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TIME SUBMITTED	22-SEP-2020 01:29PM (UTC+0700)	WORD COUNT	2279
SUBMISSION ID	1393687053	CHARACTER COUNT	12669

FACTORS AFFECTING FARMER'S ADOPTION OF TECHNOLOGY FOR PROCESSING BEEF CATTLE WASTE ON INTEGRATED FARMING SYSTEMS

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Received on: 29.02.2020
Accepted on: 23.05.2020

ABSTRACT

Integrated farming systems of beef cattle with paddy is the best strategy to improve the optimization for utilising of agricultural waste resources. This technique has not been implemented well, because it is still done partially, and not integrated and holistic. Main component technology to be controlled by farmers in the integrated farming systems particularly paddy and beef cattle processing technologies waste is waste rice straw and cow dung of cattle. The research aims to understand the factors that affect farmers in the adoption of the capacity of waste processing technology rice straw and cow dung. The research was conducted using a survey method with the total sample of 160 respondents. Data was analysed using descriptive equation and structural model analysis. The results showed that factors affected farmers in the adoption of technology on the capacity of waste processing rice straw and waste droppings of cattle on integrated farming systems were socio economic, socio psychological characteristics the performance of counselors, characteristic of innovation , and perceptions of farmers on the performance counselors.

Key words: Farmers, adoption of technology, waste, rice straw, droppings of cattle, integrated beef cattle and paddy

Introduction

The development of beef cattle and beef cattle population has been increasing every year. The number of cattle dung that can be used as a source of fertilizer and biogas also increases. Furthermore, increase in the area of paddy harvesting has a the potential to produce rice straw as waste rice plants. This waste could be used as resource to feed beef cattle. Syamsu (2007), reported that an agricultural waste has large potential as a source of cattle feed. The volume of agricultural waste production in Indonesia account 51.546,297,3 tons with the largest production of rice straw, 44.229,343,0 tons of BK or 85.81% of all the agricultural waste product (cultivation of food crops). On the other hand, the Directorate General of Animal Husbandry in 2009 stated that livestock numbers in Indonesia consisting of large ruminant livestock as many as 13.680,000 and small ruminant 21.688,000.

Although both the waste of rice straw and cow dung have potential to be used as fertilizer and feed stock, but the utilization of this sources was not optimal to add a value and increase productivity of farming. The determining factor for successful integrated system in using cattle waste was determined by rice farmers in terms of attitude of rice farmers, knowledge and skills that is still low and less adopted technology and also breeders are less aware toward waste processing technology. Abdullah and Syamsu (2008), mentioned that the success of integrated method development of beef cattle and paddy is determined by farmers capacity resources. The development of farmers capacity can be carried out with awareness generation, where all the activity was conducted for beef cattle livestock by and for the farmers. The development of farmers can be conducted with shades of participation so that the principle of equality, transparency, responsibility, accountability and empowerment in cooperation can be the components for new breeders that combined with rice plants cultivation in cattle farming system.This will bring the positive impact on cultivation, social and economic status, such as livestock feed can be more efficient with a sustainable availability. In addition, social problems due to rice straw waste and cattle dung which cause pollution can be overcome, as well as brings good economy to farmers and methodical for business (Abdullah and Syamsu, 2013). Due to this reason, it was necessary to conduct a research to know the factors that affect farmers in adoption of the capacity of waste processing technologies in the integration of beef cattle, in an effort to develop the capacity of rice farmers in order to the utilization of resources, that have added value through innovation and technology.

Methods

Research was conducted at Pinrang District, South Sulawesi Province. The determination of farmers as a respondent was randomly calculated based on Slovin (Umar, 1997). The number of respondents were 160 farmers. Data were collected using survey and interview methods. The questionnaire used and form of questions in the questionnaire was closed and open types. In addition there were also a focus group discussion with farmers to dig deeper the actual condition of various problems that occurs in beef and paddy, and business development. Besides interview an in-depth study were also conducted to analyze the several key informants (Kerlinger, 1993). Variables in this research were socio-economic and socio psychological characteristic of farmers, capacity of farmers (attitudes, knowledge and skill in paddy and beef cattle farming), farmers in the capacity of beef cattle farming, paddy farmers in the capacity of waste management (rice straw and dung of cattle), the capacity of farmers in the

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management of waste droppings of cattle), the performance of counseling, characteristic of technological innovation, the perception of farmers against the performance of counselors.

The measurement of variables were done through the measurement of each variable and sub indicators of the relevant research. Qualitative variables were measured using indicator likert scale consisting of four level, each level was given a score of 1, 2, 3 and 4. The average data from each variable were calculated. The processing of the data was initiated by the tabulation, and then these tabulated data were analyzed for calculation of the average value, the percentage and frequency. To test the hypotheses, the data were analyzed with a method of Structural Equation Model (SEM) by using LISREL (Kusnedi, 2008). To test the validity and reliability of instruments, confirmatory factor analysis was used. Confirmatory factor analysis can measure indicator variables which were latent variables that affect indicators that have largest and smallest load error with the goodness of fit criteria of chi- square *p*> 0.05 (2) Means square Root Error of Approximation (RMSEA) < 0.08 dan (3) Comparative Fit Index (CFI) > 0.90.

Results and Discussion

Capacity strengthening variables affect farmers in the adoption of waste processing technology. Every indicator showed that the value of real t-counting was greater than t-standard. Overall, the analysis of rice and beef waste processing structural model on the integration of the adoption of technology fit with the data showed in the model, which can be shown through the relations between variables/sub variables, a direct influence, indirect effect, the total research influence and t-counting variables. The influence of socio-economic characteristic of farmers, socio-psycologis characteristic of farmers, characteristic of technology innovation, performance of the counselors, capacity of farmer in paddy and beef cattle rancher in the adoption of the rice straw and waste processing droppings of cattle were analyzed.

The results showed that socio-economic and socio-psycology characteristics directly affected farmers capacity in the adoption of rice straw waste processing and cattle waste processing. This indicated that the characteristics of farmers determined the capacity of farmers in the adoption of waste processing rice straw and waste droppings of cattle with the coefficient value of 0.54; 0.72 and significant difference at **á**= 0.05. The analysis showed that socio economic characteristics of breeders that can be estimated by structural model, ownership of livestock and ownership of land directly influence the capacity of breeders in the processing of rice straw and beef cattle waste.

Characteristic of technological innovation showed that all innovations associated with the capacity of farmers, but who may be estimated on the model, namely to gain relative and compability that advantage relative and compatibility influential direct against the capacity of farmers account for 0.15 and 0.09. The presence of the influence of relative advantage showed that the decision made by farmers in innovation adoption in this technology of fermented rice straw depends on the nature of innovation. The bigger relative advantage obtained by breeder in rice straw and waste droppings of cattle technology, the more rapidly the innovation can be adopted by farmers. This is supported by the opinions of Lionberger (1968); Rogers and Shomaker (1987); Mardikanto (1996) they mentioned that there were a positive connection between advantage relative to the adoption of technological innovation.

The performance of counseling directly influence the capacity of farmers in adopting technological innovation in the integration of beef cattle paddy, account for 0.61 with the significant difference at **á**= 0.05. This indicates that an increase in one unit of the performance will increase the capacity of farmers in adopting technology to 0.61 unit. Hence the development of information management method in counseling including the matter and media counseling, increased use of computers to locate and conveye information and heightened the use of the method of study in any counseling of farmers will increase the capacity of farmers in adopting technology.

Theoretically research was in line with the Rogers (1985) and presented an example of the difficulty to diffuse innovation, like the failure of the diffusion of the water in the ripe molinos (Peru). The elucidation in Los Molinos caused some respects between other message contrary to the local, cultural norm one of the counselors have a key and does not involve community leaders (opinion leader) to disseminate information was persuasive.

The perception of farmers on the performance of counselors in this responsibility and the quality of services to farmers directly influenced the adoption of technology in the capacity of waste processing waste rice straw and cow dung with coefficient influence account for 0.40 unit. This indicated that if there was an increase in one unit of the perception of farmers on the performance of information will increase the capacity of farmers in the adoption of technology and rice straw 0.08 unit. Farmers in the adoption of increasing the capacity of waste processing technology extension included the quality of service. Counseling involment in the implementation and evaluation influenced farmers in the adoption of technology on the capacity of waste rice straw and waste cow dung. This means involving counseling joint to adoption innovation to farmers was required. This indicated that if there was an increase in one unit of involvement in counseling , farmers will increase the capacity of the adoption of technology in waste processing rice straw and cattle waste by 0.08 unit.

Conclusion

1. Characteristic of farmers socio-economic, socio psychological characteristics, characteristic technological innovation , the performance of counselors and perceptions of farmers on the performance of real counselors directly affected farmers in the adoption of technology in the capacity of waste processing rice straw and fecal waste beef cattle on the integration of paddy.
2. The performance of counselors and perceptions of farmers was significant and influential technology innovation to the adoption of waste processing rice straw and waste droppings of cattle . This provides information that the performance of counselors and perceptions of farmers on the adoption of technology to improve technology innovation in waste processing rice straw and waste processing on the integration of beef cattle dung of cattle paddy.

Acknowledgements

This research funded by University Research Scheme, budget year 2013-2014.

Author thanks to the Directorate General of the Ministry of Higher Education, Rector Hasanuddin University, and community research funds for assistance that provided so that this research can be implemented .

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