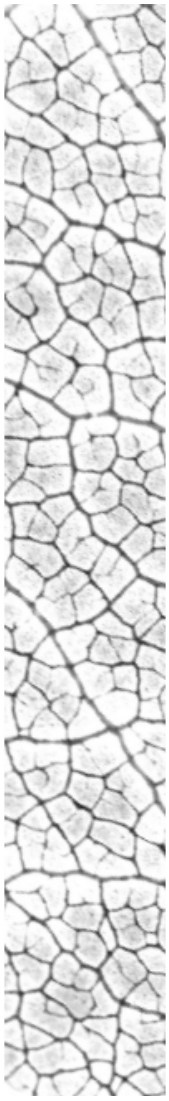

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The response of farmers to implementation of agricultural marketing information system

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Abstract
This study was aimed to identify the farmers' response to an agricultural marketing information system. In this the study, 100 randomly selected farmers in Pasuruan and Malang, East Java, Indonesia, were members of horticultural farmer groups planting different commodities, including potatoes, apples, peppers, chrysanthemums, and other vegetables. The observations were conducted before and after the farmers had attended a workshop about developing business plan and training on a marketing information system. The responses of the farmers to the implementation of the agricultural marketing information system were different for each commodity, but the farmers were enthusiastic about developing their businesses and applying the information system, which is expected to be effective for marketing. The risks related with the system were market factors, including that the system can be applied in its own market that marketing must be fully coordinated, and had to update the market price constantly. The risks obtained from having a partnership were that the partners build and maintain the trustworthy relationship to farmers.

Keywords: agricultural, farmer, implementation, marketing, model

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INTRODUCTION

Farmers have many farming problems, not only in the production and processing technologies, but also in market competition. Raw horticulture products (vegetables, fruit, and flowers) are easily damaged, so must be rapidly sold on the market unless it is processed to be lasts longer and to increase the value (Jones and Rowley 2011, Ozcimen et al. 2016) East Java is a province in Indonesia that has high potential to produce agricultural products, such as crops, horticultural produce, and raw plant materials for industry (cacao, coffee, sugar cane, etc.). Horticultural produce is mostly vegetables and fruit, and more of these have been grown in recent years.

There is a gap between food crops which have the highest production and other types of plants which have the lowest production (Jenaabadi et al. 2013). Comparing with the developments in consumption, it appears that the various agricultural products have been in short supply, so that production can be exported to other regions. The problem faced by farmers is that their production quality is not competitive enough (Nasiri et al. 2014, Oyiyenka and Bello 2013, Poon 1980).

The initial step that can be applied by farmers is joining farmers group to unite the their economical strength. However, there is a lack of influence and significant empowerment of farmer groups in various activities. Yektiningsih et al. (2014) concluded that the processing of agriculture waste from biogas generators into solid and liquid fertilizers did not have a significant influence on the empowerment of farmer groups. Factors behind this include the gap that exists in the lack of technology application, motivation, and education of farmers. In this era, the application of information technology becomes very necessary to communicate quickly and effectively (Alkan et al. 2017, Bilman et al. 2017, Mukhlis 2005). This research was aimed at increasing the empowerment of farmer groups in an effort to increase the value of their agriculture products.

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Table 1. The number of samples in two subdistrict, East Java

No	Name of Farmers Group	Location Subdistrict - District	Commodity	Individual farmer sample
1	Horti Prima	Tutur - Pasuruan	Potatoes	10
2	Alam Sugro Lestari		Apples	10
3	Subur Makmur		Paprika	10
4	Padmasari II		Chrysanthemums	10
5	Tlogosari		Vegetables	20
6	Sumber Makmur 2	Pujon - Malang	Vegetables	40

Table 2. Demographic characteristics of farmers

Commodity	Age (Year)	Annual Income ($ US)	Number of Family Members (person)	Education Background	Work Period as a farmer (Year)
Potatoes	43.2	1941.88	3	Senior HS	14,5
Apples	43.4	1950.87	5	Junior HS	19
Paprika	40.4	1816.02	4	Senior HS	11
Chrysanthemums	41.4	1860.97	3	Senior HS	10
Vegetable	42.2	1896.93	5	Junior HS	20

Note: HS: high school

MATERIALS AND METHODS

Research Design and Sample Collection

Target population for this research was all the farmer groups in two sub-districts of two districts in East Java province, Tutur sub-district in Pasuruan and Pujon sub-district in Malang, East Java, Indonesia. These areas were chosen due to they are the production centers in East Java for many different commodities, including vegetables, fruit, and flowers and these areas were conveniently accessible to the researchers. The sample was determined by the random cluster sampling method. The clusters were based on the type of commodities produced by farmers that have joined farmer groups. The respondents from each farmer group were randomly selected, and the number determined proportionally. The total number of farmers who participated in the study was 100 (**Table 1**).

Data Collection

The data were collected through interviews with individual farmers using a structured questionnaire. The interviews were conducted to determine the farmers' responses and their perceptions about the implementation of a holticultural marketing information system for their businesses. For the purposes of validating the perceptions and opinions of the farmers, they practiced using the marketing information system. To make the material that would be incorporated into the information system, a workshop was held beforehand on how to develop a business plan, and training was given to improve the quality of production, and on marketing management.

Risk Priority Number (RPN) Estimation

Each of source of risk was analyzed using Failure Mode and Effect Analysis (FMEA). To use the FMEA method, the quantity (weight) of Severity (S), Occurrence (O), and Detection (D) for each variable must be determined. To determine the priority of the risks faced, the value of the Risk Priority Number (RPN) must be calculated based on equation 1. The amount of risk due to implementation of horticultural marketing information system was calculated based on source of risk.

$$RPN = S \times O \times D \qquad \text{(Equation 1)}$$

Data Analysis

Paired sample T-test 5 % was performed to analyze the differences between before and after the workshop and training. Descriptive statistics were performed to determined farmers perception and response regarding implementation of agricultural marketing information system in their business. These data were analyzed using SPSS ver. plus 16 software.

RESULTS

Demographic Characteristics of the Farmers

Demographic characteristics showed farmers' age who managing commodity was not varied too much. Potatoes, apples, and vegetables were managed dominantly by farmers above 42 years old, compared to chrysanthemum and paprikas farmers. However, the annual income relatively showed lower value in paprikas and chrysanthemums with shorter work period compared with another. These demographic characteristics were performed based on average data (**Table 2**).

Farmers Perception

The result showed none of the farmers though that the implementation of horticultural marketing information system was useless. The half or more farmers working in paprika, chrysanthemum, and vegetables mostly regarded very useful compared to potatoes and apples that tend to be lower. However, none of farmers perceived it not useful (**Fig. 1**).

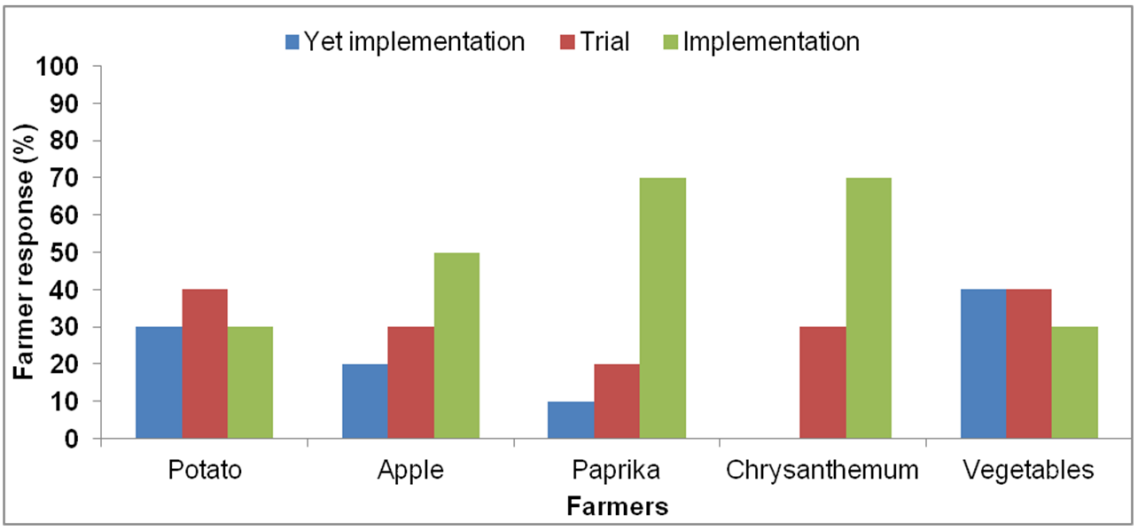

Fig. 1. Farmers response on implementation of agricultural marketing information system

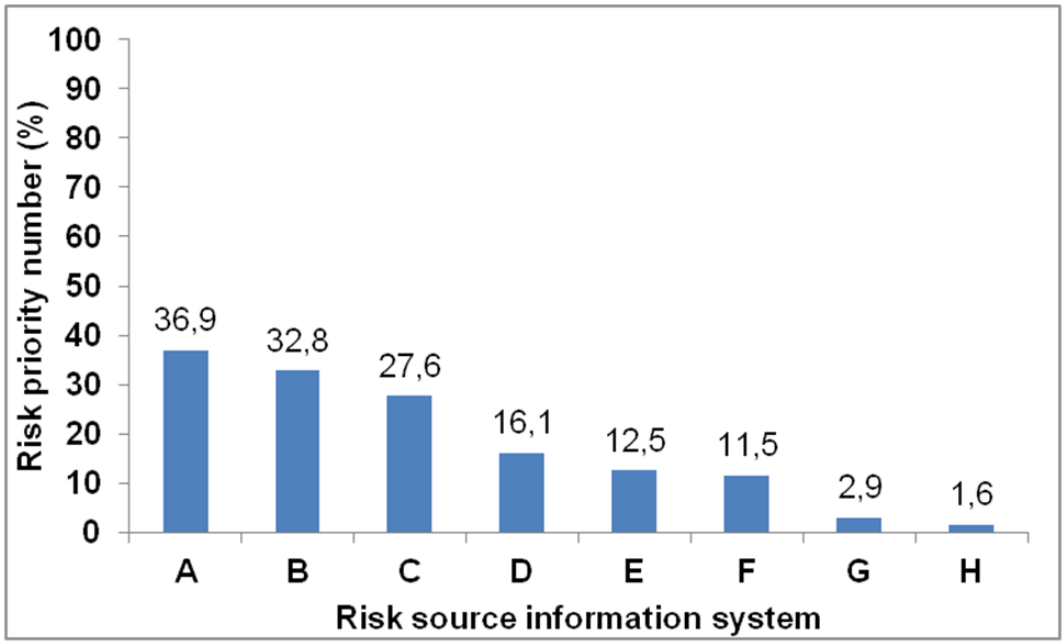

Fig. 2. Risk analysis information system implementation of horticultural products marketing based risk priority number (RPN) value

Note: risk source information system were designated as alphabet. Informations as follows: (A) keep the market price up to date; (B) farmers direct participation; (C) proper information about system operator; (D) good-coordinated marketing strategy; (E) good business plan; (F) should be able to suitable own market; (G) must have trustworth partner; (H) maintaining good partnership. Sorting based on higher to lower percentage was done to make it easier for take handling priority

Farmers Response

The result showed training and workshop significantly on managing the farmers for implement agricultural marketing information system ($p < 0.05$). Agricultural marketing information system could be implemented in all of farmers. Farmers response on implementation of agricultural marketing information system varied in five commodities. Paprikas and chrysanthemums farmers mostly had implemented that strategy with value 70 %. Contrary, vegetables and potatoes farmers commonly did not implement the strategy. However, farmers who did not implement the strategy did not showed higher percentage (**Fig. 2**).

Risk Priority in Implementation of Horticultural Products Marketing

There are three groups of risk source in implementation horticultural products marketing. Risk source about farmer groups risk management was categorized as B, C, and E; risks due to market for A, D, and F; risks associated with the partnership factor for G and H. The highest risks source was A and the lowest one was H. This indicate that “keeping the market price

up to date" in market factors need to handle most intensive compared to another risk. In addition, management and marketing risk group overall had higher value of risk priority number (RPN) compared to partnership risk (**Fig. 2**).

DISCUSSION

Demographic characteristics of farmers in East Java are divided into two groups based on their commodities. The younger who dominated by farmers above 42 years old mostly cultivated older commodities such as vegetables, apples, and potatos. Meanwhile, the farmers below 42 years old tend to cultivated newer commodities such as chrysanthemums and paprikas. European Food Safety Authority (2012) and Sundström et al. (2014) stated that chrysanthemum and paprika are two commodities with high risk since they are more susceptible to small climate change, animal, plant, and virus-caused disease. They need more extra care to maintain even to improve their production. This indicate that younger farmes have courage in face of risk. The younger farmers also have higher educational background compared to the older. Guo, Qiyu, and Jingjuan (2015) stated that in Chinese, there were significant correlation between farmers age and educational background who younger age have higher education. It will have an impact on improvement of crop production. However, the annual income in paprika and chrysanthemum commodities were lower compared to another commodities. This might be due to paprika and chrysanthemum need more extra care, so the farmers spend much money to maintain that compared to vegetables, potatoes, and apples that do not need too much care and have long time period for cultivation.

Farmers perception on implementation of agricultural marketing information system was very important. It might be due some commodities selling still need commodities strategy through information system. The farmers who working on paprikas and chrysanthemums commodities perceived it to be very useful compared with others. It is related with some strategies that proposed by Repar et al. (2017) such as supply chain, public policies, risk and power distribution between parties, sustainable and fair relationship between farmers and traders. In addition, marketing of both these commodities is dominated by traders so that the profit for the farmers is relatively small and less increased. The bargaining position of farmers with respect to consumers would be expected to improve if an information system was in place since the farmers could deal directly and demonstrate their products on the internet.

Some of the farmers were less daring but still tried to use the information system for marketing horticultural products. Vegetable farmers commonly does not implementated the marketing information system. Contrary, peppers and chrysanthemum farmers had implemented the strategy. In addition, the potato farmers said that they would do this trial. This difference is caused by the fact that some of the farmers were did not know how to use the information system and they mentioned that they do not have time to use internet (Atuahene-Gima and Murray 2004).

Agriculture and horticulture are the subjects of risk as result of many challenges. There are climate condition, disease, market and price support, and liberalization of trade. There are six types of risk, i.e. product risk, market and price risks, institutional risks, personal risks, responsibility risks and financial risks. Risk analysis is required to test the feasibility of the implementation of an holticultural marketing information systems (Deuninck et al. 2008). There are three risk sources in this research, including the products, the markets, and the partnerships. This research addresses the problem of marketing horticultural products and identifies marketing risks. The first step was to identify the risks source of implementing an information system for marketing horticultural products. The risk sources for marketing were identified by observing at the marketing of products range.

Risks associated with the implementation of horticultural marketing implementation of an holticultural marketing information system are influenced by three factors. Those factors including the management of the farmer group, the markets, and the partnerships. To manage the risks associated with the farmer group, the group should manage these following things: (1) having proper information about the system operator; (2) arranging a business plan, and; (3) must be direct participated / active roles. Managing the risks associated with the market, the system should manage these following things: (1) should be able to find its own market which suitable to sell their products; (2) maintaining good-coordinated marketing, and; (3) keeping the market price up-to-date. In addition, to manage the risks associated with the partnership, the system must built a good partnership with these following criteria: (1) must have a partner who is not detrimental to farmers (trustworthy), and; (2) must be able to maintain the partnership (**Fig. 3**).

The highest RPN is 36.864 for the risk "keeping the market price up-to-date", which is one of the risks caused by market factors. The lowest RPN is for the risk "maintaining partnership", which is one of the risks caused by partnership factors. The RPN for each risk indicates the resources level is required to handle the risk. The risk with the highest RPN is the risk that has the highest priority, so the farmer groups should not fail to ensure that it is addressed in the implementation of the information system for marketing horticultural products. Conversely, the risk with the lowest RPN is the one that has the lowest priority for handling, so the farmer groups should not put on the last handler in the

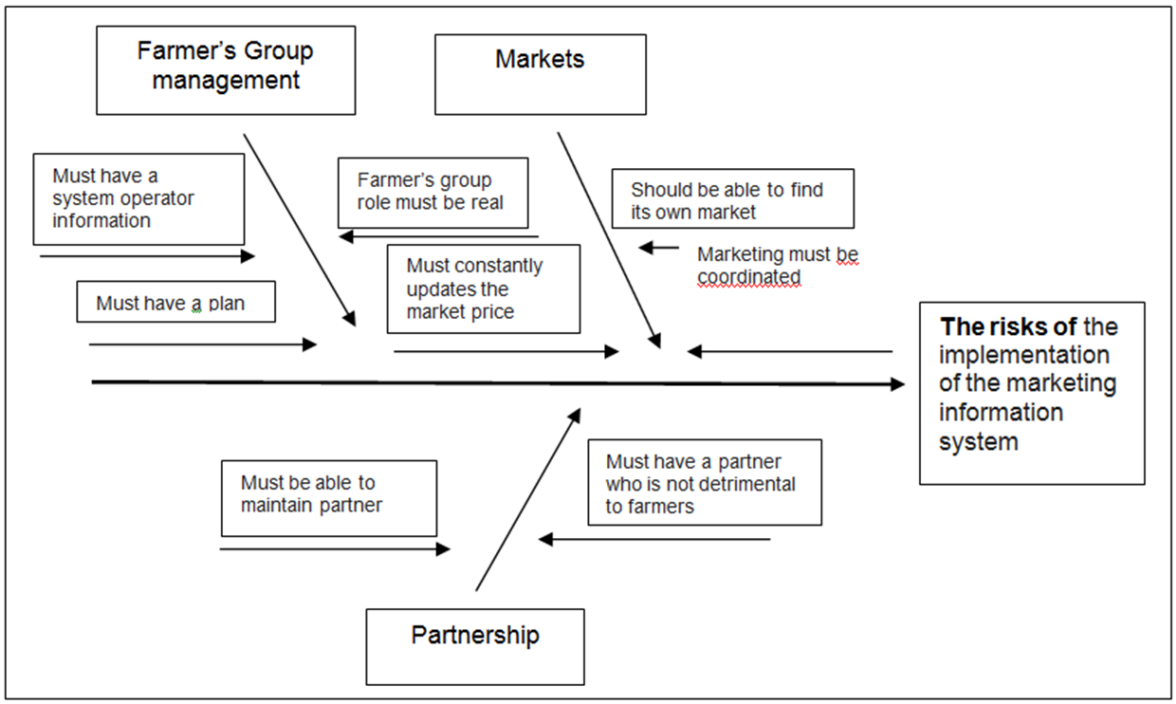

Fig. 3. The source of marketing risk that analyzed using Failure Mode and Effects Analysis (FMEA)

implementation of the information system for marketing horticultural products.

Most of the farmers perceived the implementation of an holticultural marketing information systems to be helpful. The majority of farmers responded that they were willing to implement an information system for marketing horticultural products, while only a few farmers said that they would not try it. There are significant differences between the farmers before and after the workshops and training in the information system for marketing horticultural products were held. The risks associated with market factors could be managed by ensuring that the system could find its own market, that marketing was coordinated, and that the market price was constantly updated. The risk resulting from the partnership factors could be managed by ensuring that the partner was trustworthy and not detrimental to the farmers and maintain the good partnership.

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