

Community-Based Joint Business Model Design for Solutions to Implementing Technology Innovation in Small Farmers

Desenho de Modelo de Negócios Conjunto Baseado na Comunidade para Soluções na Implementação de Inovação Tecnológica em Pequenos Agricultores

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Abstract

In general, small-scale farmers in rural areas often experience obstacles in implementing technological innovations offered by agricultural extension workers. Obstacles can come from within the individual breeder himself. The theory of small farmers and the theory of collective action is expected to solve the obstacles to implementing these technological innovations. This study aims to analyze and find solutions to the obstacles to implementing technological innovation at the individual level of small farmers in rural areas. Researchers took case study research with a research and development (R&D) method approach to find the construction of a joint venture model. Qualitative methods are used in Focus Group Discussion (FGD) activities. At the same time, the quantitative descriptive research method is to evaluate the results of implementing the joint venture model. The population and the evaluation research sample were members of the Ampelsari Makmur Jaya farmer group in Pasuruan Regency and the La Tulip Farmer/Women Group in Lamongan Regency. The number of respondents for the perception evaluation was 68, determined as a total sample. Data was collected through participation techniques, in-depth interviews, FGDs and surveys. The evaluation perception was analyzed using descriptive analysis and Score T. The evaluation of respondents' perceptions resulted in the farmers accepting the establishment of community-based business units (complete feed and pastured chicken business). The solution is also considered effective in solving the obstacles to applying technological innovation by rural and small-scale farmers in Indonesia.

Keywords: Farmer/women farmer group; Collective action; Perception evaluation

Resumo

Em geral, os pequenos agricultores das áreas rurais muitas vezes enfrentam obstáculos para implementar as inovações tecnológicas oferecidas pelos extensionistas agrícolas. Os obstáculos podem vir do próprio criador. Espera-se que a teoria dos pequenos agricultores e a teoria da ação coletiva resolvam os obstáculos à implementação dessas inovações tecnológicas. Este estudo tem como objetivo analisar e encontrar soluções para os obstáculos à implementação da inovação tecnológica no nível individual de pequenos agricultores em áreas rurais. Os pesquisadores fizeram uma pesquisa de estudo de caso com uma abordagem de método de pesquisa e desenvolvimento (P&D) para encontrar a construção de um modelo de joint venture. Métodos qualitativos são utilizados nas atividades de Discussão em Grupo Focal (DGF). Ao mesmo tempo, o método de pesquisa descritiva quantitativa consiste em avaliar os resultados da implementação do modelo de joint venture. A população e a amostra da pesquisa de avaliação foram membros do grupo de agricultores Ampelsari Makmur Jaya na Pasuruan Regency e do Grupo de Agricultoras La Tulip na Lamongan Regency. O número de entrevistados para a avaliação perceptiva foi de 68, determinado como amostra total. Os dados foram coletados por meio de técnicas de participação, entrevistas em profundidade, FGDs e pesquisas. A avaliação perceptiva foi analisada por meio de análise descritiva e Score T. A percepção da avaliação foi analisada por meio de análise descritiva e Score T. A avaliação das percepções dos entrevistados resultou na aceitação dos agricultores da criação de unidades de negócios de base comunitária (ração completa e negócios de frango a pasto). A solução também é considerada eficaz para resolver os obstáculos à aplicação da inovação tecnológica por agricultores rurais e de pequena escala na Indonésia.

Palavras-chave: Grupo agricultor/agricultora; Ação coletiva; Avaliação perceptiva

1 Introduction

Various efforts have been made by agricultural practitioners and Agricultural Extension Agents (AEA) in Indonesia to disseminate agricultural and livestock technology innovation so that farmers could adopt and enhance business production (ADB 2019; FAO 2018; Hurst 2005). Many technological innovations have been disseminated in the livestock sector, such as reproductive technology, forage, animal feed processing technology, rearing technology, disease protection, and handling technology (Thornton 2010). Of the many technologies introduced, not all can be applied by small-scale farmers with ownership of 2-3 cows (Graf et al. 2015) in Indonesia due to several obstacles in the application process and sustainability (Purnawan et al. 2020; Zeweld et al. 2017) reality contradicts the Indonesian government's agricultural development goals and targets. Program planners, especially the Ministry of Agriculture and Local Government (OECD 2001), have yet to predict several problems applying this technological innovation. Only after a few years, it was discovered that the programs to introduce technology innovation to farmers by agricultural extension agents needed to be more active in technology transfer and application. There was a tendency for farmers to refrain from using the knowledge and skills they had mastered in managing their livestock business (Dhehibi et al. 2020; Fatchiya, Muflikhati & Soedewo 2018; Hamid 2018).

Suppose this problem needs to be handled more seriously by the relevant parties. In that case, it will impact long-term adoption motivation due to the adoption process that farmers should implement in stages, starting at simple, medium, and more complex levels. (Liu, Bruins & Heberling 2018; Mwangi & Kariuki 2015). An example was the animal feed processing technology to make silage. When farmers in the village ignore this forage processing technology, they will unknowingly lose the opportunity to apply technological innovations in the future, for example, complete feed manufacturing technology and so on, because technology will continue to develop rapidly and become more complex. There needs to be a collaboration between farmers as a community, as well as between stakeholders, to enhance awareness in building a more modern livestock sector in terms of technology with the opportunity to collaborate with the interests and abilities of small-scale farmers in the village in its application (Hurst 2005; Leicht & Heiss 2018; Maass Wolfenson 2013).

The inhibition of innovation adoption of small farmers in Indonesia was because they still believe in an old paradigm (Ali et al. 2022; Ponniah et al. 2008; Deguine et al. 2021) there was individual, social, and technical aspects

as well (Chalil 2013; Connor et al. 2021; Rodriguez et al. 2009). The fact was farmers have been able to implement technological innovations, but they doubt the results of the application of these technologies because they have not seen any other farmers succeed in their implementation; it is mainly because farmers do not dare to take risks in adopting agricultural innovations (Indraningsih 2018; Ritter et al. 2017). Their confidence influences farmers' perception of technology in their abilities, and they will refrain from applying it even though they know the innovation could be helpful. Farmers often need more confidence to apply the technology properly (OECD 2001). This presentation provides a guide that one of the obstacles breeders want to avoid in implementing technological innovations is that farmers view themselves as individuals managing busy businesses and businesses on a small scale.

In this study, researchers suggest that technological innovations can be implemented more quickly by small-scale breeders, namely by implementing cooperation to form a joint business unit model in farmer groups (communities) to form the perception of farmers so that they no longer wait for each other in implementing the technological innovations they have mastered (Anantanyu 2011; Fischer & Qaim 2014). Case studies of this joint business implementation have been carried out in the Farmers Group in two districts, namely Pasuruan Regency and Lamongan Regency. Breeders from each group started business jointly. The two groups run different types of businesses. The considerations were the interests, abilities, potentials, opportunities, and business strategies that are still prospective in the area—creating the joint business unit with the intent that the active farmers of farmers become more dynamic (Krissella & Nugroho 2020). Based on the description, the purpose of this study was to find out the hindrance and solutions to the obstacles of applying technological innovation at the individual level of small farmers in the village, namely by building community-based joint ventures.

2 Theory and Research Framework

This theory explains collective action as a function of the individual ability to overcome social dilemmas (Villamayor-Tomas et al. 2021; Willer 2009). Referring to the definition of collective action as coordinated group behaviour towards common goals or shared interests (Padovan et al. 2019), the context of forming groups (community institutions in villages) that form the basis of collective action refers to the concept of social capital as a structure of relationships between actors that encourage productive activities (Figure 1).

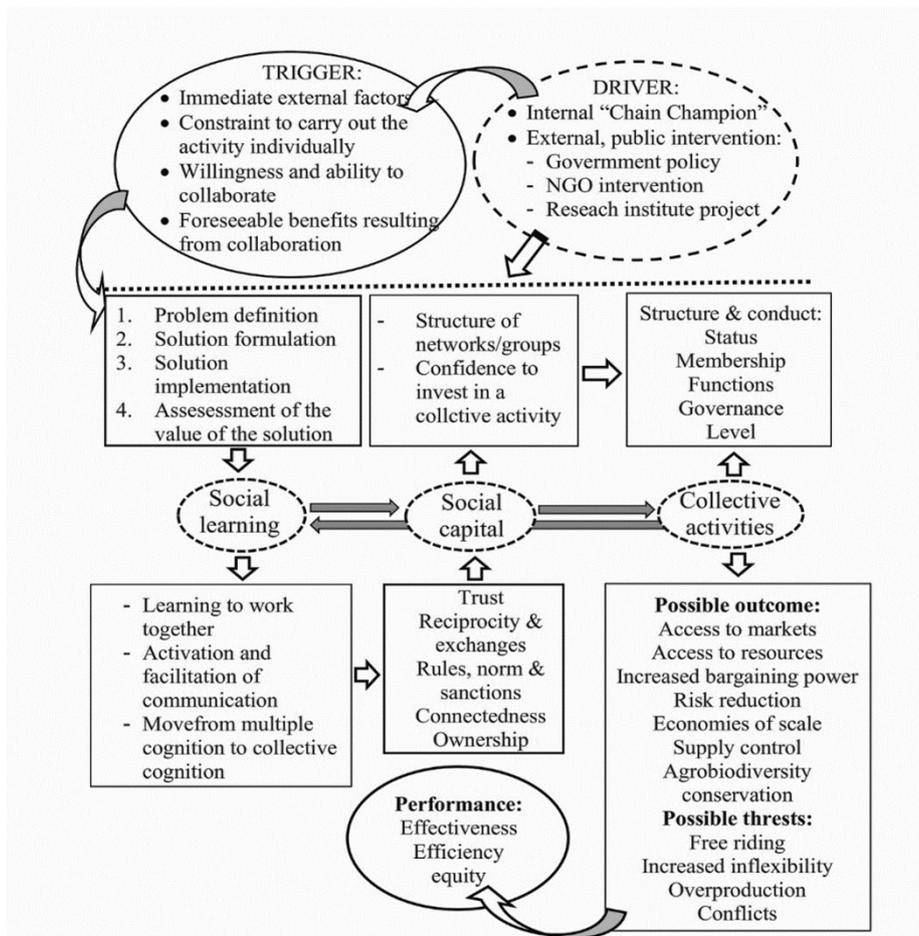


Figure 1 Collective action process for smallholder market participation (Kruijssen, Keizer & Giuliani 2009).

Triggers cause the initiation of processes of social learning and collective action. However, there must be constraints when carrying out activities individually, and there must be a willingness to do so in groups indicated by a certain level of relatedness, motivation and capacity. Also, the benefits obtained from collective action must be visible to the participants.

Collective action through farmer groups is an essential strategy for smallholders to stay afloat and competitive in a rapidly changing environment. Since the commitment to collective goals and contributions of individual members is critical to the success and survival of farmer groups, understanding what drives different intensities of participation an essential prerequisite is for improving the institutional performance of farmers (Fischer & Qaim 2014).

Collective action can be implemented through community-based enterprise (CBE), which grows and develops into a joint venture institution owned by the community to obtain uses and benefits to realize community

welfare (Peredo & Chrisman 1991; Ratten & Welpel 2011). Community-based entrepreneurship is a social entrepreneurship model with commercial characteristics that aim to solve social problems and participatory governance (Kusumasari 2015). Community-based joint venture units are local, but that does not mean they are closed to interactions with the external environment; they will remain connected to the wider surrounding environment. The main characteristic of social entrepreneurship is a participatory management approach among members, business unit managers, and various stakeholders (Hidayat & Putra 2020).

3 Methodology and Data

The chosen research method is a case study with a research and development (R&D) method approach to find the construction of a joint venture model (Ker & Galindo-Rueda 2017). Qualitative methods are used in Focus Group Discussion (FGD) activities. At the same time, the quantitative descriptive research method is to

evaluate the results of implementing the joint venture model. Determination of the population and the research sample, namely members of the Ampelsari Makmur Jaya farmer group in Pasuruan Regency and La Tulip Farmer Group/Women Farmer Lamongan Regency. Data was collected through participation techniques, in-depth interviews, FGDs and surveys. The evaluation subjects were case studies (Gerring 2007), namely members of a farmer group who had carried out a joint business unit as part of a business unit owned by the group, then the Ampelsari Makmur Jaya Farmer Group was selected and established, Pasuruan Regency with a total of 38 members and the Farmer Group/Women Farmer La Tulip Lamongan Regency with a total of 30 members.

The data analysis used consisted of 1) descriptive statistical analysis. Descriptive statistical analysis was carried out using the mean formula or average value or value that is considered the same as owned by each member in the group (Calvani & Chinnanon 2003; Muliawan 2014) and 2) T score to measure group members' perceptions of the characteristics of innovation. The T score is a measurement standard used to measure attitudes and perceptions. The instrument used is a Likert Scale questionnaire with the final output accepting and rejecting or positive and negative with a mean T of 50 and a standard deviation of 10 (Azwar 2007).

The stages of activity in R&D (Research and Development) research consist of three stages: the assessment stage, the design stage and the model evaluation stage (Prasetyo 2014; Richey & Klein 2014; Ulusoy 2013).

3.1 Assessment Stage

The assessment stage was the preliminary stage aimed at gathering information on problems and potentials that could be developed in research. Researchers collect and analyze information and data as a consideration in developing models that are expected to solve the problems encountered (Goss, Rossi & Moretti 2011; Snyder 2019). This study's sources of data were primary and secondary (Hox & Boeije 2004). Primary data was obtained from the results of Regional Potential Identification and needed assessment through direct observation and interviews. Secondary data were obtained from the Department of Agriculture, the Central Statistics Agency, and other related agencies in Pasuruan and Lamongan Regencies.

The method used to explore the potential of farmer groups' area was descriptive quantitative (Strijker, Bosworth & Bouter 2020). Quantitative descriptive is a statistical analysis method used to analyze data obtained from research samples and secondary data, which are then interpreted as numbers or images (Apuke 2017). The finding was using

questionnaires and structured interviews with administrators and several members of farmer groups. Informants were determined based on the snowball sampling technique (Creswell & Creswell 2018). In this study, there were a maximum of 10 informants per unit of the data source.

3.2 The Construction of Joint-Business-Unit-Model Design Stage

The design stage was critical in applied and action research, namely building a model or strategy for the innovation or technology being developed so that the feasibility of the innovation or technology could be achieved (Diaconu 2011; Foray et al. 2012; Frow et al. 2015). The construction of the joint-business-unit-model stage was carried out using a participatory method approach and a Focus Group Discussion (FGD) (Schot & Steinmueller 2018), with the participation of farmer groups and stakeholders engaged in fostering farmer institutions, agricultural business actors, and the Department of Agriculture of Pasuruan and Lamongan districts (Ananga et al. 2021; Hidayah, Wiyono & Karyanto 2021; Molina et al. 2021). The participatory method was carried out in three meetings, resulting in a draft business unit model run by farmer groups. The draft was finalized using the FGD technique to determine the model of the complete feed business unit and the domestic chicken business unit. The business unit model was conveyed in a flow chart that contains and describes the parts/divisions and their activities, as well as the management procedures that must be carried out.

The model design trial used a quasi-experimental design (non-design) with a one-shot case study model where a group was given an activity, then observations were made on the results (Haas & Kraft 1984). This trial uses a mentoring approach to group activities that are carried out and developed through guidance and coaching through ongoing training and agriculture extension.

3.3 Evaluation Stage

The establishment of joint ventures with farmer groups was evaluated by conducting research on the implementation or evaluation of development programs (Calvani & Chinnanon 2003). The emphasis and focus of the evaluation object are the growth of joint business units by farmer groups. The objective of the evaluation was to choose two selected farmer groups using specific considerations and a demographical factor. The selected farmer groups established businesses on their own, located in Lamongan Regency and Pasuruan Regency, East Java, Indonesia.

Rogers' Innovation Adoption Theory was chosen as an opening to prove the perception of farmer group members on the implementation of joint business growth in their group. Based on the Innovation Adoption theory (Rogers, Singhal & Quinlan 2019) it is stated that the adoption rate of an innovation depends on the adopter's perception of the characteristics of the innovation to evaluating the adoption of innovation (Ali et al. 2022) model for the establishment of joint ventures in farmer groups, the parameters set are the perceptions of group members including variables of relative advantage, level of suitability, level of complexity, trialability and observability.

4 Results and Discussion

4.1 Design and Implementation of a Domestic Chicken Business Unit in the Women Farmers Group in Lamongan Regency

The development or design stage involves planning, implementation, and evaluation (Kennedy-Chouane & Lundgren 2013; Shakman & Rodriguez 2015). The design stage uses a group approach with the coaching method (Lemma 2016). The planning stage was the development of the domestic chicken business unit group model, which was to establish a domestic chicken group business that utilizes yard land using its business capital and is supported by a capital provider institution. The innovation of domestic chicken business in groups is profitable for the group and members' families. The business also increases the skills of women farmers by utilizing existing potential (Methamonti et al. 2022).

The operational model for domestic chicken for the women-farmer group was implementing a joint best abolishment model formed from a strategy that farmer group members had chosen with the assistance of stakeholders during the focus group discussion (FGD). The business development model in the form of an operational scheme for a business unit with free-range chicken in the La Tulip Women Farmer Group, Lamongan Regency, is presented in Figure 2.

The operational concept design in Figure 2 can be explained as follows: a) Investors are investors someone who provides business capital. Investors could be capital provider institutions or individuals who provide money

capital and collaborate with the farmer group. The investor's duty was to provide additional capital, which the farmer group utilizes to run the domestic chicken business. The connection between the investor and farmer group was reciprocal, the lation in which inves provide capital for the farmer group, and other mer group share divided profit with investor according to the agreement, b) As the domestic chicken business unit, the farmer group was responsible for all business activities. The farmer group received economic capital from an investor, which was utilized in running a domestic chicken business. The group delegated the group member to manage all the domestic chicken business activities. The group is divided into three subgroups, namely the breeding unit, farming unit, and marketing unit, c) The breeding team consisted of a member of the group who was in charge of providing the chicks supply. The chicks could be provided by breeding them independently or buying them from the market. The self-breeding could be done using a hatchery machine. In this case, a group member deposits eggs according to the agreement in one hatching period. d) The farming team was the group member who was in charge of rearing the chicks from day one until it is ready to harvest. The farming activity carried out was by the group internal, in which the group handled the chicks that belonged to the farmer group. Meanwhile, the farmer group could also rear the chicks from outside of the group (group external), in which the group buys chicks from the market to be kept temporarily until the marketing team sells the chickens, e) The marketing team was the group member in charge of selling the product. The product was the chicken and the chicken carcass. Live chicken could be sold to a local middleman or directly to the needy. The chicken carcass could be sold to chicken-meat traders, restaurants, minimarkets, and household members. The marketing team was tasked with selling domestic chicken products and cooperating with marketing agencies. Sales of products in the form of live chickens or carcasses are sold directly to consumers and adjusted to market needs/demands and the results of the MoU Agreement, and f) The consumer plays the leading role in domestic chicken business activities because the business could not go on without consumers. Consumers who are enthusiasts of domestic chicken products provide financial input to the business. Consumers purchased the product produced by the farmer group, and the money was used to manage the business.

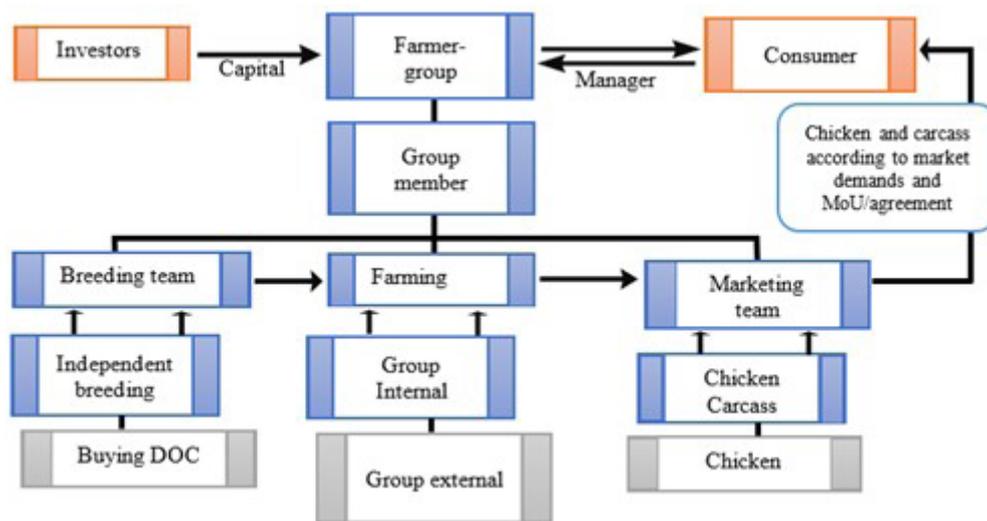


Figure 2 Concept of operational model joint business unit of free range chicken in Women-Farmer Group 'La Tulip' Lamongan regency.

4.2 The Design and Implementation of a Complete Feed Business Unit in "Ampelsari Makmur Jaya" Farmer Group in Pasuruan Regency

Management of joint business units by maximizing production assets owned by farmer groups. These assets are labor (group members as wage workers), facilities owned in the form of machinery, equipment, production raw materials, and buildings for production. In establishing a complete feed business unit, the business object is a product, as seen in Figure 3.

The first step was to collect capital that could be obtained from a group member. The capital also could be obtained from investors; in this case, the farmer group shares the profit with investors. After the capital was collected, the fund was recorded and handled by the exchequer, supervised by the chairman and the secretary, farmer group members, and investors.

The second step was the production stage, in which the coordinator of team A tasked to provide the list of materials needed along with the prices and pass it to the exchequer. The exchequer reports to the secretary regarding the cost of expenses, then the secretary submits it to the chairman. After Team A had prepared all the materials needed, the materials were distributed to Team B. Team B was tasked to process the raw material into complete feed and store it until the complete feed was fermented. Team C was tasked to do the packaging of the complete feed. The last, team D was tasked to sell the complete feed to the market.

The last stage was about the management of capital. The initial capital was taken from a group member or group cash; it was collected at every group meeting held twice a month. The capital was also obtained from the investors; in this case, the service officers provided the capital, IDR. 150.000 per month. Initially, the manufacture of complete feed for beef cattle was focused on fulfilling the group's need for cattle feed.

4.3 Evaluation of Perception on Design and Implementation of Community-Based Joint Business Unit in Farmer Group

The perception of technological innovation is a person's initial view of information on the latest innovations and technologies in a developing field in society (Tan 2010). The level of adoption of an innovation depends on the adopter's perception of the characteristics of the innovation, including relative advantage, level of suitability, complexity, trialability, and observability (Gandasari 2021; Scott et al. 2008). The results of the analysis of the evaluation of perceptions of the implementation of community-based joint venture units in farmer groups are presented in Table 1 below.

Table 1 illustrates the perception of Women Farmer Groups (WFG) based on the characteristics of innovation, including relative advantage, level of suitability, level of complexity, trialability, and observability, stating that they accept the innovation of community-based joint business unit model (T-score 50).

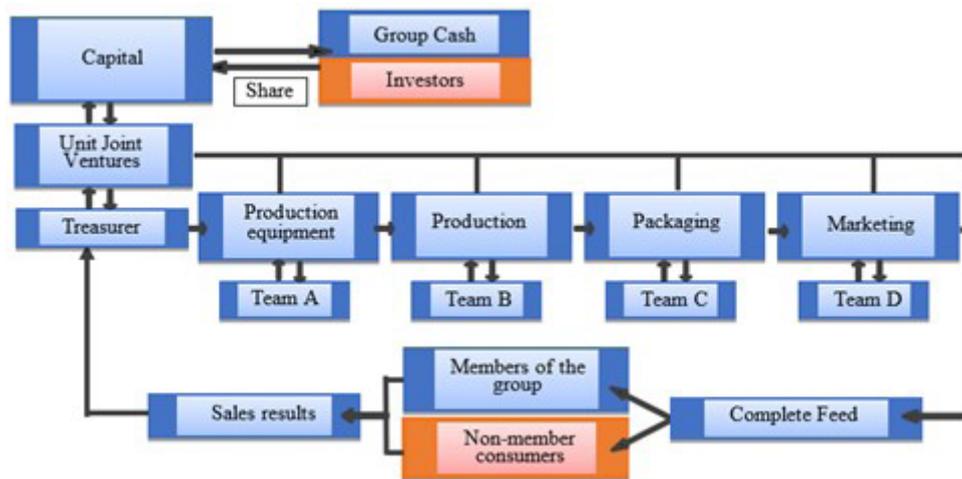


Figure 3 The operational concept of complete-feed joint business unit in ‘Ampelsari Makmur Jaya’ Farmer Group Pasuruan Regency.

Table 1 Evaluation of member perceptions on the establishment of community-based joint business units in Farmer Groups.

Perception	T score (Category) ¹⁾	% (n)	Mean	T-test ²⁾
Relative advantage	< 50.00 (reject)	20.6 (14)	36.60	0.000 ¹⁾
	≥ 50.00 (accept)	79.4 (54)		
Level of suitability	< 50.00 (reject)	19.1 (13)	23.77	0.000 ¹⁾
	≥ 50.00 (accept)	80.9 (55)		
Level of complexity	< 50.00 (reject)	25.0 (17)	13.27	0.000 ¹⁾
	≥ 50.00 (accept)	75.0 (51)		
Triability	< 50.00 (reject)	22.1 (15)	19.37	0.000 ¹⁾
	≥ 50.00 (accept)	77.9 (53)		
Observability	< 50.00 (reject)	19.1 (13)	19.90	0.000 ¹⁾
	≥ 50.00 (accept)	80.9 (55)		

Note: 1) T-score ≥50 (accept) and 2) T-test = ¹⁾ P<0.05

Regarding the effectiveness and efficiency of the model, based on empirical data and the results of the T-test analysis of 0.000 < 0.05, it can be concluded that the innovation of the establishing domestic chicken business unit model was considered effective in reviving the farmer group activities in Lamongan and Pasuruan, Indonesia (Birhanu & Jensen 2023; Giller et al. 2021).

The technical aspect of relative advantage contributes to the perception of women farmers because the business unit could be implemented with existing sources; thus, the group members accept and believe that this innovation could make it easier for them to manage their business. Based on the economic aspect, the innovation did not require high additional costs, so it was not burdensome for the group members. The capital was provided from internal funding (group savings and contribution of members) and

external parties, namely investors. The relative advantage was that, based on the social aspect, the innovation was not contradicted the values and norms of the community; on the contrary, it is believed to optimize the utilization of natural resources, human resources, and the surrounding environment. Group dynamics will form a driving force if the relative advantage becomes part of the innovation implementation process carried out by the group and its members. The relative advantage was the degree to which innovation was perceived better than what it replaced (Kozlowski 2018). Perception is more important than reality because reality has not happened yet, so before that reality happens, it is important to make someone accept or believe the innovation (Sugandini & Effendi 2013). Perception itself is more directed to what individuals believe is more effective, efficient and equity (36.60).

The evaluation of the level of compatibility showed that the group members accepted or agreed that the innovation of establishing the domestic chicken joint business was compatible with the needs of the farmer group (Anderson, Potočnik & Zhou 2014). The facilities, infrastructure, capital, and resources owned by the farmer group and its members are compatible with establishing a business unit. The daily activities of group members were rearing domestic chicken, although it was still traditional or semi-intensive. Compatibility or suitability of innovation is the harmony between the innovation introduced and the existing technology, the needs of farmers, the prevailing agricultural pattern, the ideas that were introduced earlier, and the values and norms of social, cultural, and local farmers' beliefs (Musyafak 2005). Group members aspired that the innovation of the business unit could overcome the stagnant business management. The stagnancy was due to the absence of a business concept and deficient competency in managing the group. This background makes group members expect the business unit innovation to drive the development of the farmer group in a more dynamic direction (Etriya et al. 2019).

The group members' opinions expressed acceptance of the implementation of the business unit as part of group activities because its process, activities, and implementation were carried out in stages (Figures 1 and 2). Activities designed with the step-by-step model will undoubtedly be easier to accept and implement, and it was also to avoid the impression that technology is complicated. An innovation that is easy to understand and use will spread quickly, while an innovation that is difficult to understand or use will spread slowly (Haryanto 2007).

The evaluation of the trialability aspect showed that group members accepted the implementation of business unit innovations. Innovation's trialability influences the possibility of the innovation being implemented. The trial of innovation on a limited basis allows adopters to be familiar with how the innovation works and evaluate its effectiveness while minimizing the risk of adoption on a larger scale (Samiee, Rezvanfar & Faham 2009). The characteristics and conditions of innovations that the community will try are mentioned by (Reed 2007) as follows: 1) perception and awareness of innovation, 2) perception that innovation is worth experimenting with, 3) perception that innovation is worth trying, and 4) perception that innovation promotes farmers. The reasons the members of the women farmer group to accept and start implementing business unit innovations, namely; 1) farming techniques as a basis for supporting the establishment of business units have been mastered, 2) the ownership of cages and equipment, 3) most group members already rearing domestic chickens,

4) willingness of group members to participate in the management and development of business units, and 5) the business unit allows the organization learning process in growing the dynamics of women farmer groups.

The perception of the growth and development of a business unit as a business or collective action can be accepted by group members because in its development, the free-range chicken business unit is formed in one organizational unit and its accessories so that it will be more effective, efficient and equity (Mutonyi 2019). With these organizational activities, group members are involved in many business unit activities, namely; 1) nursery business, 2) cultivation business, and 3) marketing business. These activities are group dynamics that all group members can observe because they are involved and feel the dynamics in the group.

4.4 Obstacles for the Implementation of Technology Innovation Adoption at Small-Scale Farmers

The obstacles regarding applying technological innovation to the small-scale farmers in Pasuruan and Lamongan, Indonesia, were because farmers did not want to apply the technological innovations they received individually. From the beginning, these farmers perceived that: 1) the application of technological innovations required additional energy, time, and costs which were deemed a burden, and 2) they tended to resist change because they already had the experience of raising livestock for generations. They believe that there is no need to make changes because they feel that the current farming techniques already provide benefits, 3) the limitations of the existence of technical factors in the application, including; inadequate equipment and no additional costs, were used to give raw feed instead of processed feed, 4) they were accustomed to waiting for another farmer to apply new technology, in which they ensure technical excellence. In this way, they avoid the risk of loss that must be borne because of the trial (Da Silveira et al. 2023).

Even though the farm was small-scale, the fact was that these farmers already understood and were able to apply the technological innovations they had acquired to their livestock business. However, they are still determining if they are adding value to production with this new technology, and they need to see other farmers successfully using it. Their doubt also influenced farmers' appliance of technological innovations in their abilities, and they refrained from adopting even though the innovation was practical. This condition was simply because they did not have faith or belief that they could apply it correctly.

Based on the explanation of the obstacles to the adoption of technological innovations, it can be understood that the impediment to implementing technological innovations by small-scale farmers, namely because they have to do it individually. There were also some technical and non-technical obstacles during its implementation.

4.5 Solutions for Implementing Technological Innovation at the Small-Scale Farmer Level with a Community-Based Joint Business Model

There needs to be a solution that could be the bridge between technological innovation and small-scale farmers. One of the solutions was to establish community-based entrepreneurship (community-based enterprise (CBE) as a model for the farmer group business unit (Collective Action Process). The community-based business unit was expected to solve the problem faced by small-scale farmers regarding implementing technological innovation individually (OECD 2001). The solution for implementing technological innovation in the two farmer groups in Lamongan and Pasuruan Regency is stated as follows. The 'Ampelsari Sumber Makmur II Farmers Group in Pasuruan Regency was establishing a community-based business unit in which they produce complete feed. Meanwhile, the 'La Tulip' Women Farmer Group in Lamongan Regency was establishing a community-based business unit, the Domestic Chicken Group. Community-based management of the group's business unit could utilize natural and human resources owned by the farmer group. In contrast, the operations of the group's business unit were managed by the group's management.

In this regard, community-based cultivation of complete feed group business units and free-range/local chicken business is a stimulus that can be felt by group member breeders, such as for members of the Ampelsari Sumber Makmur II Farmer Group, namely the availability of cheap but high-quality complete feed for preparations in the dry season as well as farmer group activities become more effective, efficient and equitable (Performance). The benefits of group business unit community-based growth obtained by group members are a response to the stimulus of business unit community-based growth, which is evaluated through evaluation attributes in the form of relative advantage, level of suitability, level of complexity, can be tried, and can be observed as indicators of positive perception. So that delays in the adoption of technological innovations by individual small-scale farmers can be overcome by the application of community-based innovations in business units together or in groups.

5 Conclusion

The research design was developed through R&D research through the planning, engineering, and evaluation stages. The results of this study obtained two models for the establishment of farming group business units, and there was a complete feed business unit in the Ampelsari Makmur Jaya Farming Group in Pasuruan Regency and domestic/local chicken business units in the 'La Tulip' Women Farmer Group, Lamongan Regency.

The evaluation of perceptions of the two business units by farmer group members as business actors in Pasuruan and Lamongan Regencies stated that they accepted (T-score ≥ 50). Furthermore, the results of the analysis of the T-test $0.000 < 0.05$, thus the innovation of implementing a community-based business unit model was considered adequate as a solution to implementing technological innovations in small-scale rural farmers and breeders in two districts in Indonesia.

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Yudi Rustandi: conceptualization; formal analysis, methodology; validation; writing-original draft; writing-review and editing; supervision; visualization. **Restu Wulandari:** methodology; writing-original draft; funding acquisition; field contributor; field practitioners. **Mirna Savitri:** formal analysis; methodology; writing-original draft; writing funding acquisition; field contributor, field practitioners.

Conflict of interest

The authors declare no conflict of interest.

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