**HOUSEHOLD ECONOMIC EMPOWEMRNT THROUGH THE MODEL OF BUSINESS PATTERN IMPLEMENTATION ZERO WASTE**

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**ABSTRACT**

Livestock business development has good prospects. This is because all livestock products can be used and provide benefits, ranging from meat, milk, skin, and even leftover waste such as feces and urine. Farmers do not know the benefits and economic value of cattle manure as a source of household income. The introduction of technology is done to improve the management of cattle manure into organic fertilizer. This research was carried out in several stages, namely: (1) applying thefarming business model *zero waste* by utilizing cattle manure into compost on farmers' land, (2) analyzing the content of N, P, K compost, and (3) analyzing the level of technology adoption of the implementation of livestock business patternsmodel *zero waste*. The introduction of this technology produces organic fertilizer which is useful in farming activities. The implementation of this farming business pattern has a positive impact on the household economy and supports government programs in an environmentally sound and sustainable agricultural concept. Mentoring activities still have to be done so that these productive activities are sustainable in an effort to increase farm household income.

***Keywords: Empowerment, Households, Animal Husbandry***

**INTRODUCTION**

Environmentally sound agricultural systems are principally agricultural systems that apply the basic principles of bio-industry, namely: (1) *zero waste*, (2) zero *imported* production inputs, (3) zero *imported* energy, (4) processing biomass and waste so new bio-products are of high value, (5) integrated and environmentally friendly, and (6) as *biorefinery* advanced food and non-food science-based (Soeharsmo *et al* 2008, Priyanti *et al* 2009, Basuni *et al* 2010).

The existence of community farming systems in Minahasa Regency, namely *mix cropping*, requires a zero waste farming system, and efficient use of inputs. The zero waste model technology is implemented through various methods or models. The benefit of this activity is that the community runs afarming model *zero waste* so that it is efficient in the use of inputs, environmentally friendly (*zero waste*), and impacts on the diversity of food and processed food products (Kariyasa 2003, Elly *et al* 2008).

Cattle farming is a source of household income for farmers in particular and rural communities in general. Some studies show that livestock business can contribute to the household income of farmers (Priyanti *et al* 2009). Data on the potential of the Minahasa Regency area shows that Minahasa District is a region that has the potential to develop a cattle business. Most cattle breeders are farmers with an average cultivated land area of ​​0.60 ha, so that in the long run food crops cannot be relied upon by farmers. In this case the development of cattle can be increased because it does not require large land (BPS Sulut 2014).

In general, this study aims to implement environmentally sound farming business patterns in Minahasa District. To achieve these general objectives, it is preceded by the phasing in the achievement of specific objectives of this study which includes: (1) applying the technology of integration of maize and cattle with the use of cattle manure into compost on farmer's land, (2) analyzing protein content , carbohydrate, and crude fiber for silage and ammoniation, and the content of N, P, K for compost, and (3) analyze the factors that influence the implementation of environmentally sound farming business patterns in Minahasa District.

**RESEARCH METHODS**

This study was conducted in Minahasa District. Subdistrict and village samples were determined *purposively* based on: (1) beef cattle breeding development areas in Minahasa District, (2) locations for developing forage fodder in North Sulawesi, and (3) already integrating corn-cattle. Selected Ranotongkor Timur Village, East Tombariri District.

**RESULTS AND DISCUSSION**

**The introduction of Model Technology *Zero Waste* through Compost Making Fertilizer**

The introduction of compost fertilizer from cattle feed residues and cattle manure was carried out as an effort to utilize waste in themodel farming *zero waste*. The introduction of technology begins with extension activities, where group members are provided with knowledge of the benefits, stages of manufacture, and economic value of compost. This is done because in general group members do not yet have knowledge about the package of introduction of waste utilization technology in thefarming model *zero waste* of cattle business.

The activity of making compost is carried out by farmers accompanied by technicians. This activity begins with the creation of *activators*. *activator* EM4purchased at the store was replaced with mixed activator itself by technicians and farmers using bamboo shoots and coconut water. *activator* Thisis given the name of the bamboo shoot mole. The activity of making *activator* thisis one form of technology introduction to increase added value. Thus farmers no longer need to buy EM4 for composting activities. The compost fertilizer in this invention uses material which is a waste from the cattle business itself, which is the remaining cattle feed and cow dung. The compost fertilizer produced was then analyzed to find out the macro nutrient content. This result was then compared with the content of the compost fertilizer which received a recommendation from SNI.

Table 1. Macro Nutrient Content of Compost Fertilizer from Cattle Feces

|  |  |  |
| --- | --- | --- |
| No | Parameter | Result of Analysis |
| 1. | Total N | 0.64 |
| 2. | Phosphorus | 0.15 |
| 3. | Potassium | 1.08 |

The analysis shows that there are 3 parameters namely Nitrogen (N), Phosphorus (P), and Potassium ( K) with a value between 0.15 - 1.08. The highest value is potassium (K) which is 1.08 and the lowest is Phosphorus (P) which is 0.15. Furthermore, Table 2 shows the micro nutrient content of compost that meets SNI (Indonesian National Standard).

Table 2. Macro Nutrient Content of Compost Fertilizer according to SNI

|  |  |  |
| --- | --- | --- |
| No. | Chemical Properties | SNI Standard |
| 1. | N total | 0.4 |
| 2. | Phosphorus | 0.1 |
| 3. | Potassium | 0.2 |

**Factors Affecting the Implementation of Environmentally Friendly Livestock Business Patterns**

The process of adopting technology is a process of applying a new idea. In this case the level of technology adoption can be measured by the quality of adoption and quantity of adoption. The quality and quantity of adoption is related to the appropriateness and amount of application of farming technology components according to recommendations (Herianto 2005, Bulu 2010). Rogers (1983) and Ray (1998), put forward five stages of the adoption process, namely: knowing and conscious, interest, evaluation, trying, and adoption. Based on this, the adoption of technology in this study is defined as the ability of farmers to implement or implement waste utilization technology in the implementation of environmentally sound livestock farming patterns of integration systems that are categorized into: receiving given number 3, hesitant given number 2, and refusing to be given a number 1.

Results The research shows that the factors that influence the adoption of waste treatment technology in the integration system of corn and cattle are influenced by internal and external factors. These factors are age, education, and business experience. The results of the regression analysis show that the three variables significantly influence the level of adoption of waste utilization in the integration system in Minahasa District in Table 3.

Table 3. Results of Multiple Linear Regression Analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variable Free | VariablesBound | CoefficientRegression | t- | Sig. |
| Constant | Adoption of Technology (Y) | 2,021 | 3,452 | .001 |
| Age (X1) |   | .116 | .751 | .056 |
| Education (X2) |   | .111 | .519 | .064 |
|  Farming Experience (X3) |   |  -.156 |  -1.055 |  .48 |
| Rsquare = 0.782 |   |   |   |   |

 Source: Results of Regression Analysis

Based on the table above the multiple linear regression equation the regression equation is obtained as follows: Y = 2.021 + 0.116X1 + 0.111X2 - 0.156X3 where X1 states age, X2 states education, and X3 states business experience. The coefficient of determination (R2)of 0782 means the variation fluctuation waste utilization rate of adoption by farmers on 78.2 percent of system integration is determined by age, education, and business experience, while 21.8 percent influenced by other variables not included in the model.

**1.** **Age**

 Regarding the context of agricultural technology adoption, the concentration of age in productive age can be a resource that will accelerate the adoption of farming technology. Generally the respondent farmers in this study were 39 - 57 years old or equal to 56.25, followed by 58 - 75 years at 31.25 percent, and the remaining 8 percent at the age of 20 - 38 years. This data shows that farmers are in productive age (Table 4).

 The results of the regression analysis show the regression coefficient of age variable (X1) of 0.116 means that each increase in age value will cause an increase in adoption value of 0.116 percent, assuming *ceteris paribus.* This indicates that the age of farmers influences the acceleration of technology adoption. This result is not in line withresearch Rangkuti's (2003)that the older the farmer the less involvement in communication networks.

Table 4. Age of Farmers in the Integration System in Minahasa District

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| No | Indicators | Score | Number (people) | Percentage (%) | Weight |
| 123 | 58 - 75 years39 - 57 years20 - 38 years | 321 | 15276  | 31.2556.258  | 45816 |
| Total |  48 |   100 | 132 |

Source: Primary Data (processed), 2019

**2.** **Education**

Education can influence the ability of a farmer to adopt a technology. The higher the level of education of farmers, the faster understanding of technology. Education shows the level of intelligence that is related to one's thinking power. The higher the level of education of a person the wider his knowledge (Soekartawi 2005). This is in accordance with the opinion of Margono in Setiadin (2005) stating that education affects one's understanding in learning something both in the form of skills and knowledge. The implication is that farmers do not dare to adopt a technology due to not knowing the benefits of technology. Thusfarmers' education variables are a significant determinant of technology adoption decisions.

The Education Level regression coefficient (X2) of 0.111 means that any increase in the value of education will cause an increase in the value of technology adoption of 0.111 percent assuming *ceteris paribus*. These results indicate that farmers who are highly educated are relatively faster in conducting counseling advice. On the other hand, farmers with low education are generally reluctant to receive / increase knowledge. Mauludin (2009) states that the level of formal education owned by farmers shows the level of knowledge and insights of farmers in implementing technology introduction (Table 4).

The results showed that the highest percentage of farmer education in the integration system in Minahasa District finished elementary school at 45.83 percent, followed by junior high-school graduating farmers at 37.50 percent, and graduated from Diploma-Higher Education at 16.66 percent (Table 5). This shows that the level of education is still low, so they still consider that livestock business does not need adequate education.

 The implications of the low level of formal education of farmers needed assistance in accelerating the adoption of technological innovations. Nurlaelasari (2007) states that education is one of the most influential factors in livestock business. An adequate level of education will have an impact on the ability of the management of the livestock business involved. In other words, the higher the level of one's formal education, the faster the level of adjustment to technological developments can accelerate one's thinking.

Table 5. Farmer Education in the Integration System in Minahasa District

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| No | Indicator | Score | Number (people) | Percentage (%) | Weight |
| 123 | Diploma - UniversityJunior High SchoolSenior High School | 321 |  8 1 8  | 16.6637.5045.83 | 243622  |
| Total |   | 100 | 82 |

Source: Primary (processed) data, 2019

**3.** **Business Experience**

 There is a striking difference in performance in terms of the farming experience of respondents' livestock, which is between 2 and 40 years. The livestock farming experience shows how long someone has struggled in the business. The more experience in trying livestock farming, the higher the level of linkages, diversity, cohesiveness and openness of farmers in communication networks with other farmers. The high bond is one indicator that determines the acceleration of technology adoption. The business experience (X3) in this study is defined as the length of time the farmer runs the farming system in the integration of corn and cattle.

Business experience influences decision making in the face of choosing whether or not to adopt a technology. The longer a person's experience of farming, the easier it is to understand a technological innovation and tend to be easier to implement it (Roswida 2003). Fitriana (2014) stated that integrated farming technology innovation which is the result of technological modification was intended to help farmers in their farming activities. The results of the study indicate that the business experience of farmers in the integration system in Minahasa Regency is 2 - 40 years. This can be seen in Table 6

Table 6. Experience of Farmers on Adoption of Farmer Technology in Integration Systems in Minahasa District

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| No | Indicators | Score | Amount (people) | Percentage (%) | Weight |
| 123 | 28 - 40 years15-27 years 2-14 years  | 321 |  917 | 18.7535.1445.83 | 183422  |
|  | Total |  | 4 | 100 | 74 |

Source: Primary Data After processing, 2018

Table 5 shows that the largest percentage of farmers' business experience in the integration system is 2 - 14 years, followed by 15-27 years, and 28-40 years. Experience regression coefficient (X3) of -0.156 means that any increase in experience value will cause a decrease in adoption value of 0.156 percent assuming *ceteris paribus.* This condition indicates that the longer the business experience of farmers, the more difficult it is to accept and implement a new technology. This is not in accordance with the opinion of Rogers (2003) which states that the longer a person's experience of farming, the easier it is to understand a technological innovation and tend to more easily implement it. Business experience can show deep knowledge about the business managed so far, so that they will think to simplify the work they have been doing or think about increasing the productivity of their business with the resources they have. In this case the respondent's farmer is in a condition that feels safe with the business pattern that has been cultivated so far and tends to be apathetic towards a technology. This is due to more experience so that it can make comparisons in decision making. The results of this study are in line with Prabowo (2012), but it is not in line with Rahardi (2003) that farmers who have been cultivating for a long time will find it easier to implement innovations than beginner farmers.

**CONCLUSION**

1. The introduction of compost fertilizer manufacturing technology received a positive

 response from farmers and became a new source of income for farmer households.

1. Analysis of the content of macro nutrients (NPK) on compost shows a value that is almost

the same as the recommended content value.

1. The factors that influence the technology adoption of the system of integrating corn and cattle are significantly influenced by age, education, and business experience. Of the three variables, the age and education regression coefficients are positive, meaning that the adoption of waste utilization technology in the maize integration system and cattle in Minahasa Regency is directly proportional to the age and education variables. While the business experience variable is inversely proportional, indicating the respondent is in a condition that feels safe with the business pattern that has been cultivated so far and tends to be apathetic towards a technology.

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