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## Biotechnology in cattle business in indonesia

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Innovation, dissemination, and biotechnological implications are widely applied in various fields of agriculture and health, including the dairy cattle business in Indonesia. This study aims to evaluate the use of biotechnology based on marketing aspects. The study was conducted at the Tirtasari Kresna Gemilang Joint Business Group (KUB) in Pujon District, Malang Regency, East Java Province. The study was conducted in October-December 2018. The research variables consisted of farmer expectations (X1), perceived quality (X2), perceived value (Z1), farmer satisfaction (Z2), farmer loyalty (Y1), and farmer complaints (Y2). Respondents were all KUB member dairy farmers, namely 174 dairy farmers. Data analysis using the SEM (Structural Equation Model) method with SmartPLS 2.0. The results showed that the satisfaction of dairy farmers on biotechnology products was influenced by farmers' expectations, perceived quality, and perceived value, while farmer satisfaction influenced farmer loyalty and farmers' complaints. The conclusions from the research show that the use of biotechnology products in dairy cattle business has begun to be accepted by the community.

**Keywords:** biotechnology, dairy cows, satisfaction, loyalty, and complaints.

### INTRODUCTION

In general, the notion of biotechnology is a branch of science that studies the process of using living things / microorganisms such as bacteria, viruses, and fungi along with the utilization of products from living things / organisms such as enzymes and alcohol in the production process to produce goods and services. This shows that based on the ontology, axiology, and epistemology aspects of biotechnology systems include input, process, and output, while the study of outcome, benefit, and impact needs to be carried out deeper studies through the socio-economic field of agriculture, especially towards community satisfaction with biotechnology innovations, the implications, and its impact on social reality and productivity as an effort to support people's welfare.

Dairy farming in the modern era is inseparable from the use of biotechnology. The use of biotechnology includes the communal vaccination-based Brucellosis control program on calves (Askura et al., 2018), the use of biotechnology for animal feed which has an impact on increasing milk production (Barkema et al., 2015), reproduction and cross-breeding (Clasen et al. 2017), sex cement sorting programs (Cottle et al., 2018), genealogy-based genetic engineering (Weigel et al., 2017), mastitis problems (DeLong et al., 2017), and antibiotics (Gussmann et al., 2017)

In Indonesia, the use of biotechnology in dairy farming is not well developed. The high cost and low cost of breeders' human resources causes the difficulty of adopting biotechnology.

This study aims to evaluate the use of biotechnology based on marketing aspects. Factors that may be decisive in the use of biotechnology in dairy farming in Indonesia include: farmer expectations, perceived quality, perceived value, satisfaction, loyalty, and complaints

## MATERIALS AND METHODS

### Location and Time of Research

The research was conducted at the Tirtasari Kresna Gemilang Joint Business Group (KUB) animal husbandry institution located in Pujon District, Malang Regency, East Java Province. The time of research is conducted from October to December 2018.

**Table 1. Research Variables and Indicators**

Hope of Farmers	Notation
Quality of biotechnology products according to expectations	X <sub>11</sub>
Biotech products as needed	X <sub>12</sub>
Affordable prices	X <sub>13</sub>
Perception of quality	Notation
Good Quality	X <sub>21</sub>
Satisfying biotech product services	X <sub>22</sub>
Transparent Biotechnology product information	X <sub>23</sub>
Value Perception (Z <sub>1</sub> )	Notation
price according to biotech products	Z <sub>11</sub>
Price according to service	Z <sub>12</sub>
Information on transparent biotech products	Z <sub>13</sub>
Farmer Satisfaction (Z <sub>2</sub> )	Notation
Always use biotech products	Y <sub>11</sub>
Is a biotechnology product, it is expensive	Y <sub>12</sub>
Provide recommendations for biotechnology products, the price is expensive	Y <sub>13</sub>
Compliance	Notation
The quality of biotech products is not good	Y <sub>11</sub>
The service of biotech products is not good	Y <sub>12</sub>
Prices do not match the quality and service	Y <sub>13</sub>

### Research variable

The study consisted of 6 main variables and 18 indicators. The main variables are: a) farmer expectations, b) perceived quality, c) perceived value, d) satisfaction, e) loyalty, and f) complaints

### Research Population

Respondents are dairy farmers who are members of the Tirtasari Kresna Gemilang Joint Business Group (KUB), Pujon District, Malang Regency, East Java Province. KUB has 174 members of dairy farmers, so that in this study all KUB member farmers were used as research respondents (total sampling).

### Data collection

Data is obtained directly from respondents by using the Likert scale questionnaire filling method 1 to 5, besides the interview method and observation for direct observation is also done to obtain additional information from respondents.

### Data analysis

Data analysis was performed using the Structural Equation Model (SEM) method using SmartPLS 2.0. The results of the analysis are used to answer the hypothesis. SmartPLS 2.0 is useful for finding new theories or strengthening weak theories (Wiyono, 2011).

## RESULTS

### Test Indicator

Indicators that support the main variables in this study were tested first using SmartPLS 2.0. Indicators that are declared valid and meet the requirements are indicators that have a value of outer loading > 0.500. The test results of the indicators are:

Indicators providing recommendations to other farmers to use biotech products are considered invalid because they have an outer loading value of <0.500, so indicator Y1.3 must be removed in the model.

### Structural Test

SEM analysis techniques using SmartPLS 2.0 produce structural test criteria in the form of Composite Reliability (CR), R Square (R<sup>2</sup>), and Cronbach's Alpha (CA) values. The results of the test criteria are:

**Table 2. Outer Loading Value**

	X <sub>1</sub>	X <sub>2</sub>	Z <sub>1</sub>	Z <sub>2</sub>	Y <sub>1</sub>	Y <sub>2</sub>	Result
21	0.894						Valid
22	0.968						Valid
23	0.927						Valid
21		0.909					Valid
22		0.812					Valid
23		0.957					Valid
11			0.957				Valid
12			0.844				Valid
13			0.927				Valid
21				0.935			Valid
22				0.920			Valid
23				0.941			Valid
11					0.916		Valid
12					0.808		Valid
13					0.482		Not valid
21						0.927	Valid
22						0.817	Valid
23						0.912	Valid

Source: Data processed

The results of the coefficient of determination indicate that farmer satisfaction with biotechnology products is influenced by farmer expectations, perceived quality, and perceived value of 36.5%. Farmer loyalty to biotechnology products is 23.1%.

**Table 3. Structural Test**

	CR	R <sup>2</sup>	CA
X <sub>1</sub>	0.717		0.882
X <sub>2</sub>	0.868	0.216	0.878
Z <sub>1</sub>	0.835	0.329	0.861
Z <sub>2</sub>	0.910	0.365	0.935
Y <sub>1</sub>	0.710	0.231	0.813
Y <sub>2</sub>	0.881	0.158	0.824

Source: data processed (2018)

The structural test on the effect test is carried out after performing an indicator test called direct effect which consists of path coefficient and t-statistic values. The effect test results are:

### Hope of Farmers

The farmers' expectations of biotechnology products have a significant negative effect on perceived quality of -0.245. That is, the higher the farmer's expectations for biotechnology products, the lower the perceived quality. Perceptions of quality are not as expected by dairy farmers.

The use of biotechnology is becoming increasingly important when biotechnology is applied in the community (Dano, 2007), but the perception of the quality of biotech products is not in line with the expectations of dairy farmers

The farmers' expectations of biotechnology products have a significant negative effect on the perception of values of -0.338. That is, the higher the farmer's expectations for biotechnology products, the lower the perception of its value. This shows that perceptions of value are not as expected by dairy farmers. Suppose the cost of raising young dairy cows is part of the cost of dairy cattle business, namely raising dairy cows for the future, but most farmers are not aware of maintenance costs (Nor et al., 2012), so the perception of the value of biotech products is not in line with the farmers' expectations dairy cows. The farmers' expectations about biotechnology products have a significant positive effect on farmer satisfaction by 0.325. That is, the higher the farmer's expectations for biotechnology products, the higher the level of satisfaction. This shows that the level of customer satisfaction as expected by dairy farmers.

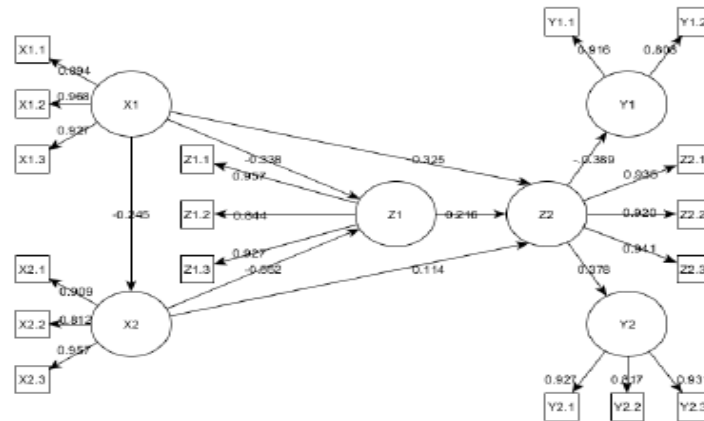


Figure 1; Logarithmic PLS results

Table 4; Yield of Direct Effect

Endogen Fungtion	Statistical Path Coefficient						
	Exogen Fungtion	Hope Farmer	Qualoity Perception	Value Perception	Satisfaction	Loyalty	Chance
		X <sub>1</sub>	X <sub>2</sub>	Z <sub>1</sub>	Z <sub>2</sub>	Y <sub>1</sub>	Y <sub>2</sub>
Farmer Hope	X <sub>1</sub>	---	<u>-0.245</u>	<u>-0.338</u>	<u>0.325</u>		
Quality Perception	X <sub>2</sub>	---	1.820	1.924	2.365		
Value Perception	Z <sub>1</sub>	---		<u>-0.522</u>	0.114		
Satisfaction	Z <sub>2</sub>	---		2.289	0.819		
Loyalty	Y <sub>1</sub>	---			0.216	<u>0.389</u>	<u>0.378</u>
Complain	Y <sub>2</sub>	---			4.321	4.728	3.667

ct Source: data processed (2018)

Pratiwi (2010) revealed that it is appropriate for biotechnology to be declared as a center of development in the present and in the future because it is able to overcome various crises in a development, so that farmer expectations are in accordance with the level of satisfaction of dairy farmers.

**Quality Perception**

Quality perception has a significant negative effect on the perception of the value of biotechnology products at -0.552. That is, the higher the perception of the quality of farmers on biotechnology products, the lower the perceived value. This shows that perception of value is not like the perception of quality according to dairy farmers. Shukla and Purani (2012) stated that the perception of the luxury value of biotechnology products is strongly influenced by culture and country, so it is natural that perceptions of quality are higher than perceptions of value. Quality perceptions have a significant positive

effect on the satisfaction of farmers using biotechnology products of 0.114. That is, the higher the perception of the quality of farmers on biotechnology products, the higher the level of satisfaction. This shows that farmer satisfaction is the same as perceptions of quality according to dairy farmers. Kreis and Mafael (2014) mention that loyalty and satisfaction can be seen from the perception of quality. That is, the perception of the quality of biotech products can affect the satisfaction and loyalty of dairy farmers.

**Value Perception**

Value perception has a significant positive effect on the satisfaction of farmers using biotechnology products of 0.216. That is, the higher the perception of farmers' value on biotechnology products, the higher the level of satisfaction. This shows that farmer satisfaction is the same as perceptions of value according to dairy farmers. Zielke (2014) states that perceived value has the strongest total effect, which is partly mediated by pleasure, shame, and guilt. The

perception of value at the location of the study shows that most farmers adopt biotech products because of social environmental influences, but this actually makes farmers feel satisfied with the use of biotech products

### Farmer Satisfaction

Farmer satisfaction has a significant negative effect on the loyalty of farmers as users of biotechnology products of -0.389. That is, the higher the farmers' satisfaction with biotechnology products, the lower the level of loyalty. This shows that the satisfaction felt by farmers does not cause them to be loyal to biotechnology products. (Ahrholdt et al., 2018) states that happiness and satisfaction affect loyalty. Dairy farmers in the research location feel satisfaction with biotechnology products, but have not reached the stage of loyalty.

Farmer satisfaction has a significant positive effect on farmer complaints as a user of biotechnology products of 0.378. This shows that the satisfaction felt by farmers does not cause them to complain about biotechnology products. (Frasquet et al., 2018) states that the majority of complaints received complaints come from consumers with the use of cellular applications. Conditions at the study site indicate that biotech products are not traded through online sites, so they do not cause complaints.

### CONCLUSION

Satisfaction of dairy farmers to biotech products is influenced by farmer expectations, perceived quality, and perceived value. Satisfaction of dairy farmers to biotechnology products influences farmer loyalty and farmers' Complaints.

### CONFLICT OF INTEREST

The authors declared that present study was performed in absence of any conflict of interest.

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### AUTHOR CONTRIBUTIONS

Amam designed his plant program as a whole. Moh. Wildan Jadmiko, Pradiptya Ayu Harsita, Roni Yulianto, and Mohammad Setyo Poerwoko designed work on the field.

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