Analysis of Factors Affecting Farmer Satisfaction in Artificial Insemination Services in Jepara Regency Central Java Indonesia

Isna Sa'adah*, Mukson, Yon Soepri Ondho

Faculty of Animal and Agriculture Science, Diponegoro University, Semarang
Tembalang Campus, Semarang 50275 – Indonesia
*Email: saadahisna@gmail.com

Abstract—*Artificial Insemination (AI) is a technology developed with the aim of increasing production by increasing population in livestock and livestock genetic quality. AI services are currently carried out by relevant official officers who handle the field of animal husbandry. Satisfaction in the service of AI is the farmer evaluation after comparing the performance or the results he feels with his expectations. The purpose of this study is to analyze the factors which influence farmer satisfaction in AI services in Jepara Regency. The study was conducted in three districts in Jepara Regency (Donorojo District, Bangsri District and Pakis Aji District). The data collection is done through distributing questionnaires to 150 respondents who use the services of Artificial Insemination, determining the sample using purposive sampling. Path Analysis (Path Analysis) was used to determine the effect of availability of AI iequipment, field conditions and service quality on farmer satisfaction. The results of Path Analysis show that there is a direct relationship between the equipment availability to service quality and the indirect relationship of the equipment availability to the satisfaction of farmers. equipment availability has a positive effect on service quality. The equipment availability also has a positive effect on satisfaction. Field conditions have a positive effect on service quality and service quality has a positive effect on farmer satisfaction.*

Keywords— *Artificial Insemination (AI), Path analysis, farmer satisfaction.*

I. INTRODUCTION

Population growth, improved per capita income, and changes in consumer tastes have an impact on increasing meat requirements. Domestic meat production has not been able to fulfill the needs so until this time, to fulfill meat needs are fulfilled from imports. Various efforts have been made by the government to fulfill the needs of beef. According to the Ministry of Agriculture of the Republic of Indonesia (2015) the general policy of animal husbandry and animal health development in order to achieve self-sufficiency in meat is to increase livestock production and productivity where one operational step is optimization of artificial insemination (AI) and lust synchronization. AI technology is one of the reproductive technologies that is capable and has succeeded in improving the genetic quality of livestock, so it can produce good quality tillers by utilizing superior males (Ismaya, 2014).

Jepara Regency is an AI service area in the self-help stage with the realization of AI services with average of 12,000 doses per year with Service rates per Conception (S / C) 2.0 in 2016 and 1.9 in 2017. (Jepara Regency Food and Agriculture Resilience Service , 2017). The technology of insemination is now well known to farmers in Jepara where it can be seen from the increasing number of acceptors every year. Problems in AI services in Jepara Regency include the availability of AI infrastructure facilities namely frozen semen and AI equipment, staff skills, still high S/C numbers, farmers' ability to detect lust, the presence of cattle reptoduction disorders, the ratio of staff to acceptors and regional conditions / field of work. These problems will affect the quality of services that have an impact on the satisfaction or dissatisfaction of farmers.

Service quality is the expected excellence level and control over the level of excellence to fulfill customer desires (Tjiptono 2008). Whereas according to (Wijaya 2011) Quality of service is a measure of how well the level of service provided is able to fulfill customer expectations. Service quality according to Parasuraman in Kotler (2000) is customer valuation (a form of attitude) and is the result of comparisons made by customers regarding actual expectations and perceptions of the services they receive.

Satisfaction is important used to evaluate service performance and improve competitiveness (Ferreira and Fernandes, 2015). After consuming a product or service consumers will feel satisfaction or dissatisfaction with the

product or service that has been consumed (Sumarwan, 2011). Engel *et al.*, (1990) stated that customer satisfaction is a full-time evaluation where the alternatives chosen are at least equal to or exceed customer expectations, while dissatisfaction arises if the results do not meet expectations.

Satisfaction is important to be used to measure the performance of a service, therefore it is important to analyze the factors that influence farmers satisfaction in AI services so that steps can be taken to improve the AI service.

II. METHODOLOGI

The research method used is the survey research method. This study uses two types of data, namely primary data and secondary data. Primary data is a source of research data obtained directly from original sources. Primary data was specifically collected from questionnaires in the field to answer research questions. Secondary data is data obtained by recording data that has been documented by related parties including agencies / institutions, other parties, literature and other library sources. Primary data collection techniques with interviews and questionnaire dissemination secondary data collection with literature studies and documentation studies.This study uses two types of data, namely primary data and secondary data. Primary data is a source of research data obtained directly from original sources. Primary data was specifically collected from questionnaires in the field to answer research questions. Secondary data is data obtained by recording data that has been documented by related parties including agencies / institutions, other parties, literature and other library sources. Primary data collection techniques with interviews and questionnaire dissemination secondary data collection with literature studies and documentation studies.

Sampling in this study using a purposive sampling sample with consideration of having female cattle and using Artificial Insemination services. Sampling is determined as much as 150 so that the number of samples is in accordance with the recommended and quite representative for the study. According to Hair *et al.*, (1995), the sample size needed for multivariate data is between 100-200 samples, or when using the estimated maximum likelihood the sample size is 5-10 times the indicator variable.

Tabel.1: Research Variables, Definitions and Indicators.

NO	VARIABLE	Definition	Indicator
1	Equipment Availability	Availability of equipment that must be owned by inseminator in order to perform AI services properly	1. Availability straw 2. The use of field clothes 3. The use booth shoes 4. The use Gloove 5. The use thermos
2	Field conditions	Staff working area conditions.	1. The closest distance to the officer 2. Total of acceptors 3. The condition of road facilities 4. Field conditions in the work area
3.	Service Quality	AI customer views on the form of service provided by officers	1. Tangibility (increase in livestock productivity, increase in farmer income, birth and pregnancy rates, appearance of officers 2. Reliability (able to fulfill the desires of farmers, not making mistakes in service) 3. Rresponsiveness (fast, precise, clear and certain in providing service) 4. Assurance (skills, knowledge, politeness, ability to provide services that are free of danger and risk). 5. Emphaty (ease in establishing communication, individual attention, and avoiding the use of terms that are not understood by livestock).
4	Farmer satisfaction	The level of feeling of the farmer after comparing the performance or results he feels with his expectations	1. Feeling satisfied / happy 2. Interest in reusing AI 3. The desire to recommend to other farmers 4. Complaints / complaints by farmers

The questionnaire is measured by a Likert scale 1 (one) up to 5 (five). Sugiyono (2012) explains that the Likert scale is used to measure the attitudes or opinions of someone or a number of groups on a social phenomenon where the answers to each instrument item have radations from very positive to very negative Variables in this study include Equipment Availability, field conditions, service quality as exogenous variables and farmer satisfaction as endogenous variables. Operational definitions are explained in Table 1.

Data analysis techniques to analyze the factors that influence farmer satisfaction are used path analysis as in Figure 1.
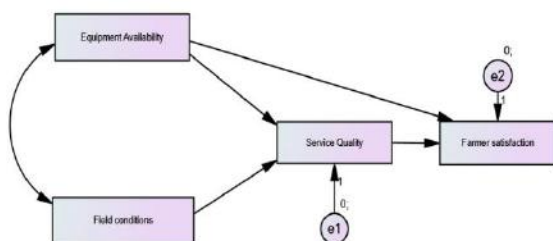

Fig. 1. Path Analysis Model.

Mathematical equations for the models developed in the study:

$$Y1 = \rho(y1x1)X1 + \rho(y1x2)X2 + e1$$
$$Y2 = \rho(y1x1)X1 + \beta(y2y1)Y1 + e2$$

Where :

X1 : Equipment Availability
X2 : Field conditions
Y1 : Service Quality
Y2 : Farmer satisfaction

Hypothesis :

H1 : It is suspected that there is an influence on the Equipment Availability on service quality
H2 : It is suspected that there is an influence on field conditions on quality service
H3 : It is suspected that there is an influence on the Equipment Availability for satisfaction
H4 : It is suspected that there is an influence of service quality on satisfaction

Before the path analysis is carried out, classic assumption tests must be done first. The classic assumption test is done so that the regression model in the study is significant and representative. Classical assumption tests in this study include:

1). Autocorrelation test. Autocorrelation test to find out whether there is a perfect correlation between the members of the observation. Detection using Durbin Watson Test (Gujarati 1991: 201). If the Durbin Watson value between du (Durbin Watson is maximal) and 4-dl (Durbin Watson is minimal) then autocorrelation does not occur.

2). Multicollinearity Test. Multicollinearity is a situation where there is a perfect relationship between several / all independent variables in the regression model. Detection is done by using tolerance value and VIF (Variance Inflation Factor). If the tolerance value is > 0.10 and VIF <10, multicollinearity does not occur.

3). Heterocedasticity test. Heterocedasticity means that there are variants that are not the same in the confounding error. The detection is done by the Glejser method (Arief 1992: 134), namely by regressing the absolute value of residuals. If the t-count is between ± t-tables, there is no heterocedasticity in the study.

4). Normality test. The normality test is used to determine whether the population of the data is normally distributed or not. This test is usually used to measure ordinal, interval, or ratio data. If the analysis uses parametric methods, the normality requirements must be fulfilled, ie the data comes from a normal distribution.

III. DISCUSSION AND RESULT

3.1. General Overview of AI Services in Jepara District

Jepara Regency Government through the Food and Agriculture Resilience Service has made efforts to improve and improve the quality of local cattle and livestock production, especially beef cattle, by implementing an artificial insemination program. The total number of inseminators in Jepara Regency as a whole is 25 people spread across 15 subdistricts, while Karimunjawa sub-district does not yet have an inseminator officer so that farmers rely on natural mating with low productivity because they are influenced by feed quality and maintenance patterns.

The realization of AI services in Jepara Regency continues to increase from year to year. Data on realization of AI services in 2015 were 9,400 doses and increased to 12,926 doses in 2016 and reached 18,656 doses in 2017. The improvement in AI services in Jepara Regency was partly due to the increasing knowledge of farmers about AI, successful socialization by AI officers, and additions AI officers by related agencies thus expanding the reach of the service area. Evaluation of the success of AI can be done by calculating the value of Service per Conception (S/C). S/C is the number of insemination services needed by a female until pregnancy occurs. The S/C value of Jepara Regency was 1.9 in 2017. Normal S/C values were between 1.6-2 (Toelihere, 1981). The Jepara Regency Government through the Food and Agriculture Resilience Service has made efforts to improve and improve the quality of local cattle and livestock production, especially beef cattle, by

implementing an artificial insemination program. The total number of inseminators in Jepara Regency as a whole is 25 people spread across 15 subdistricts, while Karimunjawa sub-district does not yet have an inseminator officer so that farmers rely on natural mating with low productivity because they are influenced by feed quality and maintenance patterns.

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Normal S/C values were between 1.6-2 (Toelihere, 1981). The starw types that are often requested by farmers are Simental types totaling 12,210, PO (Peranakan Ongole) types 7,421, 1,931 Limousin types, Brahman types 272 and other types 47. Farmers in Jepara Regency make simental breeds as their favorite based on several factors, including more weight large, easy to adapt to the environment and also resistant to disease, so that it becomes a consideration for more dominant breeders to choose AI Simental compared to others. The total weight of simental cows for adult males can reach 1,400 kg, and adult female simental cows reach 600-800 kg (Siregar, 1992).

The second most preferred type of cow seedlings is the type of PO. PO cattle are local Indonesian cattle, so farmers are used to this type of cow, besides that PO cattle are preferred because they are relatively tame and can be used as labor to plow fields. Adult PO cattle weight reaches 800 kg for bulls, for females the weight can reach 500 kg.

3.1. Path Analysis Results
The path diagram that is processed by Amos data shows the following results:
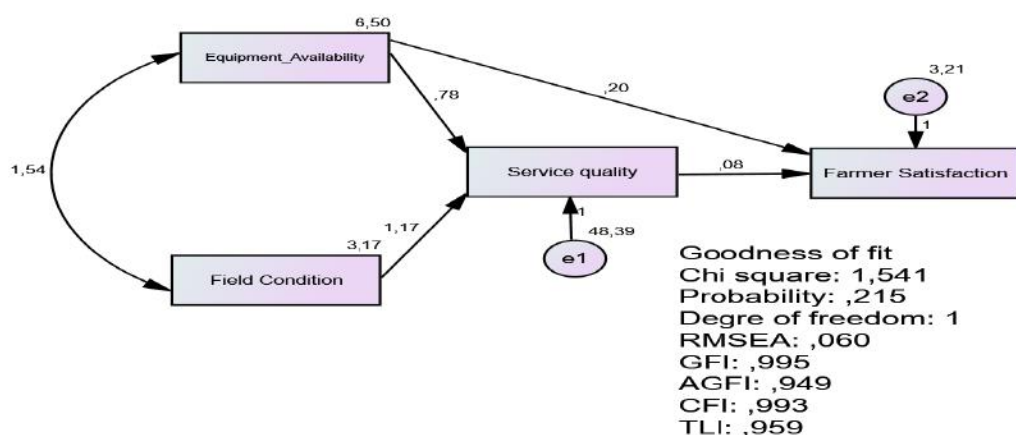

Fig 2. Research Result of Path Diagram

Path analysis must go through the stages of *Goodness-of-fit* criteria assessment (Ghozali, 2017). This step is to assess the overall model fit as a whole, both structural and measurement models together. The results of *the Goodness of Fit* test are presented in Table 2.

Table.2: Testing Results Criteria Goodness of Fit Research data

Criteria	Limitation	Score	Information
RMSEA	0,05 < RMSEA < 0,08	0,060	*Fit*
GFI	> 0,90	0,995	*Fit*
AGFI	≥ 0,90	0,949	*Fit*
CMIN/df	≤ 2	1,541	*Fit*
TLI	> 0,90	0,959	*Fit*
CFI	> 0,95	0,993	*Fit*

Source : Primary data analysis, 2017

Hypothesis testing is done by analyzing the significance of regression weight. The results of the Standardized Regression Estimate (loading factor) calculation can be seen in Table 3.

Table.3: Results of Standardized Regression Estimate (loading factor).
Regression Weights: (Group number 1 - Default model)

			Estimate Unstandardized	Estimate standardized	S.E.	C.R.	P
Service quality	<---	Equipment Availability	,779	,258	,238	3,280	,001
Service quality	<---	Field conditions	1,166	,269	,340	3,428	***
Farmer Satisfaction	<---	Service quality	,078	,301	,020	3,859	***
Farmer Satisfaction	<---	Equipment Availability	,198	,251	,061	3,222	,001

Based on the results of processing with the AMOS program obtained regression weight values as in Table 3 from the results of data processing can be seen that all variables have a significant effect.

The basis for decision making test of significance for regresion weight are : if p value < alpha 0.05 so the hypothesis become zero (0) and H0 is rejected, means that there are influences between two variables statiscally. if p value > alpha 0.05 the hypothesis become zero (0) and H0 is accepted, means that there is no influence between the two variables statiscally.

Thus the hypothesis test can mean something like this:

a. Hypothesis test 1

H0: There is no influence between the variable equipment availability and service quality

H1: There is an influence between the variable equipment availability and service quality

The test results prove that the variable coefficient of equipment availability for service quality is positive at 0.258. The effect of the equipment availability of statistically significant means is because it is known that the variable equipment availability has a p-value of 0,000 smaller than 0.05, then H0 is rejected which means there is a significant relationship of variable equipment availability with service quality variables.

b. Hypothesis test 2

H0: There is no influence between field condition variables and service quality

H1: There is an influence between field condition variables and service quality

The effect of field condition variables is statistically significant because the field condition variable has a p-value of *** smaller than 0.05. And has a positive variable coefficient value of 0.269, therefore H0 is rejected which means that there is a significant effect of the field condition variable on service quality variables.

c. Hypothesis test 3

H0: There is no influence between the variable equipment availability and satisfaction.

H1: There is an influence between the variable equipment availability and satisfaction.

The test results prove that the variable coefficient of equipment availability is positive at 0.251. The influence of availability of means is statistically significant because it is known that the availability variable has a p-value of 0,000 less than 0.05, then H0 is rejected which means there is a significant relationship of the variable equipment availability with satisfaction variables.

a. Hypothesis test 4

H0: There is no influence between service quality variables and satisfaction.

H1: There is an influence between service quality variables and satisfaction.

The test results prove that the variable coefficient of service quality to satisfaction is positive at 0.301. The influence of service quality is statistically significant because it is known that service quality variables have a p-value of *** smaller than 0.05, then H0 is rejected which means there is a significant relationship of service quality variables with satisfaction variables.

3.1.1. Effect of Equipment Availability and Field Conditions on Service Quality

The results of path analysis with exogenous variables are the equipment availability, and field conditions while the service quality endogenous variable (Figure 2) shows the results of the equation as follows:

Service quality = 51,954 + 0,779 Equipment Availability + 1,166 Field conditions

The above equation constant value is 51,954. Positive constant values indicate positive effects of exogenous variables (equipment availability, and field conditions).

The constant value is 51,954, which means that if the independent variable which consists of the availability of means equipment availability, and the conditions of the field , increases by 1 scale, farmers' satisfaction will increase by 51,954 units. Based on these equations can be interpreted as follows:

In the above equation the coefficient value of the equipment availability is 0.779 and the coefficient of the field condition variable is 1.116, the positive path coefficient value indicates the variable equipment availability and field conditions has a positive influence on service quality. This means that if AI facilities such as straw are always available, AI equipment is increasingly fulfilled, and field conditions such as good road facilities, a small number of acceptors, and the distance of officers is getting closer, it will improve AI service quality.

Sutardjo (2003) states that the availability of AI infrastructure has an effect on the quality of service, because the availability of sufficient facilities will facilitate service operations but the condition of the field / work area does not affect the quality of AI services. AI officers in Malang Regency according to Sutardjo have high professionalism and consider providing AI services to the community is a duty and obligation that must be carried out.

3.1.2. Effect of Equipment Availability and Service Quality on Farmer Satisfaction

The results of path analysis with exogenous variables on the equipment availability, and service quality while the endogenous variables of farmer satisfaction (Figure 2) show the results of the following equation

Farmer Satisfaction = 14,384 + 0,198 Equipment Availability + 0,078 service quality

The value of the constant of the equation above is 14.38. Constant value of 14.384 means that if the independent variable consisting of the equipment availability, and service quality, has increased by 1 scale then, farmer satisfaction will increase by 14,384 units. Positive constant values indicate the positive influence of exogenous variables (equipment availability and service quality) on endogenous variables of farmers satisfaction.

The variable coefficient of equipment availability is 0.198 and the variable coefficient value of service quality is 0.078, the positive path coefficient value indicates the variable equipment availability and service quality has a positive effect on farmer satisfaction. This means if AI equipment such as straw is always available, AI equipment is more complete, S/C is getting smaller, skilled staff, officers are fast, precise and clear in providing services, and great attention from officers to farmers, it will increase farmer satisfaction in AI services. The value of S/C is very important to measure the success of insemination (Hardjopranjoto, 1995), so it is necessary to try to reduce the S/C number because farmers are not satisfied with the current pregnancy rate. To improve the pregnancy rate, it is necessary to increase the competence of AI officers through technical training, improving the reproductive conditions of livestock to support the success of the AI, improving the ability of farmers to detect lust through socialization and training, and maintaining straw quality to be in good condition.

This is in line with the research conducted by Rahayu, YM (2017) that the equipment availability and service quality have an effect on customer satisfaction through customer value. Service quality and price have an effect on farmer satisfaction (Yazdanpanah et al., 2013). According to Hapsari et al., (2016) that satisfaction does not only depend on service quality but also depends on the cost and time sacrificed by the customer to get services.

IV. CONCLUSION

1. There is a direct relationship between the equipment availability and the quality of services and there is an indirect relationship between the equipment availability to satisfaction of farmers.
2. There is a direct relationship between field conditions and service quality and there is an indirect relationship from field conditions to farmer satisfaction.
3. Equipment availability has a positive effect on service quality. the equipment availability also has a positive effect on satisfaction.
4. Field conditions have a positive effect on service quality and service quality has a positive effect on farmer satisfaction.

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