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Accelerating Downstream Agribusiness: An Analysis of Factors Driving Millennial Farmers' Interest in Innovative Yogurt Entrepreneurship

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A B S T R A C T

This study aims to analyze the driving factors of millennial farmers' entrepreneurial interest in the innovative processing of cow's milk into Ambon banana yoghurt in Boyolali Regency. The local dairy farming sector faces challenges in optimising the added value of derivative products due to millennial farmers' limited knowledge. Using a descriptive quantitative approach, the study was conducted in Boyolali Regency, Central Java Province, Indonesia, from April to June 2025, with 33 respondents selected through purposive sampling. Data were collected through interviews, observations, and questionnaires, then analyzed using descriptive analysis and multiple linear regression (SPSS). The descriptive analysis showed that millennial farmers' interest was relatively high (83.83%). The regression analysis identified that simultaneously, age, education level, and experience had a very significant effect on entrepreneurial interest ($R2=0.713$; $p<0.01$). Partially, education level and experience were the main determinants, while age was not a significant factor. The effectiveness of extension services was considered very effective (81.13%). The study concludes that cognitive factors (education and experience) play a crucial role in fostering interest in innovation-based entrepreneurship among millennial farmers. The study's results recommend a structured extension program to accelerate the downstreaming of agribusiness products.

Contribution to Sustainable Development Goals (SDGs):
SDG 2: Zero Hunger
SDG 4: Quality Education
SDG 8: Decent Work and Economic Growth
SDG 9: Industry, Innovation, and Infrastructure

1. INTRODUCTION

1.1. Research Background

Dairy cattle are a strategic livestock commodity in Indonesia, producing milk with complex nutritional content. In Samiran Village, Selo District, Boyolali Regency, Central Java Province, Indonesia, there are around 100 dairy cattle with a production of up to 72,000 litres per year. However, this potential has not been fully realised because the value chain remains limited to the sale of fresh milk. Product diversification through fermentation technology is crucial because processed dairy products have longer shelf lives and much higher economic value than raw milk [1]. One highly promising product is yogurt, which is currently experiencing rapid demand in line with the trend of public awareness of gut microbiota health [2].

Product innovation can be achieved by integrating local potential, such as Ambon bananas. According to the latest data, Selo District is a banana production centre, with annual yields of thousands of quintals [3]. Adding fruits such as bananas to yoghurt has been scientifically proven to increase antioxidant activity and improve texture and flavour, making it more appealing to modern consumers [4]. The combination of milk protein and fiber from Ambon bananas creates a functional food product that is highly competitive in the market [4].

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Despite the vast market opportunities, the low interest and limited skills of millennial farmers in post-harvest processing remain major challenges. 104 millennial farmers are expected to become the driving force of agribusiness in the research location. Recent studies have shown that entrepreneurial interest among the younger generation in agriculture is strongly influenced by access to processing technology and the perceived economic benefits of product innovation [5]. Therefore, this study aims to examine millennial farmers' interest in entrepreneurship in innovative Ambon banana yoghurt in Samiran Village, Boyolali. The research focuses on analysing internal factors such as age, education, and experience, as well as the effectiveness of extension services in encouraging behavioural change among raw material producers and processed product entrepreneurs [6].

Interest is defined as an internal drive that includes attention, interest, and willingness to engage in a particular activity. In this context, the involvement of millennial farmers (aged 19–39 years) is key to the sustainability of the agricultural sector through the adoption of digital innovation and mechanization [7]. Yoghurt is produced through a symbiotic relationship between Streptococcus thermophilus and Lactobacillus bulgaricus, which convert lactose into lactic acid, creating a thick texture and a distinctive sour taste [8]. Through a structured extension process, it is hoped that farmers will be able to increase their capacity to process the potential of milk and Ambon bananas into high-value products, thereby improving their welfare [9].

1.2. Literature Review

1.2.1. *Yogurt: Economic Added Value and Functional Benefits*

The dairy farming sector faces the challenge of volatile fresh milk prices. Recent literature emphasises the importance of product diversification through post-harvest processing to ensure economic stability and increase small-scale farmers' incomes [1]. Processing milk into value-added products such as yogurt extends the product's shelf life and positions it in a more profitable market segment [10]. Consumer demand for yogurt is increasing, driven by health awareness regarding the benefits of gut microbiota and digestion [2].

1.2.2. *Ambon Banana Innovation as Functional Yogurt Fortification*

The development of innovative functional food products is a rapidly growing area of research. Utilizing local resources, such as Ambon bananas, as fortification ingredients offers unique opportunities. Scientific studies confirm that the addition of tropical fruits not only improves the sensory characteristics of the final product, such as taste and texture, but also increases antioxidant activity and the natural prebiotic fibre content [11]. The integration of Ambon banana with yoghurt creates nutritional synergy between milk protein and fruit fibre, resulting in a food product with high market competitiveness [4]. Various government policies to support increased productivity and quality of food commodities continue to be implemented. This is to maintain domestic food availability or realize national food security. One of the government's policies is to provide fertilizer subsidies to farmers to reduce production costs.

1.2.3. *Factors Determining Millennial Farmers' Entrepreneurial Interest*

The involvement of the millennial generation (aged 19-39) inthe agribusiness sector is crucial for farmer regeneration and food sustainability [12]. Recent studies have identified several key factors influencing their interest in entrepreneurship, including access to digital technology [5].

1.2.4. *Indicators of Millennial Farmers' Interest*

Entrepreneurial interest is measured through several key indicators, including feelings of enjoyment, attention, interest, and willingness [7]. These feelings of enjoyment and interest are often influenced by a good knowledge of the material (its definition, benefits, and future prospects), which allows individuals to be more diligent in learning it [13].

1.2.5. *Education, Experience, and Age*

A sufficient level of education is significantly positively correlated with farmers' ability to adapt to innovations and manage their businesses effectively. Practical experience in milk processing is also a driving factor for business success. The longer the experience, the better the farmer's ability to make informed decisions and manage their business. However, several studies have found that the age factor of millennial farmers does not always significantly influence entrepreneurial interest, often due to the relatively homogeneous age range of respondents or a preference for seeking employment outside the agricultural sector despite being of productive age [14].

1.2.6. *1.2.6 Environmental and Policy Support*

In addition to internal factors, entrepreneurial interest is influenced by the social environment and supporting policies. Access to information and communication technology, the role of agricultural extension agents, and the availability of training programs are important elements that must be strengthened through government policy [7].

1.2.7. *The Effective Role of Agricultural Extension*

Extension is a crucial instrument for facilitating learning and behavioral change among farmers [9]. Farmers' socioeconomic characteristics, such as education level and market orientation, must be considered when selecting the most targeted extension methods [6]. Methods that combine various media, such as presentations, print materials, group discussions, and demonstrations, have proven highly effective in improving millennial farmers' knowledge, attitudes, and skills in adopting innovations for processing milk into yoghurt.

1.2 Research Objective

The purpose of this study is to analyse the driving factors and the effectiveness of extension in accelerating entrepreneurial interest among millennial farmers in the downstreaming of Ambon banana yoghurt agribusiness innovation.

2. MATERIALS AND METHODS

This study focuses on the analysis of millennial farmers' interest in entrepreneurship in processing cow's milk into yoghurt, with the innovation of adding Ambon bananas, in Samiran Village, Selo District, Boyolali Regency, Central Java Province. The study period was April 2025 to June 2025. The population of millennial farmers (aged 19–39 years) was 104 people. The Independent Variables were age, education level, and experience in processing cow's milk. The Dependent Variable was millennial farmers' interest in entrepreneurship in processing cow's milk into yoghurt. The research method used a quantitative, descriptive approach. The research design for millennial farmers' interest used a one-shot case study. The effectiveness of extension & behaviour change was evaluated using a One-Group Pretest-Posttest design. The sampling technique was Purposive sampling (sampling based on certain criteria). The number of samples that met the criteria was 33 respondents. Data sources were primary data and secondary data. Data collection techniques used Interviews, Observations, Questionnaires. Data Analysis Method: Descriptive Analysis was used to describe the level of interest of millennial farmers in general. Multiple linear regression is used to test the hypothesis of the simultaneous influence of independent variables on dependent variables (F test) and the partial influence of independent variables on dependent variables (t test) in SPSS.

3. RESULT AND DISCUSSION

3.1. Millennial Farmer Interest

Millennial farmers' interest in entrepreneurship involving the processing of cow's milk into yoghurt, with the innovative addition of Ambon bananas, was measured using indicators of happiness, attention, interest, and willingness. Interest was assessed through interviews with 33 respondents using a valid and reliable 12 item questionnaire. A summary of respondents' answers regarding millennial farmers' interest in entrepreneurship involving the processing of cow's milk into yogurt using the innovative addition of Ambon bananas is shown in Table 1 below.

Table 1. Summary of Respondents' Answers

Criteria	Indicator		
	Feeling Like	Attention	Interest
Very High (5)	200	170	160
Height (4)	208	212	216
Medium (3)	18	36	33
Low (2)	2	0	4
Very Low (1)	0	0	0
Total	428	418	413

Source: Processed Data 2025

Based on the table, respondents' answers to the happiness indicator, with the criterion of very high, were: very high 200, high 208, moderate 18, low 2, and very low 0, for a total score of 428. For the attention indicator, the criteria were: very high (170), high (212), moderate (36), low (0), and very low (0), with a total score of 418. For the interest indicator, the criteria were: very high (160), high (216), moderate (33), low (4), and very low (0), with a total score of 413. For the willingness indicator, the criteria were: very high (120), high (232), moderate (45), low (4), and very low (0), with a total score of 401.

The total number of indicators was determined based on the recapitulated data from the questionnaire responses. The total number of values obtained from all indicators is 1660 with details on the very high criteria obtaining a total value of 650, high criteria obtaining a total value of 868, medium criteria obtaining a total value of 132, low criteria obtaining a total value of 10 and very low criteria obtaining a total value of 0. Based on the tabulation results of 12 questions consisting of 4 indicators, namely feelings of pleasure, attention, interest and willingness, which contributed the most answers to the high criteria, namely the willingness indicator. Data tabulation is presented in Appendix 13. The level of interest among millennial farmers, as indicated by feelings of pleasure, attention, interest, and willingness, in Samiran Village, Selo District, is shown in Figure 1.

Fig 1. Continuum Line of Millennial Farmer Levels

Figure 1 shows that the interest score of 1660 falls within the 1346.5-1663.2 range, categorized as high. This indicates that millennial farmers' interest in entrepreneurship involving processing cow's milk into yogurt with the innovation of adding Ambon bananas is high. A high-interest criterion indicates that millennial farmers have gained knowledge, skills, and experience in processing cow's milk into yoghurt. This knowledge, skills, and experience can then be developed into a business, thereby increasing farmers' income.

The processed cow's milk will then be marketed, and marketing is relatively easy with the use of technology. Because Samiran Village is a tourist village, sales targets can be targeted to visitors. Which states that millennials have a strong understanding of the material, including its definition, application, benefits, and future prospects. Strong knowledge influences interest; the more knowledge, the greater the interest [13].

3.2. Factors Influencing Millennial Farmer Interest

Factors suspected of influencing millennial farmer interest include age, education level, and experience in processing cow's milk. To identify these influencing factors, a hypothesis test was conducted using SPSS (Statistical Product and Service Solutions). This hypothesis test involved multiple linear regression analysis, which included classical assumption testing and hypothesis testing.

3.2.1. Classical Assumption Test

a. Normality Test

The normality test used the Shapiro Wilk test because the number of respondents was less than 50, if the p-value > 0.05, the data is normally distributed [16]. There were 33 respondents in this study, with the results of the Shapiro-Wilk normality test shown in Table 2.

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Table 2. Normality Test

Test of Normality	Shapiro Wilk		
	Statistic	df	Sig.
Age	0,897	17	0,060
Education Level	0,893	17	0,053
Experience in Processing Cow's Milk	0,915	17	0,122

Source: Processed Data 2025

Judging from Table 2, the age variable has a significance value of 0.060, the education level variable has a significance value of 0.053, and the experience variable in processing cow's milk has a significance value of 0.122. Therefore, all three variables are normally distributed because the p-values are > 0.05.

b. Multicollinearity Test

The multicollinearity test used was the VIF (Variance Inflation Factor) test; the absence of multicollinearity is indicated by a VIF value <10 [16]. The VIF test is examined from the coefficients table in the multicollinearity test results. The results of the multicollinearity test, based on the VIF values, are shown in Table 3.

Table 3. Multicollinearity Test

Model	Collinearity Statistics	
	Tolerance	VIF
Age	0.671	1.490
Education Level	0.878	1.139
Experience in Processing Cow's Milk	0.751	1.331

Source: Processed Data 2025

Table 3 shows that the age variable has a VIF of 1.490, the education level variable has a VIF of 1.139, and the experience in processing cow's milk variable has a VIF of 1.331. Based on the VIF values for these three variables, there is no multicollinearity.

c. Heteroscedasticity Test

The heteroscedasticity test is evident in the resulting scatterplot, which shows a regular wave-like pattern or consistent variation in width, indicating heteroscedasticity [16]. Conversely, if the data is homoscedastic or does not exhibit heteroscedasticity, the data points are randomly distributed around the Y-axis. The scatterplot diagram is shown below.

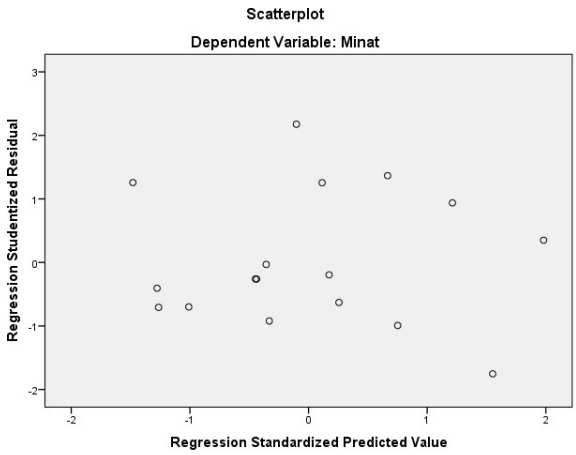

Fig 2. Heteroscedasticity Test (Scatterplot)

Figure 2 shows that the scatterplot heteroscedasticity test indicates the points are spread above and below the Y-axis.

3.2.2. Hypothesis Testing

To test the hypothesis, a multiple linear regression analysis was conducted using SPSS 22. Multiple linear regression is a statistical tool used to analyse and predict the value of a dependent variable based on several independent variables. In this study, the independent variables were age, education level, and experience processing cow's milk. In contrast, the dependent variable was millennial farmers' interest in entrepreneurship, as reflected in their processing cow's milk into yoghurt by adding Ambon bananas. The results of the multiple linear regression analysis are shown in Table 4.

Table 4. Results of Multiple Linear Regression Analysis

Componen	Coefisien	Sig.
Coefficient of Determination	0.713	
F-Test (Simultaneous)	14.225	0.000
Constant	32.591	0.042
Age	7.005	0.103
Education Level	-2.037	0.002
Experience in Processing Cow's Milk	1.643	0.032

Source: Processed Data 2025

a. Coefficient of Determination

The coefficient of determination, or Adjusted R-squared, measures the proportion of variation in the dependent variable that the independent variables in the regression model can predict. The coefficient of determination ranges from 0 to 1, or 0% to 100% when expressed as a percentage. A larger value indicates that the model better explains the variation in the dependent variable. However, it should be noted that unexplained variation may be due to other variables not included in the analysis [17].

The results of the coefficient of determination test, shown in Table 4, indicate a value of 0.713 (71.3%). This means that the variables age, education level, and experience in processing cow's milk can explain 71.3% of the variation in the dependent variable, namely millennial farmers' interest in entrepreneurship in processing cow's milk into yoghurt with the innovation of adding Ambon bananas. In contrast, variables outside the model such as income, extension intensity, environment, motivation, facilities, and infrastructure, explain 28.7%.

b. F Test (Simultaneous)

The F test is used to determine the simultaneous effect of independent variables on the dependent variable. The results of the F test are shown in the ANOVA table, with a confidence interval of 0.05. If the significance value is less than the confidence interval, the alternative hypothesis is accepted, stating that the independent variables simultaneously influence the dependent variable [18]. The F test results, shown in Table 4, show a significance value of 0.000 ($p < 0.01$), indicating that age, education level, and experience in processing cow's milk simultaneously have a very significant effect on millennial farmers' interest in entrepreneurship by processing cow's milk into yogurt with the innovation of adding Ambon bananas.

c. t Test (Partial)

The t test is used to determine the partial effect of independent variables on the dependent variable. The following is the magnitude of the effect of the independent variables on the dependent variable.

1) Age (X1)
The results of the multiple linear regression in Table 4 indicate that age has no significant effect on millennial farmers' interest in entrepreneurship in processing cow's milk into yoghurt with the innovation of adding Ambon bananas, as the significance value was 0.103. The lack of a significant effect could be due to the relatively small age difference between respondents [19]. That age does not significantly influence interest in agricultural entrepreneurship due to the relatively small age difference between respondents and their productive age [20]. This encourages respondents to prefer working outside the agricultural sector. This finding aligns with the age range of respondents in this study, which ranged from 19 to 39 years and is considered productive.

2) Education Level (X2)
The results of the multiple linear regression in Table 4 show that the variable of education level has a very significant effect on millennial farmers' interest in entrepreneurship in processing cow's milk into yoghurt by adding Ambon bananas, with a significance value of 0.002. Adequate education prepares someone to become an entrepreneur. A person's educational background, particularly related to the business world, is believed to influence the desire and interest to start a new business in the future [21]. Adequate education will enable farmers to adapt to developments in the agricultural and livestock sector [15]. Optimising farmer institutions can be achieved by strengthening the ability to plan and organise members, carry out activities, control and report, and develop farmer group leadership [22]. The average education level of respondents in this study was high school/equivalent, with 22 respondents (66.7%). A higher level of education certainly facilitates the acceptance of external innovations.

3) Experience in Processing Cow's Milk (X3)
The results of the multiple linear regression in Table 4 show that experience in processing cow's milk has a significant effect on millennial farmers' interest in entrepreneurship in processing cow's milk into yoghurt by adding Ambon bananas, with a significance value of 0.032. The majority of milk processing experience is passed down from parents. This experience influences problem-solving skills in business operations. The longer the experience, the better the farmer's ability to manage their business [23]. Farmers rely on their experience in managing their business. Farmers with more experience are better able to predict environmental conditions and make informed decisions. Experience is one of the factors driving business success; without interest, the business management process will not run optimally, which will impact farmer income [14].

Meanwhile, the sustainability of agriculture by millennial farmers is supported by awareness of the need to balance social, economic, and environmental factors in the Business as Usual (BAU) Scenario and business strategy [24]. Among the respondents in this study, the percentage with experience in processing cow's milk remains relatively low, with the largest group, 25, reporting 0-2 years of experience. Most respondents were still beginners (having previously processed or just started processing cow's milk) and still needed to learn, so many respondents were interested in the innovation offered.

3.3. Extension Effectiveness (EP) and Behavior Change Effectiveness (EPP)

Extension Effectiveness (EP) and Behaviour Change Effectiveness (EPP) aim to determine the extent to which extension and behaviour change are effective, ranging from very effective to very ineffective. There are 15 questions covering knowledge, attitudes, and skills, with the following criteria.
Pretest score = 495
Posttest score = 2008
Maximum score = Number of questions x Highest score x Number of respondents = 12 x 5 x 33 = 2475

The following is the calculation of the percentage of extension effectiveness (EE) and behavior change effectiveness (BCE):

EE = (posttest score)/(maximum categorized score) x 100%
= 2008/2475 x 100% = 81.13%
BCE = (posttest-pretest)/(maximum score-pretest) x 100%
= (2008-495)/(2475-495) x 100% = 63.01%

Based on the results of the extension effectiveness (EP) and behaviour change effectiveness (BCE) calculations, the extension effectiveness (EE) percentage of 81.13% falls within the highly effective range. The behaviour change effectiveness (BCE) percentage of 63.01% falls within the effective range according to [24].

The extension effectiveness (EE) and behavior change effectiveness (BCE) are considered highly effective because the material covered in the extension activities addresses existing problems, namely suboptimal cow's milk processing and relatively low milk prices. Furthermore, the media and extension methods used can be influenced. The extension media used include PowerPoint presentations, printed folders, and actual media (tools and materials for making yoghurt from cow's milk). The methods used include lectures, discussions, and demonstrations, which can improve respondents' knowledge and skills.

Agricultural extension media influences the effectiveness of agricultural extension because the media used are real [23]. Discussion and demonstration methods with a group approach have enlivened the extension atmosphere, and the interesting and informative PowerPoint and folder media make it easier for female farmers to absorb the information provided, thus resulting in good extension effectiveness [26].

4. CONCLUSION

Regression analysis indicated that age, education level, and experience simultaneously had a very significant effect on entrepreneurial interest ($R2=0.713$; $p<0.01$). Partially, education level and experience were the main determinants, while age was not significant. The level of interest among millennial farmers in innovative yoghurt processing entrepreneurship was high (83.83%), indicating significant potential to accelerate the downstreaming of livestock agribusiness. Main Driving Factors

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of Interest. Simultaneously, age, education level, and experience in processing cow's milk had a very significant effect on entrepreneurial interest. The variables of education level and experience were the most significant driving factors, while age had no partial effect. The effectiveness of Extension Services was Very Supportive in increasing the interest and changing the behavior of millennial farmers in the very effective category (81.13%). The effectiveness of extension services was considered very effective (81.13%). The use of demonstration methods and real media was key to this program's success.

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