Asian Journal of Agriculture and Rural Development
Volume 13, Issue 1 (2023): 16-24.

http://www.aessweb.com/journals/5005

The influence of farmers' business behavior in achieving success with integrated paddy and beef cattle agricultural systems in Indonesia

Dewi Ning Rahayu[a]
Sutrisno Hadi Purnomo[b†]
Joko Sutrisno[c]

[a]*Department Magister of Animal Science, Faculty of Agriculture, Sebelas Maret University, Jl. Ir. Sutami 36A Kentingan Jebres Surakarta 57126, Indonesia.*
[b]*Department of Animal Science, Faculty of Agriculture, Sebelas Maret University, Jl. Ir. Sutami 36A Kentingan Jebres Surakarta 57126, Indonesia.*
[c]*Department of Agribusiness, Faculty of Agriculture, Sebelas Maret University, Jl. Ir. Sutami 36A Kentingan Jebres Surakarta 57126, Indonesia.*

† ✉ sutrisno.purnomo@gmail.com *(Corresponding author)*

Article History
Received: 10 October 2022
Revised: 30 November 2022
Accepted: 9 January 2023
Published: 27 January 2023

Keywords
Agricultural systems
Beef cattle
Business behavior
Farmer
Integrated farming
Paddy.

ABSTRACT
An integrated agricultural system between paddy and beef cattle can provide more benefits for farmers while maintaining environmental sustainability. This research aims to determine the influence of farmers' business behavior on achieving success with an integrated farming system between rice and beef cattle in Indonesia. This research was conducted through the purposive sampling of 183 respondents who were rice farmers and beef cattle breeders in Karanganyar Regency. A sample of farmers was selected that had implemented an integrated farming system between paddy and cattle for at least one year. The variables used in this study included individual factors, environmental factors, business behavior, and business performance. The data were analyzed through Structural Equation Modeling (SEM) using AMOS (Analysis of Moment Structure) software. The results showed that farmers' business behavior could influence farmers' business performance in achieving success with an integrated farming system between paddy and beef cattle. This study showed that individual factors, environmental factors, and business behavior can increase a farmer's business performance.

Contribution/Originality: This study examined the influence of individual factors, environmental factors, and business behavior on farmers' business performance. The results of the research can be used by local governments to increase farmers' income by encouraging them to implement an integrated farming system between paddy and beef cattle.

DOI: 10.55493/5005.v13i1.4711
ISSN(P): 2304-1455/ ISSN(E): 2224-4433
How to cite: Rahayu, D. N., Purnomo, S. H., & Sutrisno, J. (2023). The influence of farmers' business behavior in achieving success with integrated paddy and beef cattle agricultural systems in Indonesia. *Asian Journal of Agriculture and Rural Development*, *13*(1), 16–24. 10.55493/5005.v13i1.4711

1. INTRODUCTION
The agricultural sector mainly consists of crops and livestock in an integrated and complementary system. This type of system integrates plants and livestock so that each can benefit from using the waste of the other, for example, a system integrating paddy and beef cattle (Purnomo et al., 2019). Beef cattle are a source of income for rural communities. However, cattle breeding is still done traditionally and as a side business on a small scale of 2 or 3 cows, despite the fact that there is an increasing demand for beef in Indonesia. The need for beef in Indonesia reached 700,000 tons in 2020; however, domestic production is only able to supply 400,000 tons, and the shortfall is met by importing

beef (Susila, Setiaji, Wahyudi, & Setyawan, 2020). To increase domestic beef production, one possibility is an integrated agricultural system of beef cattle and paddies, where farmers use rice plant waste as cattle feed and cow dung as fertilizer for rice plants. This can reduce production costs and increase farmers' income (Purnomo, Sari, Emawati, & Rahayu, 2021). Based on research conducted by Lu, Bai, Ren, and Campbell (2010), an integrated agricultural system can also reduce environmental damage. This is supported by the finding of Chen (2006) that manure can be used as an organic fertilizer to increase soil and plant fertility. Adult cattle produce 12–15 kg of solid manure and 3–5 liters of urine per day (Elly et al., 2020). Subardja, Anas, and Widyastuti (2016) also noted that organic fertilizers are the right choice to increase rice productivity. According to research conducted by Xian et al. (2020), an integrated agricultural system of plants and livestock provides greater benefits than non-integrated systems, increasing cattle output by 41% and rice output by 30%. However, an integrated agricultural system of livestock and rice, in general, has not been able to improve farmers' welfare (Mukhlis, Noer, Nofialdi, & Mahdi, 2018). This is influenced by several factors, namely the farmer's education level, behavior, and culture, as well as the farmer's level of innovation. Therefore, activities that are intended to encourage farmers to implement an integrated agricultural business of livestock and rice in a sustainable manner must include improvements to technology and innovation. Increasing farmers' technological capacity can be achieved in various ways, such as through education, economy, and social diversity. The quality of human resources can be improved by introducing entrepreneurial traits to farmers in livestock farming (Aeni, Wahyuni, Onasis, Awaluddin, & Siraj, 2020). This is because farming activities also include processing, packaging, distribution, and marketing activities at competitive prices (Buah et al., 2011). Farmers need to have a level of creativity, an ability to see opportunities, and the courage to try new things. This is in accordance with the results of research by Ashilina, Baga, and Jahroh (2019), who found that farmers who lack an entrepreneurial spirit will experience difficulties in managing and developing their businesses and be unable to seize existing business opportunities. All farmers should have an entrepreneurial spirit, and their farming activities should be infused with qualities such as persistence, the ability to manage existing resources, and innovative thought.

Based on this brief overview, it seems that business behavior influences the performance of farmers' businesses and also has an impact on the success of the integrated farming system of rice and beef cattle; therefore, more in-depth research is needed. This study aims to determine the influence of farmers' business behavior on the successful achievement of an integrated farming system of paddy and beef cattle in Indonesia. In doing so, this study offers several novelties. First, research on integrated agricultural business behavior has not been widely carried out, so this research can provide new knowledge and perspectives in the world of agriculture and livestock. Secondly, this study provides a different point of view in terms of data analysis as it employs multivariate analysis through structural equation modeling (SEM) by using more than two constructs or variables. Data analysis using SEM can minimize measurement errors caused by many indicators in a single latent variable (Ghozali, 2017).

2. MATERIALS AND METHODS

This survey research utilized a structured questionnaire as a tool for data collection. The respondents were selected using a purposive sampling technique determined by the criterion that the farmers had both cattle and paddy cultivation. The study was conducted in September–October 2020 in Karanganyar Regency, Central Java. The study used primary and secondary data. The primary data was obtained through in-depth interviews with respondents based on a questionnaire. The secondary data was obtained through a literature study of appropriate literature, books, journals, and statistical centers. The setting was purposively determined based on certain considerations of previously known types and characteristics in accordance with the research objectives (Hennink, Hutter, & Bailey, 2020).

2.1. Sample and Data Collection

The research setting was Karanganyar Regency, Central Java, with the consideration that the area has the potential for the development of an integrated paddy and beef cattle system. This is supported by 2017 data on the population of beef cattle in Karanganyar Regency, which was as many as 63,716 cows, and the harvested area of paddy, which was 52,991.7 ha (Purnomo, Sari, Emawati, & Rahayu, 2020). From 2014 to 2016, Karanganyar Regency was also one of the areas included in the Smart House Farmer movement phase 1 for the pilot phase of rice commodities, which was a program of the Governor of Central Java. Karanganyar Regency is also included in the "JALAGARA" (Cross Southeast Java) program, which is an integration area for cattle and food crops. Therefore, it was a suitable area to investigate the effect of farmers' business behavior on the success of an integrated farming system.

The method of respondent selection in this study was purposive sampling. Purposive sampling is the selection of respondents based on criteria that have been previously determined by the researcher. The sample of farmers was selected based on the fact that these farmers had been implementing an integrated paddy and cattle farming system for at least one year. The total number of farmers and ranchers involved in this study was 183 respondents. The variables used in this study included latent and manifest variables. The latent variables comprised individual factors, environmental factors, business behavior, and business performance. The manifest variable (an indicator of the latent variable) consisted of 21 questions. These questions were answered using a 5-point Likert scale, which included (1) very poor (2) poor (3) neutral (4) good (5) very good. The data was then analyzed through SEM using AMOS software. AMOS is a widely used covariance-based SEM analysis program. This program or method of analysis of moment structures is a statistical computing software application that stands alone and operates independently.

2.2. Data Analysis

This study used validity and reliability tests to test the questionnaire instrument based on the loading factor value, Cronbach's alpha, and average variance extracted (AVE). In this study, the validity and reliability tests were assessed

through confirmatory factor analysis (CFA), provided that the loading factor value was at least 0.7 and the AVE value at least 0.5. This study used the following goodness of fit parameters: chi-square, root mean square error approximation (RMSEA), goodness of fit index (GFI), adjusted goodness of fit index (AGFI), and comparative fit index (CFI).

2.3. Measurement Development

This study developed research variables based on previous research, including individual factors, environmental factors, entrepreneurial behavior, and business performance. Therefore, this study developed measurements of these factors to determine latent and manifest variables.

2.3.1. Individual Factors of Integrated Paddy and Beef Cattle Farmers

Individual or internal factors are traits that are owned by a person and are reflected through patterns of thought, attitude, and action toward the environment (Adnan, Nordin, Bahruddin, & Tareq, 2019). Syamsu, Ali, Ridwan, and Asja (2013) added that individual factors may include age, education level, business experience, and innovative attitude. The indicators of the individual factors are presented in Table 1.

Table 1. Variables of individual factors.

Manifest variables	Description
Point of view ($X_{1,1}$)	Views on integrated farming
Business experience ($X_{1,2}$)	Length of experience in running a business
Education background ($X_{1,3}$)	Formal education level of the respondent
Age ($X_{1,4}$)	Age bracket of the respondent
Gender ($X_{1,5}$)	Gender of the respondent

2.3.2. Environmental Factors of Integrated Paddy and Beef Cattle Farmers

Besides being affected by individual factors, business behavior is also affected by environmental factors. Environmental factors are behaviors that arise from outside the individual, such as family, environment, and culture. According to Tawaf, Paturochman, Herlina, Sulistiyati, and Fitriani (2016), environmental factors may include several elements, such as the availability of production materials, government support, solidarity between farmers, easy access to information, promotion and marketing, price stability, and ease of obtaining capital assistance. The environmental factor indicators are presented in Table 2.

Table 2. Variables of environmental factors.

Manifest variables	Description
Availability of inputs for production materials ($X_{2,1}$)	Availability of production materials such as fertilizers, seeds, and livestock
Government role ($X_{2,2}$)	The role of the government in supporting integrated agriculture and animal husbandry
Government policy ($X_{2,3}$)	Government policies determining agricultural and livestock policies
Business capital assistance from the government ($X_{2,4}$)	Assistance in the form of business capital provided by the government
Promotion support ($X_{2,5}$)	The role of the government in supporting business promotion activities
Easy access to information ($X_{2,6}$)	The level of convenience farmers experience in obtaining information related to market prices

2.3.3. Entrepreneurial Behavior

According to research conducted by Welter and Smallbone (2011), business behavior comprises several elements, including the courage to take risks, self-confidence, initiative, and leadership. Abdullah, Ali, and Syamsu (2013) revealed that developing their business behavior can increase farmers' positive attitude towards the results to be achieved. This means that farmers who have an innovative attitude are able to take advantage of existing opportunities and dare to take risks. The indicators of business behavior factors are presented in Table 3.

Table 3. Variables of business behavior factors.

Manifest variables	Description
Business persistence ($X_{3,1}$)	The persistence of farmers and ranchers in running a business
Ability to recognize opportunities ($X_{3,2}$)	The ability of farmers and ranchers to seize existing business opportunities
Innovativeness ($X_{3,3}$)	The ability of farmers and ranchers to create new business ideas
Courage in the face of risk ($X_{3,4}$)	The courage of farmers and ranchers in facing the risks that occur in their business
Independence ($X_{3,5}$)	The independence of farmers and ranchers in running an integrated plant and livestock business

2.3.4. Business Performance

Business performance is the quantity and quality of the business's achievements or the results of the service performed (Morgan, 2012). Indicators of business performance include marketing, profit, quality of workers, and capital. The business performance indicators are presented in Table 4.

Table 4. Variables of business performance factors.

Manifest variables	Description
Market share expansion	Ability to expand business product marketing
Income increase	Ability to increase income from the business
Product quality	Ability to produce products with superior quality
Customer trust	Ability to obtain customer trust
Product quality improvement	Tendency to improve product quality

Table 5. Characteristics of respondents (n = 183).

Variables	Categories	Frequency	Percentage (%)
Gender	Male	162	88.52
	Female	21	11.47
Age	20-30 Years	9	4.91
	30-40 Years	29	15.84
	40-50 Years	59	32.24
	> 50 Years	86	46.99
Education	No school	10	5.46
	Elementary school	80	43.71
	Junior high school	49	26.77
	Senior high school	36	19.67
	Graduate school	8	4.37
Age of farming business	< 1 Year	13	7.10
	1-5 Years	38	20.76
	> 5 Years	132	72.13
Number of family members	2-4 People	115	62.84
	5-7 People	62	33.87
	> 7 People	6	3.27
Number of farm animals	1-2	107	58.46
	2-5	69	37.70
	> 5	7	3.82
Income from cattle	1-2 Million/Year	41	22.40
	2-4 Million/ Year	75	40.98
	> 4 Million/ Year	67	36.61
Income from rice farming	1-2 Million/ Year	42	22.95
	2-4 Million/ Year	50	27.32
	> 4 Million/ Year	91	49.72
Other income	No income	37	20.21
	1-2 Million/ Year	52	28.41
	2-4 Million/ Year	22	12.02
	> 4 Million/ Year	72	39.34

3. RESULTS AND DISCUSSION

Detailed characteristics of the respondent farmers can be seen in Table 5. It shows that the respondents were predominantly male farmers, as much as 88.52%. Most respondents were in the age range >50 years (46.99%), followed by the 40-50 age range (32.24%); the lowest proportion of respondents was 20 to 30 years old. The education level was mostly at the primary school level, with as many as 43.71% of respondents. The number of years of experience with rice and cattle farming was mainly >5 years, with as much as 72.13% of the sample. The respondent farmers' number of family members was mostly in the 2-4 range, with as much as 62.84% of respondents. The number of livestock kept was mainly 1 to 2 heads (58.46%).

Measurement model analysis was performed by correlating the four variables: individual factors, environmental factors, business behavior, and business performance. The results of the measurement model analysis consist of the chi-square value/degree of freedom, probability, RMSEA, goodness of fit index (GFI), adjusted goodness of fit (AGFI), parsimonious goodness of fit (PGFI), comparative fit index (CFI), incremental fit index (IFI), and Tucker Lewis index (TLI).

The analysis results show that of the nine parameters, seven parameters meet the good fit criteria, including chi-square/degree of freedom, probability, RMSEA, GFI, CFI, IFI, and TLI. The goodness of fit parameters included in the marginal fit criteria are AGFI and PGFI. Marginal value or marginal fit is a condition for the suitability of the measurement model under the criteria for absolute fit and incremental fit; however, these parameters can still be

accepted and used in the further analysis because their values are close to meeting the good fit criterion (Seguro, 2008). The values of the goodness of fit parameters for the measurement model measurements can be seen in detail in Table 6.

This research analyzed the nine goodness of fit parameters of chi-square (X2)/degree of freedom, probability, RMSEA, GFI, AGFI, PGFI, CFI, IFI, and TLI. The results of the structural model analysis showed that there were seven parameters that displayed a good degree of fit, these were chi-square (X2)/degree of freedom = 1.266, probability = 0.012, RMSEA = 0.038, GFI = 0.911, CFI = 0.971, IFI = 0.972 and TLI. = 0.962. The AGFI and PGFI values met the marginal fit criteria with values of 0.872 and 0.639, respectively. These results are in accordance with Hair, Hult, Ringle, and Sarstedt (2021) statement that a value of CMIN/DF ≤ 2 indicates acceptance of the model. The minimum sample of discrepancy function (CMIN) divided by the degree of freedom (DF) produces the CMIN/DF index, one of the indicators to measure a model's level of suitability.

Furthermore, the RMSEA value in the model is also supported by the statement of Hair et al. (2021). They stated that an RMSEA value that is less than or equal to 0.08 is an index for the acceptability of the model. The results of the structural model analysis can be seen in detail in Table 7.

Table 6. Goodness of fit parameters measurement model.

Goodness of fit parameters	Standard parameters	Estimate parameters (Result)	Testing results
Chi-square (X2) / Degree of freedom	≤ 2	1.249	Good fit
Probability	> 0.05	0.017	Good fit
RMSEA	≤ 0.08	0.037	Good fit
GFI	0-1, the closer to 1 the better, GFI ≥ 0.9 is a good fit, 0.08 ≤ GFI < 0.9 is a marginal fit	0.912	Good fit
AGFI	Between 0-1, the closer to 1 the model is fit	0.874	Marginal fit
PGFI	Between 0-1, the closer to 1 the model is fit	0.639	Marginal fit
CFI	Between 0-1, the closer to 1 the better	0.973	Good fit
IFI	Between 0-1, the closer to 1 the better	0.974	Good fit
TLI	The closer to 1 the better	0.965	Good fit

Table 7. Goodness of fit parameters structural model.

Goodness of fit parameters	Standard parameters	Estimate parameters (Result)	Testing results
Chi-square (X2) / Degree of freedom	≤ 2	1.266	Good fit
Probability	> 0.05	0.012	Good fit
RMSEA	≤ 0.08	0.038	Good fit
GFI	0-1, the closer to 1 the better, GFI ≥ 0.9 is a good fit, 0.08 ≤ GFI < 0.9 is a marginal fit	0.911	Good fit
AGFI	Between 0-1, the closer to 1 the model is fit	0.872	Marginal fit
PGFI	Between 0-1, the closer to 1 the model is fit	0.639	Marginal fit
CFI	Between 0-1, the closer to 1 the better	0.971	Good fit
IFI	Between 0-1, the closer to 1 the better	0.972	Good fit
TLI	The closer to 1 the better	0.962	Good fit

Table 8 shows that (1) individual factors (IF) have a positive effect on business behavior (BB); (2) environmental factors (EF) have a positive effect on business behavior (BB); (3) business behavior (BB) has a positive effect on business performance (BP); (4) individual factors (IF) have a positive effect on business performance (BP); (5) environmental factors (EF) have a positive effect on business performance (BP).

Table 8. Evaluation of the structural model and its relationship.

Hypothesis	Coefficient	Results
HI IF → BB	0.423	Significant
H2 EF → BB	0.137	Significant
H3 BB → BP	0.331	Significant
H4 IF → BP	0.600	Significant
H5 EF → BP	0.417	Significant

Note: IF= Individual factors (IF); BB = Business behavior (BB); EF = Environmental factors (EF); BP = Business performance (BP).

The causal relationship model of the factors that directly or indirectly influence business behavior and business performance can be seen in Figure 1. Figure 1 explains that the manifest variable can explain the construct well because the value is > 0.50, except for the education manifest variable, which displays a value equal to 0.11.

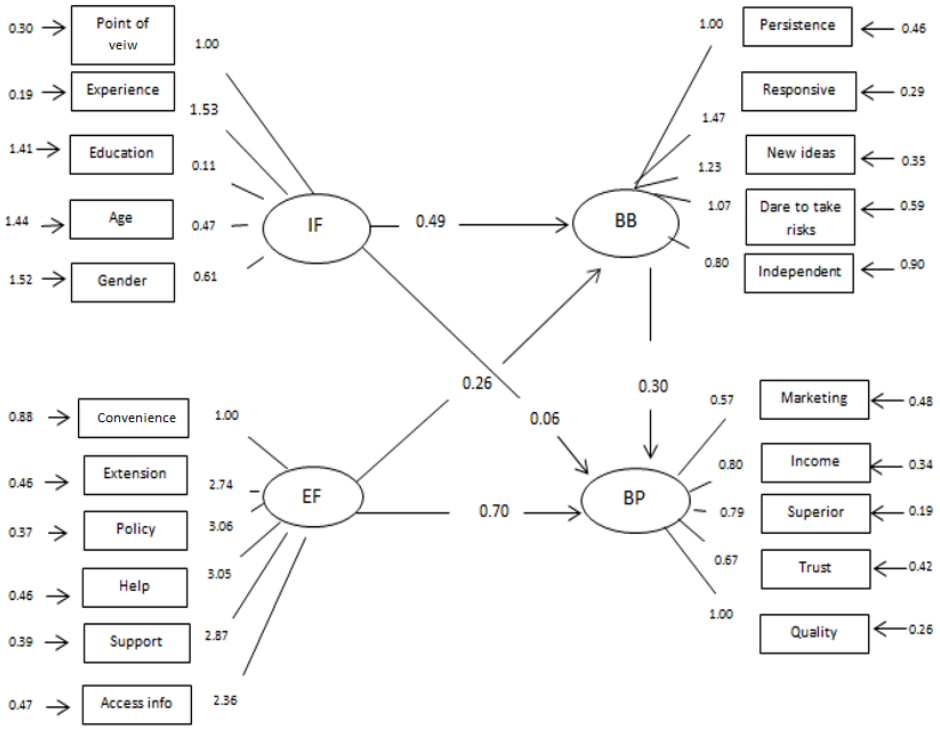

Figure 1. Standardized loading factors of the influence of business behavior on business performance.

The education variable, which is one of the individual factors, cannot represent business behavior because the results of SEM analysis show invalid results. The level of education of the respondent farmers did not improve their success in running an integrated farming system. This is because farmers still have limited knowledge about technology and a lack of insight into the integrated agricultural system of rice and cattle. This shows that, so far, the farmers have prioritized their business experience when running their business, which is apparent in the results of the analysis; the value is 1.53, compared to the low contribution of the education level. This finding is supported by Ajiwibawani and Subroto (2017), who argued that business experience, independence, and achievement motives have a positive effect on business behavior.

The results of the analysis also show that among the individual factors, the variable age of the respondent farmers had a slight effect but still affected business behavior. This is because many farmers who run integrated farming systems are over 50 years old but still have a good business spirit. This finding is contrary to Robbins and Judge (2010) statement that as workers get older, their work productivity will decrease due to the limitations of physical factors and decreased health.

The research results obtained support the hypothesis that individual factors have a positive effect on business behavior ($\beta = 0.49$, $p < 0.05$); however, individual factors have no effect on business performance ($\beta = 0.06$, $p > 0.05$). Environmental factors also have no effect on business behavior ($\beta = 0.26$, $p > 0.05$). However, environmental factors do significantly influence business performance ($\beta = 0.70$, $p < 0.05$). Business behavior has a positive effect on business performance ($\beta = 0.30$, $p < 0.05$). The coefficient of determination of this study is 22.4% for the business behavior variable, meaning that only 22.4% of the variance is explained by this model. So, hypothesis H1 is accepted, and hypothesis H3 is rejected. The coefficient of determination for the business performance variable is 45.8%, which means that there is a fairly good correlation between the constructs that make up the business performance variable; therefore, hypotheses H4 and H5 are accepted, while H2 is rejected.

3.1. Factors Affecting Farmer Business Behavior

Individual factors and environmental factors have direct and significant effects on farmers' business behavior (Table 9). Individual factors have a positive and significant effect on business behavior with an effect coefficient of ($\gamma = 0.49$). Individual factors are measured in terms of the indicators outlook, education level, business experience, age, and gender. This finding accords with the opinion of Melović, Šehović, Karadžić, Dabić, and Ćirović (2021) that business behavior is affected by individual factors, which include abilities and expertise, background, and demographics. In other words, increasing individual factor indicators can improve a farmer's business behavior. The most dominant indicator among the individual factors is business experience, with an effect value of ($\gamma = 1.53$). Our longest farming experience category was over 5 years. Since these farmers have extensive business experience, they already have good management practices for running an integrated business of beef cattle and rice plants and they are able to minimize the risks that

may occur. This is in accordance with the findings of Darby, Fugate, and Murray (2022), who noted that the length of business experience has a positive and significant effect on income.

Table 9. Composition of factors affecting farmer business behavior and business performance.

	DE	IE	TE
	Business behavior	**Business performance**	
Individual factors	0.49	0.06	0.55
Environmental factors	0.26	0.70	0.96

Note: TE (Total effect), DE (Direct effect), IE (Indirect effect), Significant at α: 0.05.

The education variable is an individual factor that does not affect business behavior because it shows invalid results. The level of education of farmers who run integrated farming systems does not lead to improved business behavior due to farmers' limited knowledge about adopting and applying technology and carrying out various innovations. This shows that, so far, farmers tend to rely on experience rather than formal education when running a business. This is in accordance with the findings of Yaseen, Somogyi, and Bryceson (2018), who stated that entrepreneurial knowledge, achievement motives, and independence have positive effects on business behavior. Thus, an increase in knowledge, independence, and motivation to excel will improve farmers' entrepreneurial behavior when running integrated agricultural and livestock businesses.

The latent variable of environmental factors has a direct effect of 0.70, while business behavior has a direct and positive effect on business performance but a smaller effect value compared to environmental factors of 0.30. This explains that ease of obtaining production materials, extension activities, good government policies, capital assistance, government support, and access to information have the effect of improving farmers' business performance when implementing an integrated agricultural system of rice plants and cattle in Karanganyar Regency. This finding is in accordance with Abimbola and Agboola (2011) statement that environmental factors in the form of infrastructure, culture, economy, society, and politics can hinder or facilitate the performance of a business. Chesbrough (2011) added that a business will grow if the environmental factors are adequate, such as supportive government policies, easy access to information, and sustainable government assistance.

3.2. Influence of Business Behavior on Business Performance

Based on Figure 1, business performance is directly affected by environmental factors and business behavior, while individual factors have an indirect effect. The latent variable of environmental factors has a direct effect of 0.70, while entrepreneurial behavior has a direct effect on business performance, but the value of the effect is smaller than that of environmental factors at 0.30. This explains that environmental factors, such as the ease of production of input materials, government support and policies, capital assistance, and access to information, are the factors with the greatest effect on business performance. In addition, business behavior, including persistence, responsiveness to opportunities, independence, innovation ability, and courage in taking risks, also has a considerable effect on business performance. This is in accordance with the results of previous research (Klatt, Schläfke, & Möller, 2011), which found that entrepreneurial behavior has a direct and positive effect on business performance, as measured by expanding market share, competitiveness, and increased income.

The entrepreneurial behavior variable with the strongest effect is responsiveness to existing opportunities (λ = 1.47), as can be seen in Figure 1. Farmers have a high ability to capture existing business opportunities. This means that farmers who are quickly able to adopt innovative opportunities for integrated rice and beef cattle farming systems increase their business efficiency as well as their income while reducing production costs. In addition, the application of an integrated farming system can reduce agricultural and livestock waste, which will protect the environment from damage and create zero-waste agriculture and animal husbandry.

Another indicator with a high value among the entrepreneurial behavior factors is the ability to create new ideas, which has a value of λ = 1.23. This shows that farmers with an integrated farming system in Karanganyar Regency implement innovations, for instance, by utilizing beef cattle urine as a pesticide to eradicate pests on rice plants. In addition, farmers also process cow feces for use as compost, as a substitute for chemical fertilizers, which will reduce rice production costs. This is in accordance with research conducted by Haryanto and Yuniarti (2017), which found that farmers in Bogor are able to run integrated plant and livestock businesses by carrying out various technological, product, and process innovations.

The lowest indicator of an entrepreneurial behavior variable is that of independent attitude (λ = 0.80). This shows that farmers are not yet able to independently manage the sale of their livestock. Breeders still tend to sell their livestock to intermediary traders (*blantik*) and have not dared to try to carry out the sales process independently, for example by selling directly to the market or to butchers, which would minimize the marketing chain and provide larger profit margins to beef cattle breeders.

Individual factors have an indirect influence on business performance. Thus, individual factors of farmers affect business performance via entrepreneurial behavior when running an integrated rice and beef cattle farming system business. This is in accordance with the opinion of Jasra, Khan, Hunjra, and Rehman (2011) that the determinants of business success comprise individual and environmental factors.

The business performance of farmers in an integrated crop and livestock farming system is illustrated by several indicators, including marketing, income, product quality excellence, customer trust, and ability to improve quality. In terms of business development, farmers with an integrated livestock system are not yet able to implement a more efficient marketing system to create a greater income. Farmers tend to use *blantik* services to sell their livestock, which

extends the livestock marketing chain. This is because farmers lack the courage to carry out livestock marketing activities. Breeders tend to entrust the market price of their livestock to intermediary traders. In terms of selecting livestock breeds to rear, the breeders also leave the search for livestock young to *intermediary trader* services. This is also motivated by a lack of courage and confidence to select the young animals independently; therefore, they rely on the important role of intermediary traders in the process of buying and selling livestock.

In general, farmers exhibit a high level of entrepreneurial behavior, but the business performance of farmers is still low. This shows that entrepreneurial behavior is only one of the factors that affect farmers' business performance. There are other factors that affect the results of business performance. This is supported by Stefanovic, Prokic, and Rankovic (2010), who stated that there are five factors that determine success in running a business: individual factors, motivation, abilities, business strategies, and environmental factors. Therefore, the sound entrepreneurial behavior of farmers is not enough to improve their business performance. It must be supported by the economic, political, and organizational environment. The business performance of farmers with an integrated rice and beef cattle system will increase with increased perseverance, responsiveness to opportunities, courage in facing risks, and independence, fully supported by regulations and assistance from the government through related agencies. It is also important that it be accompanied by an increase in farmers' ability and willingness to adopt creative and innovative ideas to improve product quality. This is in accordance with the opinion of German, Bonanno, Foster, and Cotula (2020) that the challenge of agribusiness development is the ability to fulfill the needs of the farmers and society in general.

4. CONCLUSION

The business behavior of respondent farmers is directly and positively affected by individual factors, including farmers' views on integrated farming systems, their length of business experience, age, level of education, and gender. Business behavior in the form of persistence, responsiveness to opportunities, new ideas, courage to take risks, and independence also has a direct and positive effect on farmers' business performance in achieving success with an integrated rice and cattle farming system. Business performance is not only influenced by business behavior but also by environmental factors.

This study implies that the formation of new businesses in agriculture not only creates income for the owners and job opportunities for the community but also paves the way for workers to earn a living, which will ultimately help business development. Local governments should assist in increasing farmers' financial capacity to carry out their operations where land is set aside for agriculture so that its value increases as it is put to good use.

Funding: This research is supported by the LPPM Universitas Sebelas Maret, Ministry of Research Technology and Higher Education of the Republic of Indonesia, through the scheme Research Hibah Penelitian Grup Riset PNBP, 2020. (Grant number: 452/UN27.21/PN/2020).
Competing Interests: The authors declare that they have no competing interests.
Authors' Contributions: All authors contributed equally to the conception and design of the study.

REFERENCES

Abdullah, A., Ali, H. M., & Syamsu, J. A. (2013). Strategy formulation of empowering farmers capability at integrated farming of beef cattle and paddy base on zero waste: Analytical hierarchy process approach. *Asian Journal of Agriculture and Rural Development, 3*(393-2016-23941), 746-752.

Abimbola, O. H., & Agboola, G. M. (2011). Environmental factors and entrepreneurship development in Nigeria. *Journal of Sustainable Development in Africa, 13*(4), 166-176.

Adnan, N., Nordin, S. M., Bahruddin, M. A., & Tareq, A. H. (2019). A state-of-the-art review on facilitating sustainable agriculture through green fertilizer technology adoption: Assessing farmers behavior. *Trends in Food Science & Technology, 86*, 439-452. https://doi.org/10.1016/j.tifs.2019.02.040

Aeni, S., Wahyuni, S., Onasis, A., Awaluddin, M., & Siraj, M. L. (2020). Human resource development for farmers and extension officers in supporting farming business management in bone regency. *To Administer the Journal, 7*(2), 355-362.

Ajiwibawani, M. P., & Subroto, W. T. (2017). The effect of achievement motivation, adversity quotient, and entrepreneurship experience on students entrepreneurship attitude. *International Journal of Academic Research in Business and Social Sciences, 7*(9), 441-450. https://doi.org/10.6007/ijarbss/v7-i9/3339

Ashilina, H., Baga, L. M., & Jahroh, S. (2019). The influence of farmers' entrepreneurial behavior on the business performance of dairy farmers in West Bandung Regency, Indonesia. *International Society for Southeast Asian Agricultural Sciences, 25*(2), 143-154.

Buah, S., Nutsugah, S., Kanton, R., Atokple, I., Dogbe, W., Karikari, A. S., & Ajayi, O. (2011). Enhancing farmers' access to technology for increased rice productivity in Ghana. *African Journal of Agricultural Research, 6*(19), 4455-4466.

Chen, J. H. (2006). *The combined use of chemical and organic fertilizers and/or biofertilizer for crop growth and soil fertility.* Paper presented at the International Workshop on Sustained Management of the Soil-Rhizosphere System for Efficient crop Production and Fertilizer use Land Development Department Bangkok Thailand.

Chesbrough, H. (2011). *Open services innovation: Rethinking your business to grow and compete in a new era.* New Jersey: John Wiley & Sons.

Darby, J. L., Fugate, B. S., & Murray, J. B. (2022). The role of small and medium enterprise and family business distinctions in decision-making: Insights from the farm echelon. *Decision Sciences, 53*(3), 578-597. https://doi.org/10.1111/deci.12538

Elly, F. H., Lomboan, A., Kaunang, C. L., Rundengan, M., Poli, Z., & Syarifuddin, S. (2020). Development potential of integrated farming system (local cattle-food crops). *Animal Production*, *21*(3), 143-147. https://doi.org/10.20884/1.jap.2019.21.3.739

German, L. A., Bonanno, A. M., Foster, L. C., & Cotula, L. (2020). "Inclusive business" in agriculture: Evidence from the evolution of agricultural value chains. *World Development*, *134*, 105018. https://doi.org/10.1016/j.worlddev.2020.105018

Ghozali, I. (2017). *Structural equation model concepts and applications with the AMOS 24 update Bayesian SEM program*. Semarang: Diponegoro University Publishing Agency.

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2021). *Partial least squares structural equation modeling (PLS-SEM) using R: A workbook*. London: Sage Publications.

Haryanto, Y., & Yuniarti, W. (2017). The role of farmer to farmer extension for rice farmer independence in Bogor. *International Journal of Research in Social Sciences*, 7(4), 62-74.

Hennink, M., Hutter, I., & Bailey, A. (2020). *Qualitative research methods*. London: Sage.

Jasra, J. M., Khan, M. A., Hunjra, A. I., & Rehman, R. A. U. (2011). Determinants of business success of small and medium enterprises. *International Journal of Business and Social Science*, *2*(20), 274-280.

Klatt, T., Schläfke, M., & Möller, K. (2011). Integrating business analytics into strategic planning for better performance. *Journal of Business Strategy*, *32*(6), 30-39. https://doi.org/10.1108/02756661111180113

Lu, H., Bai, Y., Ren, H., & Campbell, D. E. (2010). Integrated emergy, energy and economic evaluation of rice and vegetable production systems in alluvial paddy fields: Implications for agricultural policy in China. *Journal of Environmental Management*, *91*(12), 2727-2735. https://doi.org/10.1016/j.jenvman.2010.07.025

Melović, B., Šehović, D., Karadžić, V., Dabić, M., & Ćirović, D. (2021). Determinants of Millennials' behavior in online shopping–Implications on consumers' satisfaction and e-business development. *Technology in Society*, *65*, 101561. https://doi.org/10.1016/j.techsoc.2021.101561

Morgan, N. A. (2012). Marketing and business performance. *Journal of the Academy of Marketing Science*, *40*(1), 102-119.

Mukhlis, M., Noer, M., Nofialdi, N., & Mahdi, M. (2018). The integrated farming system of crop and livestock: a review of rice and cattle integration farming. *International Journal of Sciences: Basic and Applied Research*, *42*(3), 68-82.

Purnomo, S., Emawati, S., Sari, A., Rahayu, E., Handayanta, E., & Hanifa, A. (2019). Investigation of barriers to integrated paddy and Beef cattle farming in organic agricultural system. *Russian Journal of Agricultural and Socio-Economic Sciences*, *85*(1), 507-512. https://doi.org/10.18551/rjoas.2019-01.62

Purnomo, S. H., Sari, A. I., Emawati, S., & Rahayu, E. T. (2020). *Determining strategy of beef cattle development in Karanganyar Regency, Central Java, Indonesia*. Paper presented at the In IOP Conference Series: Earth and Environmental Science (Vol. 518, No. 1, p. 012054). IOP Publishing.

Purnomo, S. H., Sari, A. I., Emawati, S., & Rahayu, E. T. (2021). *Factors influencing the adoption of integrated crop livestock to support land conservation of organic agriculture in Mojosongo Area, Karanganyar, Indonesia*. Paper presented at the IOP Conference Series: Earth and Environmental Science.

Robbins, S. P., & Judge, T. A. (2010). *Essentials of organizational behavior* (Global ed.). Boston, MA: Prentice Hall.

Seguro, W. (2008). The influence of perceived service quality, fastening factors and quality of relational relationships on customer satisfaction and loyalty: A study on cellular telephone service providers in West Java. *Journal of Telecommunications and Computers*, *13*(3), 181-198.

Stefanovic, I., Prokic, S., & Rankovic, L. (2010). Motivational and success factors of entrepreneurs: The evidence from a developing country. *Proceedings of the Faculty of Economics in Rijeka: Journal of Economic Theory and Practice*, *28*(2), 251–269.

Subardja, V., Anas, I., & Widyastuti, R. (2016). Utilization of organic fertilizer to increase paddy growth and productivity using system of rice intensification (SRI) method in saline soil. *Journal of Degraded and Mining Lands Management*, *3*(2), 543-549.

Susila, I., Setiaji, B., Wahyudi, H. D., & Setyawan, A. A. (2020). Supply chain strategy in stabilization of products price: Case study beef price in Indonesia. *International Journal of Supply Chain Management*, *9*(4), 1055-1062.

Syamsu, J. A., Ali, H. M., Ridwan, M., & Asja, M. A. (2013). Analysis of sustainability status of integration of beef cattle and paddy with technology innovation of rice straw as feed and beef cattle manure as fertilizer and biogas. *Environment and Natural Resources Journal*, *11*(2), 1–16.

Tawaf, R., Paturochman, M., Herlina, R., Sulistiyati, M., & Fitriani, A. (2016). The optimation of farmers familities revenue the integration of pasundan cattle and paddy farming in West Java. *Journal of the Indonesian Tropical Animal Agriculture*, *42*(4), 270-278. https://doi.org/10.14710/jitaa.42.4.270-278

Welter, F., & Smallbone, D. (2011). Institutional perspectives on entrepreneurial behavior in challenging environments. *Journal of Small Business Management*, *49*(1), 107-125. https://doi.org/10.1111/j.1540-627x.2010.00317.x

Xian, Y., Chen, Y., Chen, C., He, R., Chen, X., Chen, Y., & Wang, X. (2020). Does extending recycling chain of using rice straw contribute to improving yield and reducing GHGs emissions in paddy field? An integrated analysis based on field research and system assessment. *Journal of Cleaner Production*, *264*, 121508. https://doi.org/10.1016/j.jclepro.2020.121508

Yaseen, A., Somogyi, S., & Bryceson, K. (2018). Entrepreneurial behaviour formation among farmers: Evidence from the Pakistani dairy industry. *Journal of Agribusiness in Developing and Emerging Economies*, *8*(1), 124-143. https://doi.org/10.1108/jadee-01-2017-0002