior to limit the elicited constructs. It also gives advantages to respondents in order to gain understanding the designed issues.

Table 1. Main constructs

	Constructs			
	Household condition	**Agricultural sustainability**	**Regional growth**	**Policy**
Social	• House hold size • Education level • Farming experience • Successor availability • Successor education	• Social management for farming • Contribute to local community	• Participation on community activities	
Economic	• Income • side job	• Regional minimum wage • Labor	• Job opportunity • Input price • Output price • Productivity	• Farmer loan program • agricultural subsidies
Spatial	• Land size • Soil quality		• Distance to road • Distance to market	
Agricultural practice	• Family participation	• Tools and technology	• Farmland conversion	• farming guidance

The field survey was taken place in the Kediri Municipal, East Java Province, Indonesia. Three villages were selected. Those are Ngampel Village, Gayam Village, and Pojok Village. Recently, the district where those villages located are designed as center of growth. At the same time, sustainable agriculture policy has being implemented.

Research procedure.
The respondents were limited to inhabitant within administrative boundaries and farm land owner. We counted 210 farmers or prospective respondents. Forty respondents were selected randomly from 3 different villages.

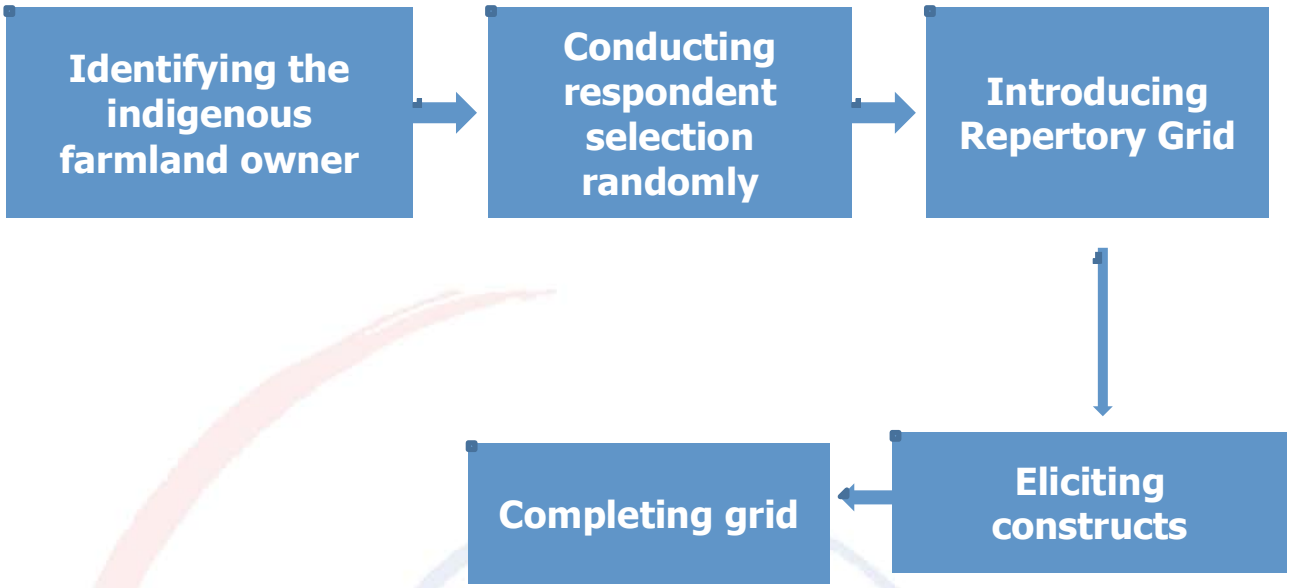


Figure 2. Field survey procedure

First, 40 respondents were divided into 3 big groups based on their location. Each group selected representative and created small group that consist 2-4 respondents. The field survey was started from small group. The small group built understanding of the research purpose and repertory grid technique. It help the researcher to explain the research purpose to their member. In order to get fruitful results, the steps has been determined as follows (Jankowicz, 2004, see also Fransella et al., 2004):

a. Explain to the respondent about the research purpose, research procedure, set of variable and set of element.
b. Take three elements and ask the respondents: what do two of these elements have in common, as opposed to the third?
c. Ask the respondents the reason behind the answer
d. Make sure the respondent understand the contras of the constructs
e. Write the constructs in the left or right base on respondents
f. Replace the element to other element and perform step "c" trough "e"
g. Repeat the steps "c" trough "f" until the respondents cannot state other constructs
h. Ask the respondent to scoring each cell base on Likert scale. Respondent could choose 1 to 5 where 5 means respondents prefer to left pole, and 1 means respondents prefer to right pole. Ask the respondents to rate each of the remaining elements on this construct

Second, the small group simulated construct elicitation process and bring the result to big group. In order to get more understanding, respondents had a right to erase or add constructs. Then, they asked to fill out the constructs. Respondents were virtually positioned their self into other elements and completed the entire grid. This role play is important due to repertory grid represent respondents personal opinion.

Analysis procedure

After having field survey, multiple grids were generated. There are 2 ways to analyze the grids. Those are single grid analysis and multiple grids analysis. Single grid analysis, every grid is analyzed

one by one. Multiple grids analysis is reproducing new grid by calculating the mean of each cell. It may lost personal identity of single grids (Ilbery, 1985). However, It gains better vision of group.

After reproducing the mean grid, the grid was analyzed by using Principal Component Analysis (PCA). IDIOGRID was used instead of SPSS. IDIOGRID is a special software for RGT analysis. PCA in IDIOGRID is designed to reveal correlation between elements and constructs.

Results and discussion

- **Profile of respondent**

40 respondents were actively participating the RGT process. This research selected 3 different villages from Kediri Municipal, those are Pojok Village, Ngampel Village, and Gayam Village. Those villages are located in the Mojoroto district, the biggest district of Kediri Municipal. Pojok Village and Gayam Village are located in the edge of Kediri Municipal, East Java province, Indonesia.

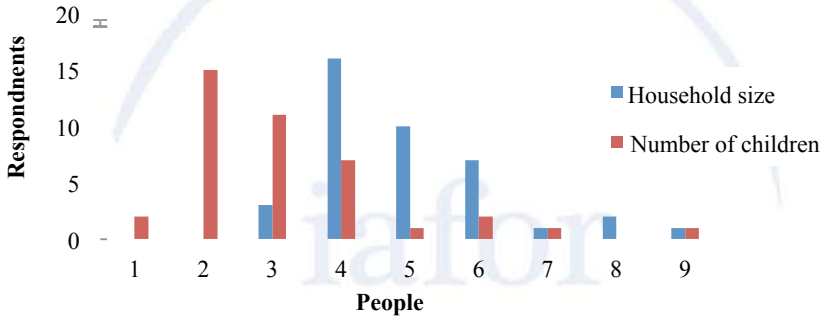


Figure 3. Comparison between Household size and Number of children

The household size is ranged from 3 people to 9 people. According field survey, 16 of 40 respondents, their household size is 4 people. Some of farm owners live with their parents or relatives. Or, their child moved out from the house because they got married.

Banyak anak, banyak rejeki (more children, more fortune) is a slogan of Javanese people. Their religious experience involves in their family planning. They believe, if they have many children, fortune will comes rapidly. Somehow, it is not fully wrong. In the agricultural point of view, many children mean the number of unpaid labor increase. However, those concepts will torn apart when modern lifestyle involves in their daily life. Basic needs should be provided such as education and food.

Based on result of field survey, 15 out 40 respondents have 2 children and respondent who has 3 children comes second. The highest is 9 children. According family welfare program, number of children is not more than 2 children. Those table shows respondents have been follow the government recommendation. Oppositely, more than half of total respondents have more than 2 children.

37 respondents (92%) are farmer and farmland owner, They also consider it as main occupation. Only a single respondent has declared himself as an entrepreneur. However, he is considering farming as side job. About a half of total respondents posses side job in their daily schedule, such as craftsman, peasant, or raising cattle. Raising cattle seem to be saving for unexpected expenses. Yet, it

turns becoming big business when the special day (i.e. in calendar of Islam) is coming. In this case, raising cattle refers to business itself. They consider raising cattle as business rather than for saving.

According to figure below, 17 respondents earn 1 to 2 million each month. That earning is slightly higher than regional minimum wage (i.e. about 1.1 million per month). However, 19 respondents have lower income than the regional minimum wage. Only 4 respondents have income double than margin minimum wage. It is hardly to say that a conclusion whether farming is good occupation or not. It depends on farm size in their possession. Roughly, farm size and type of crop affect to income.

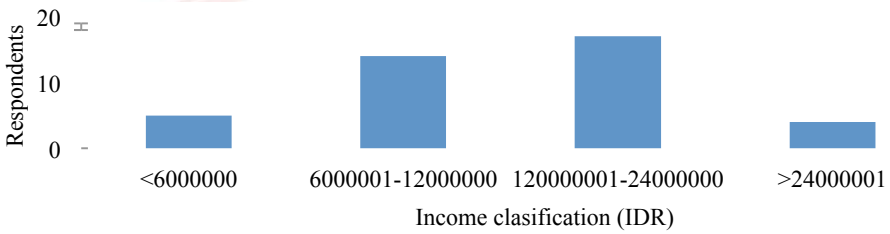


Figure 4. Income of the respondents annually

- **Principal Component Analysis**

After having eliciting construct procedure, 85 new constructs have elicited from 40 respondents. Those respondents have emerged their opinion regarding those issues. They mentioned various constructs, yet interesting. New constructs do not cover respondents consideration related existing condition but also the threat and the opportunity. For example, government involvement in the farming activity. Respondents mentioned that amount of subsidy is important. Nevertheless, distribution is also important.

The constructs are orthogonal or independent each other. Therefore, varimax rotation was chosen. Main purpose conducting Principal Component Analysis (PCA) is to gather better understanding how do the driving forces affect to decision. Idiogrid (developed by Grice in 2008) is a suitable software for RGT that produce fruitful result. PCA in Idiogrid is able to identify correlation between elements and construct. The constructs located in the same quadrant as element are identified give high score to the element. In this research, those are considered as driving force for the decision.

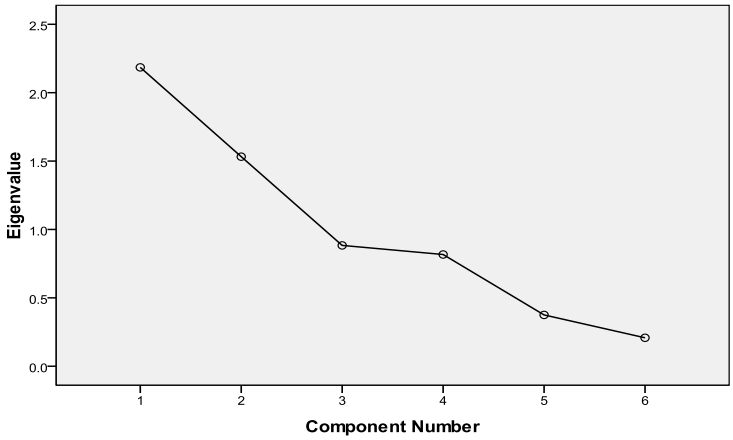


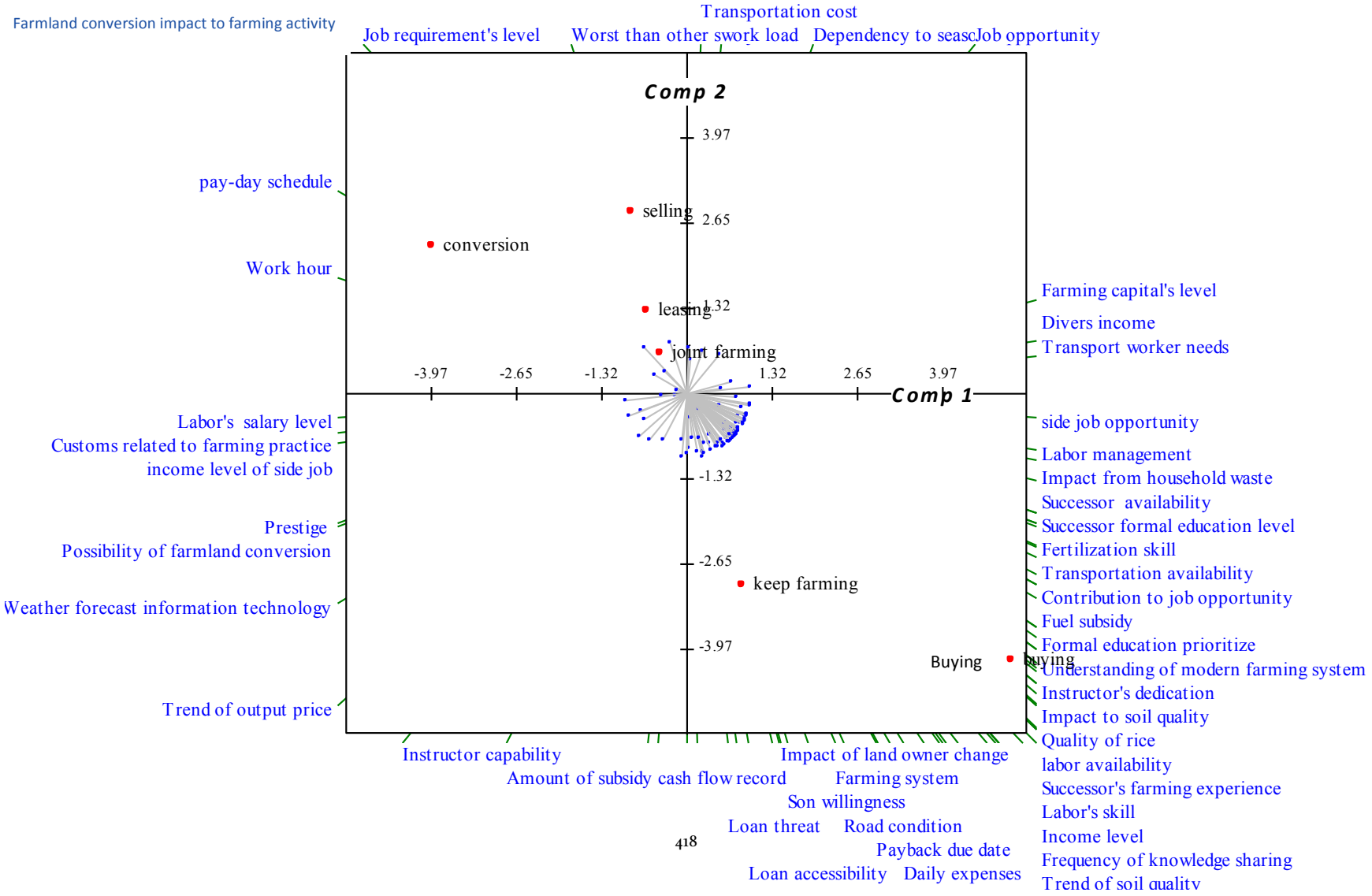
Figure 2. Initial result of element's eigenvalue.

The number of component was decided by eigenvalue of elements. Only 2 components have score more than 1. That result was used to determine the number of component of construct in PCA for

construct. It should be noted that all constructs are orthogonal and indirectly connected each other. Therefore, varimax rotation was chosen.

Comparison between PC 1 and PC 2 shows emerge pole of constructs where the best condition according expectation of respondents. There are two result can be obtained from that figure. First, decision can be classified according its driving forces. Keep farming is sharing driving forces with buying and conversion shares its driving forces with leasing, selling, and joint farming. Second, constructs are divided into 4 groups and closely related with element. When it is associated with elements, it gives high score to elements. For example, respondent will keep farming or buy new farmland if road condition is better. Oppositely, they will sell or other decision if road condition is bad.

The second component accounts for 36% of total variance where selling (+2.82), leasing (+1.3) and conversion (+2.31) are close each other especially selling and converting. In addition, joint farming merges in this group with small loading score (0.65). As well as first group in the second component, keep farming and buying show same result. Those two decisions are related each other with great gap.


Farmland conversion impact to farming activity
Transportation cost
Job requirement's level
Worst than other swork load
Dependency to seasc
Job opportunity
Comp 2
3.97
2.65
1.32
-1.32
-2.65
-3.97
Comp 1
selling
conversion
leasing
joint farming
keep farming
Buying
buying
pay-day schedule
Work hour
Labor's salary level
Customs related to farming practice
income level of side job
Prestige
Possibility of farmland conversion
Weather forecast information technology
Trend of output price
Farming capital's level
Divers income
Transport worker needs
side job opportunity
Labor management
Impact from household waste
Successor availability
Successor formal education level
Fertilization skill
Transportation availability
Contribution to job opportunity
Fuel subsidy
Formal education prioritize
Understanding of modern farming system
Instructor's dedication
Impact to soil quality
Quality of rice
labor availability
Successor's farming experience
Labor's skill
Income level
Frequency of knowledge sharing
Trend of soil quality
Instructor capability
Impact of land owner change
Amount of subsidy cash flow record
Farming system
Son willingness
Loan threat
Road condition
Payback due date
Loan accessibility
Daily expenses

Capital of production has done a lot. Farming has been affected by house hold size that provide unpaid labor (-0.84) as well as successor expectation (-0.81) and expecting own as successor (-0.79) for farming sustainability at house hold level as well as family participation in farming activity (-0.71) and son willingness to inherit the farmland for farming (-0.92). Also, government involvement is being expected. Second group of second component tends to correspond with response to governments' programme (-0.74), and the effectiveness of governments' programme (-0.75). This group also addressed loan threat (-0.69) and due date of the debt (-0.64) at medium level. But, it highly considers the availability of loan program for farmer and benefit of loan programme that shown by high loading scores, (-0.93) and (-0.89) respectively. Subsidy also took part to build this group, including the amount (-0.71) and the distribution (-0.7) as well.

Farming guidance was invented by Ministry of Agriculture to assist famer tackle down their obstacles. Capability (-0.73) and Innovation (-0.81) of instructor are highly considered if they tend to choose keep farming and/or buying new farmland decision. Those are reflected by high loading score. It is quite reason able since transfer technology and guidance will bring new experience to overcome all the obstacles may affect to their income level.

It can be easily seen that elements are divided into two big groups; those are sustainable farmland and endangered farmland. Sustainable farmland is located in the second quadrant. And, endangered farmland is located in the forth quadrant. Those big groups share the driving forces. Oppositely, constructs scatter in all quadrants and created 3 big groups; those are driving forces of sustainable farmland, driving forces of endangered farmland, and grey zone. Grey zone refers to the constructs where those constructs give average score to both groups of elements. Last but not least, prestige (-0.73), weather forecast information technology (-0.67), and trend output price (-0.73) are recorded close related to this group. Finally, this group is related to impact of farmland conversion to farming activity but in the low degree (-0.35).

We can easily find that 70% of total constructs are positioned in the second quadrant. It implies that certain constructs established the decision of sustainable farming. Respondents are really concern about those constructs when they choose those decisions (i.e. keep farming and buying). Otherwise, respondents easily choose endangered decision with a few considerations. It is ironic, yet a serious situation. Respondents can change their decision from sustainable farmland to endangered farmland any time, especially when the driving forces (i.e. constructs) satisfied the respondents demands.

Grey zones consist of uncertainty considerations. Based on respondent point of view, constructs at the grey zone moderately drive to certain condition. Nevertheless, those constructs possibly drive respondent to certain decision if user of this research result (e.g. policy maker, and land use planning agency) do not pay attention. Some constructs are suspected corresponding to other construct due to elicited from same variable. For example, farmland conversion possibility is close related to impact of regional growth in farming activity. If the user does not pay attention on farmland conversion possibility, it may drive respondent or farmland owner to endangered farmland decision.

Implications

Result of RGT is amazing and the process either. It is able to enrich knowledge related policy studies especially land use policy. During the RGT process, participation is fully accommodated. Indirectly, PCA result, which is produced by IDIOGRID can be used to drive farmland owner to certain decision. Of course, conditions are applied. Since the RGT in this research are using multiple grid, regional and group of farmland owner profile should alike.

Currently, bottom up paradigm is being applied broadly for spatial planning process. There is high possibility that RGT process can be adopted during spatial planning process. Not only its process, the result of RGT has implication to spatial planning process. Consideration of certain driving forces should be kept in high performance. Those considerations need to be adopted by policy maker in every policy or programmes.

Meanwhile, farmland conservation emerges to stop the wildness of regional growth. Farmland is not only important for food production but also keeps environment balance. It means, farmers are subjected to keep farming. And keep farming itself is a decision that should be taken by the farmland owner. It is not east to choose that decision because it has a set of consideration. Leasing, and joint farming may include in this decision. But, it is too risky to take those decision because it shares consideration with selling and converting.

The government cannot be easily excused designing conserved farmland and avoid the farmland owner concern. Those owners are also actor economic activity also part of living society, and has a right as human well being. If the government design their farmland as conserved farmland, they have to keep farming. If they intend to retire, they have to inherit it to other farmer. It is not simple action.

According to PCA process, if farmland owner intends to continue farming, a bunch of consideration has lined up. Those considerations are not only about farming capital (i.e. including availability, and condition) but also external factors such as government involvement, community involvement, as well as pressure of regional growth (i.e. house hold waste and regional economic). It means that those consideration should be kept high to ensure farmland owner keep farming.

However, big question mark still appears. How to keep those considerations in high performance? External factors may can be manipulated. To be honest, internal factor is the hardest one. The best way is adopting the considerations for governments' programme. Currently, expectation and responses of farmer to governments' programmes are statistically good enough (0.7 in average, based on PCA).

The groups of PCA result show the farmland owners' willingness on farming activity. Sustainable farmland decision represents active farming where farmland owner has strong willingness to engage farming business. This first group seems to safe decision. Otherwise, the second group, endangered farmland decision shows aversion of maintaining farmland.

The first second of decisions, joint farming and leasing, they prefer to collaborate with other farmers and leave it to their farming partner for maintaining their farmland rather than doing by them self. Farmland owners do not fully involve the farming business, it can be identified from the characteristic of the decision.

May collaboration is a good choice. However, it possibly provoke the farmland owner to hand farming works off to their partner. The farmland owners just wait the yield at home. According to PCA result, at this rate, the aversion would trigger the farmland conversion and losing farmland ownership because joint farming, and leasing, are highly related to converting and selling.

PCA result is also useful for altering decision of respondent from one decision to other decision by improving driving factor of designed decision or using driving factor of designed decision. For example altering decision from selling to keep farming. In this case, reducing performance of farmland conversion impact to farming activity is the best option. The next step is choosing

appropriate driving forces that possibly reduce the performance of farmland conversion impact to farming activity. Conceptually, any driving forces can be used. In this case, road condition is selected to reduce farmland conversion impact. Of course, the selection is based on existing condition such as internal attribute and external factor. When farmland is converted, automatically, accessibility is needed to support new land function. In this situation, new road should support farming activity. For example, truck can utilize the road to transport the yield from the field.

Conclusion

After more than a half century, Kelly's work, Repertory Grid technique can be used in the land use studies. Ilbery had spearheaded and made it possible applied in the land use study. His work about decision making in agriculture that is closely related to land use study is tombstone of this study. Agricultural activities are closely related to decision in the various dimensions; such as economic, social, environment and of course spatial aspect as part of environment. Ilbery (1987) put in geographical aspect in his decision making process and RGT as tool to investigate behavior of farmland owner. His finding has made RGT can be possible used in the land use studies since land use studies also has decision aspect.

Again, thank goes to Kelly for his magnificent work. RGT is indeed a power full and fruitful technique. This technique produces the outstanding finding and better insight of people opinion. Afterward, IDIOGRID was created base on RGT and also provides best result and fantastically could analyze bored score on the grid in to simple form but meaning full result. And it gave better result than ordinary statistical tools.

In generally, 2 groups of decisions have emerged. Those are sustainable farmland and endangered farmland. Sustainable farmland decision is built by keep farming and buying decisions where mainly driven by availability of successor, soil quality, farming system, education, yield and its quality and dependent to subsidy and supporting farming program from government.

There is a gray zone where driving forces do not significantly associate to certain decision. Some driving forces of gray zone inconsistently associate with two decision group in the same time. However, it gives clear signal that those driving forces work for any decision in the different condition depends on it loading score. Further research is needed to give better understanding of gray zone.

It seems keep farming is the best way to conserve the farmland. When the farmer leasing and joint farming, in directly, they just started to threat the farmland because those decisions are closely related to selling and conversion. It shows that passive farming would be trigger of losing land owning and farmland conversion. To alter farmland choosing endangered farmland decision, the constructs that drive to sustainable farmland decision should be kept in the high performance. In order to support farmer keeping the performances The policy markers may adopt the driving forces in their programme on issues related to land use policy and agricultural policy.

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