

ISBN 978-602-7577-70-1



2016

"Small and Medium-sized
Enterprises Competitiveness"



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INTERNATIONAL CONFERENCE

Agribusiness Development for Human Welfare



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TECHNOLOGY ADOPTION OF HIGH QUALITY GREENBEANS SEED BY FARMERS' HOUSEHOLD IN CENTRAL JAVA

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Abstract

The low technology adoption in the application of high-quality green bean seeds is identified as the main reason for the low farming productivity in Indonesia. A survey was conducted to 80 farmers in Godong District Grobogan Regency Central Java, aimed to analyze factors that affect the decision in technology adoption of the application of high-quality green bean seeds in Central Javanese farmers' household. Data were collected through interview with the structured questioner and analyzed with multiple regression models to identify factors that affect the decision of farmers to use high-quality green bean seeds. Results showed that the area of agricultural land, the allocation time of family member, the use of pesticide, and farming experience were significant factors in the decision of technology adoption. It can be concluded that the decision of technology adoption in farmers' household depend on social economic condition and the effectiveness of the related institution. Appropriate policies should be formulated to take the advantage of technology adoption in the application of high-quality green bean seeds to improve agricultural productivity.

Keywords: adoption, technology, high quality, seeds, green beans

INTRODUCTION

Green beans are cultivated crops, widely known in tropical regions which classified to leguminous pods. In Indonesia, green beans are the third important nuts group commodities after soybeans and peanuts that have many benefits for daily lives.

Green beans are the fifth important crops after rice, corn, soybeans and peanuts. In general, green beans grown in paddy fields after the rice harvest, when the predicted water is not enough anymore to suitable for planting rice or other crops. This condition is possible since the green beans known as a plant tolerant or resistant to drought (Sulistyo and Yuliasti, 2012).

The green beans have a wide range of benefits such as a food, for medicine and as animal feed ingredients, but it can be processed into a wide variety of food products. The green beans have the

potential to fill a shortage of protein and nutrition. There are quite good opportunity to develop the increasing of green beans production in Indonesia. The opportunities of developing green beans are: 1) the increasing demand for consumption and processing industry; 2) the availability of the land resources; 3) the gap in productivity (11,48 qt / ha) and the potential outcome (15-24 qt/ ha); 4) the availability of new varieties and technology packages, as well as are quite skilled labor in the cultivation of green beans (The Directorate of cultivation of various beans and tubers, 2013).

Farmers have a very important role as the main actors in the efforts to achieve a successful green beans cultivation. Farmers who were able to adopt science and technology practices expected to have more ability to develop green beans farm business. Mariyono and Sumarno (2014) stated that there are six insignificant

variables that influence farmers' decision to adopt intensive chilly farming, they are: formal education, the number of family members, wealth ranking, a size of farm, the number of plots, and agricultural training program. The insignificance of such variables means that they have no influence on farmers' decision making.

Mardikanto (1993) defines adoption as the behavior change process in the form of knowledge (cognitive), attitudes (affective) and skills (psychomotor) of a person after receiving the message delivered to the target market extension. Effect of adoption in business development is high, when farmers are able to adopt it then they will be able to apply knowledge, improve attitudes and improve skills in farm business development.

The research problems are:

1. How does the decision of technology adoption by farmers of green beans at the Central Java?

2. What are the factors that affect the adoption of technology in Central Java?

The objectives of the research are:

1. To explore the technology adoption decision by green bean farmers in Central Java.

2. To explore the factors that affect the adoption of technology by green beans farmers with high-quality seed varieties in Central Java.

METHOD

The study was conducted in the centre of green beans production in Godong Grobogan, from March to April 2014. Survey was conducted in four villages selected purposively as the villages with the highest green bean production, namely: Weroyo, Kopek, Dorolegi and Anggaswangi. Data were collected using questionnaires and interviews method with 80 green beans farmers as the respondents were selected by quota sampling.

Data were analyzed using descriptive and qualitative method. Descriptive analyzed was used to determine the characteristic of the respondents, whereas qualitative analyzed was used to determine factors influencing the green beans farmers adoption level. Set questions asked

respondents to report choices related to adopting highly green beans seeds in the past and if they planned to plant in the next year.

Multiple regression models to identify the factors that influence the farmers' decision to adopt the technology of using high-quality green beans' seed. The regression equation is as followed (Gujarati, 2004):

$$Y = a + b_1x_1 + b_2x_2 + \dots + b_7x_7 + e$$

with:

Y	=	technology adoption scores
X ₁	=	land area (ha)
X ₂	=	allocation time of family member (hours)
X ₃	=	amount of seeds (kg)
X ₄	=	amount of pesticide (liters)
X ₅	=	farming experience (years)
X ₆	=	harvesting time (days)
X ₇	=	Farmers' education (years)

RESULT AND DISCUSSION

The demographic condition of respondents is in Table 1. Table 1 shows that the respondents are green bean farmers in the district Godong Grobogan with more than 43% are 40 – 50 years old and almost 40 of them are 50 – 60 years old. It showed that almost all green beans farmers are still in the productive age. Almost 44% respondents are finished with their elementary school level and around 30% are finished their high school level. However, they had farming experience more than 10 years. Forty percent of green beans' farmers had 11 – 20 years of farming experience and almost 25% had more than 20 years of experience. More than 90% respondents work as farmers as their main employment.

Adoption decision

The adoption of a new technology is essentially a choice between two alternatives, the traditional technology, and the new one. Growers are assumed to make their decisions by choosing the alternative that maximizes their perceived

utility (Fernandez-Cornejo et al., 1994). Decisions of farmers in the area of research for the adoption of high- quality green bean seed is as much as 46.25% of respondents said that they had several times using a green bean seed excelled in the past. A total of 37.5% said very rarely use green bean seedlings excelled in the past while 16.25% said never. However, all respondents said would likely use green beans ahead in the future.

Table 1. Respondents' Demographic Condition (n = 80)

Description	Total	Percentage
Age (year)		
30 – 40	13	16.25
40 – 50	35	43.75
50 – 60	31	38.75
>61	1	1.25
Level of education		
Un schooling	2	2.50
Not finished elementary	15	18.75
Elementary	35	43.75
Junior high school	16	20.00
Senior high school	9	11.25
Graduate level	3	3.75
Experience (year)		
< 10	28	35.00
11 – 20	34	42.50
21 – 30	17	21.25
>31	1	1.25
Main employment		
Farmers	74	92.50
Village's administration employee	2	2.50
Entrepreneurship	2	2.50
Civil servant	2	2.50

This research found that technology adoption by farmers still not optimal. Farmers still did not use the high quality seed. Almost all of the respondents in this research were used green beans seed from the last previous harvest, despite of the fact that green beans seeds with high yielding varieties can result in high

productivity and provide great benefits (Cahyono, 2007). In order to increase the adoption rate, the synergistic role of agricultural extension worker is clearly needed. According to Pou et al. (2006), agricultural extension is aimed to farmers in especially about cultivation technology to shape attitudes, skills and knowledge of farmers that are expected to support the farming activities.

Table 2. The average of land area and production of green beans

Description	Land Area (Ha)	Productions (kg)	Seeds (kg)	Pesticide (lt)	Time Allocation (hours)
Anggaswangi	0.87	1271	23.75	1.486	59.43
Werdoyo	0.8	1169	22.95	1.284	64.25
Kopek	0.64	929.3	18.9	1.046	47.73
Dorolegi	0.62	911	16.65	0.934	50.37
Average	0.73	1070	20.56	1.188	55.45

Table 2 shows that the average production is 1,070 tonnes with an average land area of 0.73 ha. The average use of green beans' seed for every 0.73 ha land area was 20.56 kg. In the cultivation technique using superior varieties of seeds per ha is about 10-15kg and can achieve 1.5-1.7 tonnes per ha. A number of local seeds used by farmers in the study site are very excessive and not capable of achieving high production. BALITKABI (2016) stated use of component technology in the form of improved varieties alone can increase grain yield by 30-40% and at a spacing of regular, proper pesticide application and the type and dose of fertilizer can increase the yield by 60-78% green beans.

Factors Influencing The Adoption of The High Green Beans Seeds

The result of regression analysis is presented in Table 3. The result showed altogether the dependent variables have the effect on farmers' decision as much as 55.4% (R2 = 0.554). Indicated that independent variables relatively explained

the variation in farmers' decision to adopt the high-quality green beans seeds. The magnitude of the regression coefficient indicated the extent to which independent variable can increase or decrease farmers' decision. The four independent variables were significant influencing farmers' decision to adopt the technology of green bean seed varieties. They were agricultural land, the allocation time of family member, the use of seeds, the use of pesticides and farming experience.

Land area variable had a positive effect on farmers' decision to adopt the technology of high-quality green beans seeds. There is a tendency that the farmers with the larger land area more likely to adopt a high-quality green bean seeds. The time allocation had a significant influence on farmers' adoption of technology. Technology adoption decisions will impact on the less time is allocated to manage the farm. In other words, adoption of improved seed green beans reduces the time in managing the farm.

The use of pesticides showed a significant result. Technology adoption is affected by how the use pesticide. Farmers will be able to adopt the technology when there is a reduction in pesticide use on green beans. The use of pesticide considers as riskier than the application of transgenic (Saragih et al, 2010) The variable of farming experience showed a significant result suggesting that farmers with more experience will be able to expand the horizons and aware of the technology. It can be concluded that the ability of farmers to run green beans farming influenced by experience. Foster and Rosenzweig (1995) found that initially farmers may not adopt a new technology because of imperfect knowledge about management of the new technology. However, adoption eventually occurs due to own experience and neighbors' experience. Meanwhile, the number of seeds and harvesting were not significant to farmers' decision to adopt the technology.

Table 3. Factors Influencing Farmers' Decision

Independent Variables	Coefficients	t-value	Probability
Constant	1.777	5.030*	0.000
Land area (x1)	2.949	5.962*	0.000
Time allocation (x2)	-0.016	-2.108**	0.039
Seeds amount (x3)	0.02	0.752 ^{ns}	0.454
Pesticide (x4)	-0.089	-2.535*	0.013
Farming experience (x5)	0.016	1.981**	0.051
Harvesting time (days) (x6)	0.047	0.544 ^{ns}	0.588
Farmers' education (years) (x7)	0.049	0.877 ^{ns}	0.378
Adjusted R ²			0.554
F-value			0.000

** = level significantly of 0.05 (P<0.5)

* = level significantly of 0.1 (P<0.1)

ns=no significant

CONCLUSION

This study showed that technology adoption influenced by land area, time allocation of family member, amount of pesticide and farming experience. It can be concluded that the decision of technology adoption in households of farmers depends on the socio-economic conditions and the effectiveness of related agencies. The appropriate policy should be formulated to take advantage of the adoption of technology in the application of green beans superior quality to improve agricultural productivity.

ACKNOWLEDGMENT (IF ANY)

The author would like to say thank you for the funding from DIPA Faculty of Animal Science and Agriculture year of 2015.

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