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## The Role of Joint Liability in Lowering the Risk of Farmer and Agriculture Crowdfunding (A case study of one agriculture crowdfunding in Indonesia)

Putu Yani Pratiwi<sup>1</sup>, Ika Yanuarti<sup>2</sup>, Wim Prihanto<sup>3</sup>

{[putu.yani@lecturer.umn.ac.id](mailto:putu.yani@lecturer.umn.ac.id)<sup>1</sup>, [ika\\_y@umn.ac.id](mailto:ika_y@umn.ac.id)<sup>2</sup>, [wim.prihanto@lecturer.umn.ac.id](mailto:wim.prihanto@lecturer.umn.ac.id)<sup>3</sup>}

University of Multimedia Nusantara, Tangerang, Indonesia<sup>123</sup>

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**Abstract**

*Agriculture crowdfunding is a source of alternative financing for farmers. The crowdfunding platform does not ask collateral from the farmer, hence they apply group lending with joint liability to lower the default risk. The purpose of this paper is to understand how joint liability group lending can lower the risk of both farmers and agriculture crowdfunding. A deductive qualitative research design with case study approach is used in this paper. A series of in depth interviews were conducted with one agriculture crowdfunding and two farmers groups. Data analysis is done by using pattern matching techniques. The findings of this paper are joint liability can lower the default risk of crowdfunding platform because the farmers groups are self selected and all member have strong relationship (peer selection), the leader of the farmers group plays an important role of monitoring the member activities (peer monitoring) and he may apply social sanction to the defaulting member (peer pressure). From the farmer's side, joint liability can lower the price risk. This can be done because crowdfunding platforms apply group lending, so it can get a high volume of commodities from the farmer. This enables crowdfunding platforms to build B2B contracts with buyer companies and give fixed buying prices to farmers upon contract.*

*Keywords: Joint liability, agriculture, crowdfunding, risk management.*

## I. INTRODUCTION

One of United Nations Sustainable Development Goals (SDG) is Ending Poverty and Hunger by 2030. According to World Bank Group [1], globally, 80% people live in rural areas and 64% work in agriculture. Therefore, most of the income gain needed to end poverty by 2030 will need to come from activities in rural areas. The food and agriculture-related UN agencies estimate that ending poverty and hunger requires additional financing in agriculture and rural development of \$140 billion per year.

The source of financing in the agriculture sector generally comes from formal institutions such as banks, cooperatives and other government organizations or from informal institutions such as neighbor, friends, family or community based financial institution [2-3]. Some research showed that farmers still have difficulties to access financing from formal institutions since most of Indonesian farmers do not have land certificates as collateral [4]. As a consequence, farmers usually opt for financing from informal institutions as they are easier to access, do not request collateral and do not require a long approval process, although these institutions charge higher interest rates compared to banks [5]. This situation led to the development of alternative financing such as microfinance, crowdfunding and peer to peer network [6].

We choose crowdfunding as our unit of analysis since through crowdfunding, individual people may become investors and contribute for additional financing in the agriculture sector. To open more financing access to the farmers, crowdfunding platforms do not ask for collateral. Therefore, their loan default risk is higher since they are not able to charge financial sanction from the farmers. One way to mitigate this risk is by implementing a group lending mechanism with joint liability. Joint liability means that if one borrower cannot pay a loan, then other members of the joint liability group will do so [7]. One of the reasons why joint liability may lower the lender's default risk is because the group may apply social sanction to the defaulting member [8].

However from the borrower's point of view, joint liability causes higher risk since every group member bears his/her own risk and that of all other group members [9]. Another major risk, farmers as borrowers face price uncertainty due to inherent volatility of agriculture products [10]. Thus, the research problem is "How can the joint liability model lower the risk of both farmers and agriculture crowdfunding? "

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Previous research has demonstrated that by applying joint liability, the default risk of agriculture lending institutions can be reduced [21]. However, that research did not study how joint liability can lower the risk of farmers. Thus, our research contributes to the practice of joint liability in lowering the risk for both lender and borrower. Other than that, our study shows that if a lending institution cooperates with other stakeholders in the agriculture ecosystem (for example agri-input companies and buyer companies), the major risk of farmers which is market uncertainty can also be reduced.

## II. METHOD

A deductive qualitative research design with case study approach is used in this research. Deductive qualitative research uses theoretical propositions from literature review as a starting point and then apply these to the collection and analysis of data [11]. The appeal of deductive qualitative analysis is evident in its recommended use in case studies [12]. The intent of the case study is to understand a specific issue or problem and a case or cases are selected to best understand the problem [13]. According to Pearse [14], there are seven steps procedure in doing deductive qualitative research : (1) Create conceptual framework, (2) Create propositions, (3) Create Code Book, (4) Create Question Matrix, (5) Data Collection, (6) Analysis, (7) Reporting.

### A. Step 1 – 2 : Conceptual Framework (Literature Review) & Proposition

According to Klein et al [9], there are four main risks faced by a financial institution, namely: loan default risk which is the borrower's inability or unwillingness to repay his loan, liquidity risk which is a condition where financial institutions do not have sufficient cash, interest rate risk which is risk that loans will decrease in value due to changes in interest rates, and foreign exchange risk defines exposure to changes in exchange rates which affect international borrowings denominated in foreign currency. Since institutions that provide alternative financing such as crowdfunding platforms do not ask for collateral from the farmers, their default risk is higher because they cannot charge financial sanctions to borrowers. This has become the main cause of market failure in credit programs especially in the agricultural sector [15].

One way to mitigate a lender's default risk is by implementing a group lending mechanism with joint liability. Joint liability is defined as a control mechanism in which a group is jointly responsible if one member of the group cannot repay the

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loan [7]. The joint liability mechanism is proven to be able to increase the repayment rate of a credit program, for example, the success stories of Grameen Bank in Bangladesh and BancoSol in Bolivia. Both programs show a repayment rate of up to 95%. In addition, these two programs have also succeeded in reaching millions of borrowers who are categorized as unbankable [16].

Some factors that influence how joint liability can increase the repayment rate include peer selection, peer monitoring, and peer pressure. Several studies related to how peer selection can increase the repayment rate were conducted by Sharma & Zeller [17] and Zeller [18]. Research by Sharma & Zeller [17] states that groups that select their own members (self selected group) are proven to have a high repayment rate. Research by Zeller [18] states that if a group has a strong social relationship, the repayment rate will increase. Another study on the effect of peer monitoring on repayment rates was conducted by Varian [19]. He stated that peer monitoring plays a role as internal assurance within the group, where group members guarantee each other so that it can increase the repayment rate. The effect of peer pressure to increase repayment rate is discussed by Besley and Coate [20]. Peer pressure is the pressure from fellow group members, because they can apply social sanctions if a group member fails to pay his loan due to his negligence. Since the lender's default risk is lower due to joint liability mechanisms, banks or lending institutions can provide benefits to borrowers, for example in the form of reduced interest rate [15].

From the borrower's point of view, joint liability causes higher risk since every group member bears his/her own risk and that of all other group members [9]. The high risk perceived by borrowers is also seen in the research of Turvey et al [21] which shows that 86% of the respondents in the study stated that the reason they did not become members of the joint liability group lending was because they did not want to bear the risk in case of default from one of the group members. Another major risk, farmers face price uncertainty (price risk) due to inherent volatility of agriculture products [10].

According to Zeller [22], when taking credit is perceived as a decision making process, then it starts with the decision of the individual to apply for credit. In fact, the demand for loans depends on the self-financing potential, access to credit

facilities and risk taking ability of borrowers. Thus, benefits offered to borrowers will affect borrowers' decision to access credit from crowdfunding platforms. Those benefits are perceived to be able to reduce the risks of the borrowers.

From this conceptual framework, the propositions of the research can be built. In qualitative research, a proposition is a statement of the qualitative (and not quantitative or statistical) nature of the relationship between various concepts contained in the literature [14]. According to Trochim [23], the proposition can be derived from the literature, from theory, or from hunches developed from the researcher's experience in the field.

In summary, the conceptual framework and the proposition can be illustrated in Figure 1 and Table 1 below.

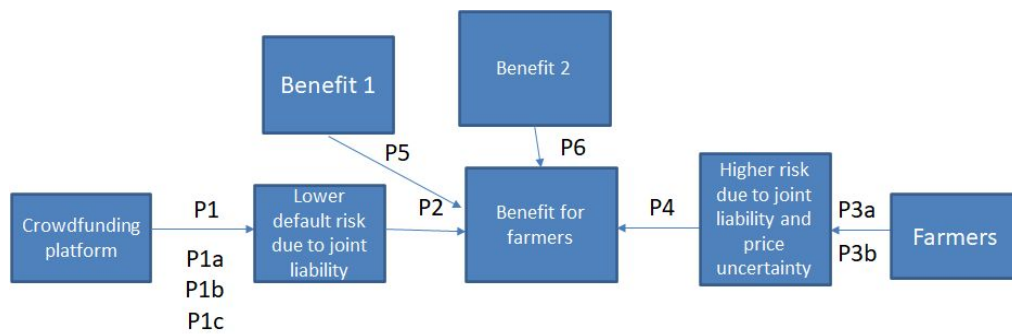


Figure 1. Conceptual Framework of how joint liability lower the risk of farmers and crowdfunding platforms.

Table 1. Research Propositions.

No	Proposition
P1	Crowdfunding platform applies joint liability group lending to lower the default risk
P1a	Crowdfunding platform's default risk is lower due to peer selection
P1b	Crowdfunding platform's default risk is lower due to peer monitoring
P1c	Crowdfunding platform's default risk is lower due to peer pressure
P2	Since crowdfunding platform's default risk is lower, it can offer more benefit to the borrower
P3a	Farmers risk is higher since every group member bears other member's risk
P3b	Price uncertainty is major risk for farmers
P4	The benefit for farmers will affect the farmers' decision to access credit from the crowdfunding platform
P5	The benefit for farmers will reduce the farmers' risk
P6	The benefit for farmers will reduce the farmers' risk

#### B. Step 3 – 4 : Code Book & Question Matrix

After stating the propositions, the researcher can now develop a code book that will be used to code the raw data [14]. The codes will represent key concepts used in this research. From the literature which are used to build the conceptual framework, seven codes are derived, namely : joint liability, peer selection, peer monitoring, peer pressure, crowdfunding platform's risk, benefit for farmers and farmers' risk.

These codes are then used as a reference to generate interview questions. Table 2 shows selected examples of interview questions.

Table 2. Examples of interview questions

Codes	Interview Questions
Joint Liability	How is the implementation of joint liability group lending in this crowdfunding platform ?
Peer Selection	How does platform select the farmers group who is eligible to get the funding ?
Peer Monitoring	How is the monitoring mechanism for the borrower (farmers group) ?
Peer Pressure	Who is responsible for the monitoring of the borrower ?
Crowdfunding platform risk	What will you do if there is a defaulting member in your group ?
Benefit for farmers	What is the most crucial risk that the crowdfunding platform face ?
Farmers' risk	What are the benefit for farmers that the platform offered ?
	What is your group's perception about joint liability ?
	What is the most crucial risk that farmers face ?
	Why do your group decide to access credit from this crowdfunding platform ?

#### C. Step 5 – 7 : Data Collection, Analysis, and Reporting

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Data collection is done by conducting in depth interviews with one crowdfunding platform and two farmers groups who got financing from the crowdfunding platform. The crowdfunding platform in our case study was founded in 2018 and they only apply group lending mechanisms with joint liability. Their current operational area is in Java and North Sumatra. The informants from the crowdfunding platform are Vice President of Marketing, Head of Finance, and Chief Risk Management Officer. The informant from the farmer groups are the leaders of the group. The first farmers group is located in West Java whose members are 70 farmers. While the second farmers group is located in Central Java whose members are 50 farmers. The interviews were conducted between July until September 2020. Each informant was interviewed individually for about 1 hour.

Data analysis is done by using pattern matching techniques. Pattern matching was originally described by Campbell [24] and is one of the analysis tools that is recommended for case study research [12]. Pattern matching involves identifying the patterns in data, and then comparing this against one or more patterns that are proposed in the literature [25].

The reporting is organized as follows : section 1 presents the introduction of the study, section 2 explains each procedure of doing deductive qualitative research, then continues with discussion of data and findings in section 3 and finally section 4 concludes the study.

### III. RESULT

#### A. How joint liability lower the risk of crowdfunding platform

Crowdfunding platforms in this case study provide financing only to farmers groups. The platform applies group lending with joint liability. Unlike traditional financial institutions, the loan repayment of this crowdfunding platform can be in the form of cash or in the form of crops. If the platform has a contract with the buyer, the repayment from the farmer will be in the form of crop. Otherwise, the repayment will be in the form of cash. For example for commodities like honeydew, the crowdfunding platform may cooperate with Sunpride, so that the farmers will repay the loan in the form of crops (honeydew). The implementation

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of joint liability group lending in this crowdfunding platform is explained by Chief Risk Management Officer as follow :

One farmers group, for example, consists of 4 farmers, and they plant honeydew. Each farmer, let's say...need to repay the loan for 3.5 tons of honeydew. In total, on harvesting time, the group needs to provide 14 tons of honeydew. In case one farmer can not provide 3.5 tons of honeydew, the other farmers need to find a solution how to provide the contracted quantity (14 tons of honeydew). As they plant the same commodity in a group, they take turns to plant the seeds. If for example the plants of farmer A got some diseases, farmer B,C, and D have to think how to mitigate the risk of not being able to repay the loan. They may search for the commodity from other sources or they may increase their productivity.

This statement supports proposition P1. Since crowdfunding platforms apply group lending with joint liability, all members of the farmers group are jointly responsible to repay the loan. Thus, the default risk of crowdfunding platforms is lower.

However, there is a challenge for the crowdfunding platform to acquire the right farmers group. In doing so, the crowdfunding platform built a relationship with agro-input companies (companies which provide seeds for the farmer). The crowdfunding platform asked for recommendation which farmers group is trustworthy and can be granted financing. Therefore, the recommended farmers group is an existing group which has a strong relationship between members. This fact supports proposition P1a that joint liability can lower the default risk due to peer selection, which means that the self-selected group has known each other and that strong relationship will increase responsibility among members [18].

After selecting the farmers group, the crowdfunding platform will assess the members. Each member of the farmers group needs to have an identity card, family document, and statement letter as a farmer from the village leader. Historical credit checking to the central bank (Bank Indonesia) will also be performed. At this stage, the crowdfunding platform will choose a key farmer as the responsible person of the group. Usually the key farmer is the leader of the

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farmers group. This fact supports proposition P1b that peer monitoring will lower the default risk of the crowdfunding platform since the key farmer will be responsible for the repayment of the other member. Other than that the crowdfunding platform also provides field managers to monitor the farmers group.

According to Aghion [8], one of the reasons why joint liability may lower the lender's default risk is because the group may apply social sanction to the defaulting member. From our interview with the leader of the first farmers group, he said :

In case there is a member who is not able to make the repayment more than 3 times, I will take that member's farm field. In fact, I have never done this. However, as a leader, it's a big responsibility to the bank. So, I need to emphasize that if more than 3 times the member can not repay the loan, I will take their farm field.

This statement supports proposition P1c that joint liability can lower the default risk due to peer pressure, which is the pressure of social sanction among the group members

#### B. Benefit for farmer

According to Ghatak & Guinane [15], since the lender's default risk is lower due to joint liability mechanism, banks or lending institutions can provide benefits to borrowers, for example in the form of reduced interest rate. By lending to a group of farmers instead of to individual farmers, where all members of the group will plant the same commodity, the crowdfunding platform will get a high volume of crops on harvest time. This enables crowdfunding platforms to build business to business contracts with buyer companies (offtaker). By having this contract, crowdfunding platforms will be able to give fixed buying prices for the farmer upon contract. This will be really beneficial for the farmers since it gives price certainty.

Moreover, the credit disbursement from this crowdfunding platform is in the form of seeds and fertilizer (agro input) instead of cash. This will make farmers to be more focused on their on-farm activity, because they don't need to buy fertilizer or other things. To do this, crowdfunding platforms cooperate with agro input

companies to distribute seeds and fertilizer to the farmers. These benefits to farmers support proposition P2 : since crowdfunding platform's default risk is lower, it can offer more benefit to the farmers and also proposition P5 & P6 : the benefit for farmers will reduce the farmer's risk.

C. How joint liability lower the risk of farmers

Proposition P3a is derived from the theory that from the borrower's point of view, joint liability causes higher risk since every group member bears his/her own risk and that of all other group members [9]. However the condition is different in our case. The farmers group has a mechanism to collect monthly funds from the member which can be used in case there is a defaulting member. Therefore, this fact refutes proposition P3a.

However, there is another major risk that farmers face which is price uncertainty. This risk is caused by inherent volatility of agriculture products [10]. According to the leader of the second farmers group :

If we access credit from a financial institution other than a crowdfunding platform, we need to negotiate the price with the local buyer on harvest time. It's easier when we cooperate with crowdfunding platforms since we agree on the fixed price upon contract.

This statement supports proposition P3b that price uncertainty is a major risk for farmers. This statement also supports proposition P4 that the benefit for farmers will affect the farmer's decision to access credit from the crowdfunding platform.

The result of the propositions analysis using pattern matching technique can be summarized in Figure 2 and Table 3 below :

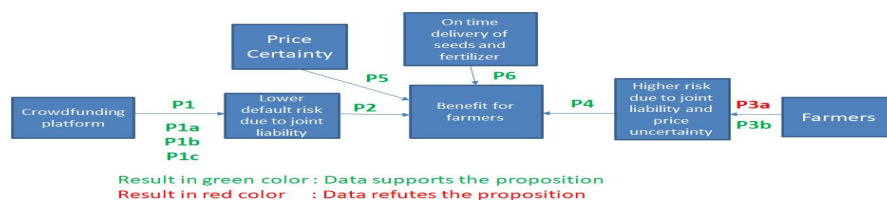


Figure 2. The result of the propositions analysis

Table 3. The result of the propositions analysis

Proposition	Result
P1	Joint liability is one form of risk mitigation in this case study.
P1a	The farmers group are existing group whose members are self-selected
P1b	The farmers group's leader will be responsible for the repayment of the other member
P1c	The farmers group's leader may apply social sanction to the defaulting group member
P2	Since crowdfunding platform applies group lending, it can get high volume of commodity from the farmer. This enable crowdfunding platform to build B2B contract with buyer company (offtaker). By having this contract, crowdfunding platform will be able to give fixed buying price for the farmer's commodity upon contract.
P3a	The farmers group has a mechanism to collect monthly fund from the member which can be used in case there is a defaulting member.
P3b	If farmers borrow money from institution other than crowdfunding platform, they need to negotiate the commodity price with local buyer after harvest time
P4	The farmers are willing to access credit from crowdfunding platform due to price certainty and on time delivery of seeds and fertilizer
P5	Price certainty will help farmers to reduce price risk (price volatility)
P6	The credit disbursement from this crowdfunding platform is in form of seeds and fertilizer (agro input) instead of cash, so that the farmer can be more focus on their on-farm activity

#### IV. CONCLUSIONS

Based on the case analysis, we can conclude that joint liability can help to lower the default risk of the crowdfunding platform because of several reasons. First, the farmers group is self selected so that all the members know each other and have strong relationships (peer selection). Second, the key farmer or the group leader plays an important role of monitoring the member activities (peer monitoring). Other than that the crowdfunding platform also provides field managers to monitor the farmers group. Third, the leader may apply social sanction to the defaulting member (peer pressure). From the farmer's side, joint liability is not considered as high risk since the farmers group collects monthly funds from members which can be used in case there is a defaulting member. The price risk is lower since the crowdfunding platform is able to give fixed buying price for the farmer's commodity upon contract (forward contract). This can be done because crowdfunding platforms apply group lending, so it can get high volume of commodities from the farmer. This enables crowdfunding platforms to build B2B contracts with buyer companies (offtaker). Beside price certainty, another benefit for the farmers is on time delivery of seeds and fertilizer, so that farmers can be more focused on their on-farm activity. In this case, crowdfunding platforms cooperate with agro input companies to distribute seeds and fertilizer to the farmers.

This research contributes practical implication for lending institutions in the agriculture sector. To lower default risk, lending institutions are suggested to apply group lending instead of individual lending to the farmers. The farmers group then need to plant

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the same commodity, so that the production risk can be managed collectively and at the end high volume of commodity can be harvested. Lending institutions are also suggested to cooperate with offtaker companies to help lower the price uncertainty of the farmers. The significance of this study is to explain that risks in the agricultural sector can be managed, so that more individual investors will be willing to contribute for additional financing in the agriculture sector.

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