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THE INFLUENCE OF FARMER ENTREPRENEURIAL BEHAVIOR ON SHALLOT FARMING PERFORMANCE

Aulia Adetya[1*]; Dwi Rachmina[2]; Lukman Mohammad Baga[2]

[1)] Master of Science Agribusiness, Faculty of Economics and Management, IPB University, Bogor, Indonesia

[2)] Department of Agribusiness, Faculty of Economics and Management, IPB University, Bogor, Indonesia

* Corresponding author: adetyaadetya@apps.ipb.ac.id

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ABSTRACT

Shallot farming has the main characteristic of being season-dependent. The phenomenon of shallot production scarcity in central areas generally occurs during the off-season, when production is 30% lower compared to the in-season. Human resource development is a key factor in facing this challenge. Globalization demands creative and innovative farmers to thrive and compete. The role of entrepreneurial behavior in the agricultural sector is essential to create more innovative, independent, and risk-taking farmers in managing their farms. This research aimed to (1) examine how individual characteristics and the business environment influence the entrepreneurial behavior of shallot farmers and (2) assess the influence of this entrepreneurial behavior on the performance of shallot farming. This study employed SEM-PLS (Structural Equation Modeling) using the Partial Least Squares (PLS) approach for data analysis, with a total sample of 130 respondents. The results showed that individual characteristics and the business environment positively and significantly influence entrepreneurial behavior, which in turn positively affects shallot farming performance. The improvement of farmers' entrepreneurial behavior is influenced by internal factors (individual characteristics) and external factors (business environment), yet the ability to grow and take risks remains a weak indicator. Building capacity through training and gaining access to low-interest financing (KUR) can help farmers overcome challenges. Additionally, low farming commitment due to unstable farmer incomes can be addressed through price stabilization programs, such as partnerships to ensure market access with consistent selling prices. Future research is recommended to explore strategies for enhancing farm performance through factors beyond entrepreneurial behavior.

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INTRODUCTION

The agricultural sector holds a strategic role in Indonesia's economy, as reflected in its various contributions, including providing food supplies, industrial raw materials, GDP contributions, foreign exchange earnings, employment opportunities, and serving as the primary income source for rural households. The sector is expected to continue contributing to high-quality economic growth through the development of strategic commodities with significant monetary value. One such potential commodity in the agricultural industry is shallots.

The average growth rate of Indonesia's shallot production from 2017 to 2021 was 8.17%, in line with the average productivity growth rate of 2.66%. However, Indonesia's average productivity growth rate remains significantly lower compared to the average productivity growth rate in ASEAN (Table 1).

Table 1. Indonesia, ASEAN, and World Shallot Productivity 2017-2021

Year	World (tons/hectare)	ASEAN (tons/hectare)	Indonesia (tons/hectare)
2017	20.53	14.96	9.29
2018	20.42	16.46	9.59
2019	20.34	13.31	9.93
2020	21.37	17.77	9.71
2021	22.15	17.84	10.30
Average	20.96	16.06	9.76

Source: Ministry of Agriculture (2023)

East Java is one of the primary shallot-producing provinces in Indonesia, with 38.72% of its shallot production coming from Nganjuk Regency, the highest shallot-producing area in East Java. The significant production figures in Nganjuk Regency present a substantial potential for further development. However, the average productivity growth rate of shallots in Nganjuk Regency is lower than the national rate, as shown in Table 2.

Table 2. Harvested Area, Production, and Productivity of Shallots in Nganjuk Regency (2017-2021)

Year	Harvested Area (Ha)	Production (Tons)	Productivity (Tons/Ha)
2017	11.900	127.004	10.67
2018	13.541	152.408	11.25
2019	13.861	162.449	11.71
2020	14.505	177.232	12.21
2021	16.780	193.652	11.54
Average Growth Rate (%)	9.12	11.24	2.08

Source: Badan Pusat Statistik (2023)

The decrease in shallot productivity in Nganjuk Regency in 2021 is belived to be caused by the inefficient utilization of farming production factors. Decreases in productivity and production can result from various issues, such as climate change, seed quality, fertilizer availability, and technical inefficiencies, including education, age, farmer group participation, farming experience, land ownership, and the use of traditional technologies (Hasan & Fauziyah, 2020). According to Kurniati et al.,

(2014), farming challenges faced by shallot farmers may also be linked to climate/weather impacts, pest and disease infestations, limited land management capabilities, farmer capital, suboptimal farm management, and low technology adoption levels.

Shallot farming has the main characteristic of being season-dependent. Shallot cultivation during the rainy season is considered off-season, while cultivation in the dry season regarded as in-season. The scarcity of shallot production in the central area generally occurs in off-season conditions, where production is 30 per cent lower than in-season conditions and has poor quality characteristics such, as small bulbs, pale colour, and an aroma that is not pungent. In order to deal with these conditions, entrepreneurial behaviour in the agricultural sector is very important to create more innovation, independence, and willingness to take risks in managing farms.

One of the key factors in improving shallot farming productivity is human resources (HR). As stated by Joenarni et al. (2022), enhancing the quality and quantity of HR is crucial since it is the farmers who plan, implement, bear the risks of production, and decide on adopting or delaying new technologies in farming. Successful farming practiceis not only determined by a group of technical cultivation skills, but also with another factors such as farmer's entrepreneurship abilities that contain attitudes, knowledge and skills formed by entrepreneurial characteristics emerged in the implementation of agriculture activities ranging from preparing plant to selling (puspitasari et al., 2019). The use of entrepreneurial behavior in shallot farmers is expected to improve farm performance, since good entrepreneurial behaviour can help direct farming potential in a more favourable trend. Despite numerous studies examining entrepreneurial behaviour and its influence on business performance (Buddhi et al., 2023; Nurdiani, 2016; Suranto & Nurlaela, 2021; Wanyonyi & Bwisa, 2015), research specifically focusing on the influence of entrepreneurial behaviour among shallot farmers remains limited. Most previous studies have concentrated on general aspects of farming or other commodities. However, shallots, as a high-value commodity with significant economic importance, require more in-depth research approaches that address individual characteristics, the business environment, and the entrepreneurial behaviour of shallot farmers. If farmers have entrepreneurial behaviour, they can plan, mobilise, and supervise the farms they run, which are supported by creativity, innovation, and risk-taking. One of the efforts that must be made to improve farm productivity is to increase internal resources, and among the most important internal resources is entrepreneurial behaviour. Based on the above problems, the objectives of this study are (1) to analyse the influence of individual characteristics and business environment on the entrepreneurial behaviour of shallot farmers and (2) to analyse the influence of the entrepreneurial behaviour of farmers on the performance of shallot farming.

RESEARCH METHOD

This study was carried in Nganjuk Regency, East Java, as it is the the province's largest center of shallot-producing. In 2022, the regency produced 183.757 tons, contributing 38,72% to the total shallot production in East Java. Specifically, the sampling for this research was conducted in four sub-districts: Nganjuk, Bagor, Wilangan, and Rejoso. The rationale behind this selection is that Nganjuk and Bagor

are central areas with the lowest productivity, while Wilangan and Rejoso are central areas with the highest productivity. This study was carried out from August to September 2024.

This research uses the Multistage Sampling because it is more efficient for large and diverse populations, allowing a focus on smaller segments to obtain detailed information. However, the use of Multistage Sampling can introduce selection bias from initial non-representative choices, and errors that may accumulate across all stages. The following are the stages in the sampling process: (1) selecting Nganjuk Regency as the regency representing East Java Province as the largest producer of shallots, (2) selecting two sub-districts with the lowest productivity, namely Nganjuk and Bagor Sub-districts, and selecting two sub-districts with the highest productivity, namely Wilangan and Rejoso Sub-districts, (3) selecting villages in each sub-district, the selected villages being Balong Pacul Village (Nganjuk Sub-district), Banaran Kulon Village (Bagor Sub-district), Sukoharjo Village (Wilangan Sub-district), Puhkerep Village (Rejoso Sub-district), and (4) selecting samples using random sampling techniques from each village. The study population consisted of shallot farmers form four sub-districts (Nganjuk, Bagor, Wilangan and Rejoso Sub-districts) with the total 4,173 farmers. From this population, 130 farmers ware sampled, comprising individuals currently engaged in or who had previously been involved in shallot farming in the research location.

This research employs both descriptive analysis and Structural Equation Modelling (SEM-PLS) using the Partial Least Squares (PLS) approach. A research variable is a measurable concept with assigned values. In this study, both latent variables and manifest variables (indicators of latent variables) are utilized. One of the main advantages of PLS-SEM is that it can generate a specific score for each composite of each observation after indicator weights/loadings are assigned. These determinant scores serve as proxies for the theoretical concepts being measured (Rigdon et al., 2010). The steps of PLS-SEM analysis according to Hair Jr et al. (2021), are as follows: (1) Development of the Theoretical Model, by designing a theoretical model that shows the relationships between latent variables, (2) Development of the outer and inner model, (3) Evaluation of the measurement model, evaluating the validity and reliability of the measurement model. Convergent validity is measured through Average Variance Extracted (AVE), where AVE values must be greater than 0.5. Discriminant validity is calculated by comparing AVE with squared correlations between constructs and using the Fornell-Larcker Criterion. Reliability is measured through Composite Reliability (CR), where CR values must be greater than 0.7. (4) Evaluation of the structural model with R-squared (R^2) values used to assess the extent to which independent variables explain the variability of the dependent variable. Q-squared (Q^2) values are used to measure the predictive relevance of the model. (5) Estimation and Bootstrapping are performed to determine the strength and direction of relationships between variables. The identification of latent variables (exogenous and endogenous) and manifest variables is presented in Table 2.

Here is a summary of the SEM-PLS model. At this point, the researcher creates equations and relationships between variables using a path diagram. The equation model in this study includes two latent variables: exogenous latent and endogenous latent. The exogenous latent variables include individual characteristics and business environment, while the endogenous latent variables encompass entrepreneurial

behaviour and farm performance. There are 21 manifest indicators. The relationship between variables, structural model and measurement model is depicted in the form of a path diagram in Figure 1.

Table 1. Latent and Manifest Variables (Indicators) of Structural Equation Models

Latent Variable	Manifest Variable (Indicator)	Source
Exogenous Latan:		
Individual Characteristics	1. Formal education 2. Age 3. Farming experience 4. Land area 5. Motivation to farming 6. Perception of farming	Zainura et al., (2016); Khairiyakh et al., (2019); Puspitasari et al., (2019); Sinulingga et al., (2022); Waqingah (2023)
Business Environment	1. Input availability 2. Extension support 3. Capital assistance 4. Market access 5. Farmer group	Khairiyakh et al., (2019); Puspitasari et al., (2019); Priyono & Burhanuddin (2020)
Endogenous Latent:		
Entrepreneurial Behavior	1. Innovative 2. Risk taking 3. Independent attitude 4. Management capabilities 5. Ability to develop	Zainura et al., (2016); Khairiyakh et al., (2019); Puspitasari et al., (2019); Priyono & Burhanuddin (2020); Radegundo et al., (2022)
Farm Performance	1. Productivity 2. Revenue 3. Market area level 4. Competitive advantage 5. Commitment to farming	Khairiyakh et al., (2019); Puspitasari et al., (2019); Radegundo Tulasi et al., (2022)

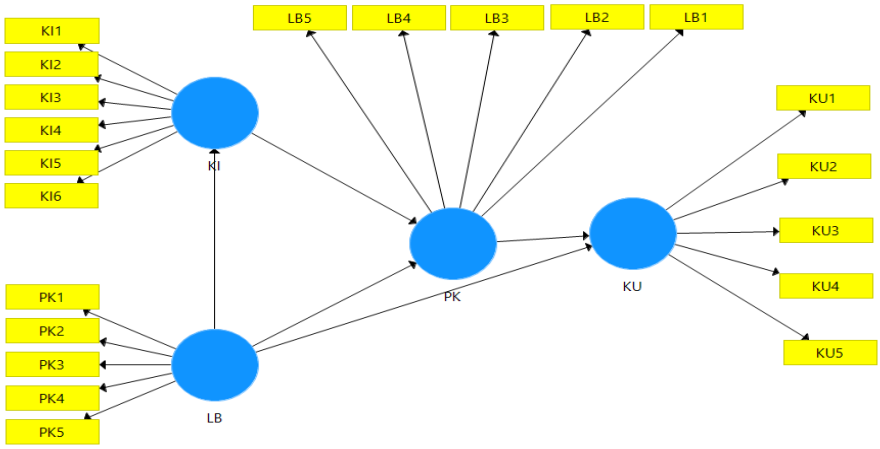

Figure 1.
Path Diagram of Farmer Entrepreneurial Behavior Towards Red Onion Farming Business Performance

Figure legend:

KI: Individual characteristics
KI 1: Formal education
KI 2: Age
KI 3: Farming experience
KI 4: Land area
KI 5: Motivation for farming
KI 6: Perception of the farmer
LB: Business environment
LB 1: Availability of inputs
LB 2: Extension support
LB 3: Capital assistance
LB 4: Market access
LB 5: Farmer group
PK: Entrepreneurial behavior
PK 1: Innovative attitude
PK 2: Risk-taking
PK 3: Independent attitude
PK 4: Management capability
PK 5: Ability to develop
KU: Farm performance
KU 1: Productivity
KU 2: Revenue
KU 3: Market expansion rate
KU 4: Competitive advantage
KU 5: Commitment to farming

RESULT AND DISCUSSION

Respondent Characteristics

Understanding farmer characteristics can be a basis for designing shallot development strategies, particularly in the research locations. This is due to the influence of farmer characteristics on various aspects of farming, cultivation practices, the application of innovation and technology, and the willingness to take risks. Respondent farmer characteristics included age, formal education, number of dependents, land ownership status, land area, farming experience, and side jobs. The study sample consisted of 130 shallot farmers in Nganjuk Regency.

Farmers age is one of factor that can influence their farming performance. In Nganjuk Regency, the age of shallot farmers is between 26 and 77 years. Most shallot farmers are in the age group of 48-58 years, as many as 32 per cent or 42 farmers. The results show that shallot farmers in Nganjuk Regency are mostly of productive age, so farmers can be said to be farmers who are still able to carry out economic activities.

The largest percentage of formal education attained by the respondent farmers was at the elementary school or equivalent level at 46.15%, followed by junior high school or equivalent at 37.69%, senior high school or equivalent at 15.38%, and diploma/bachelor's degree at 0.76%. These characteristics show that the formal education level of respondent farmers in general is still low, but most farmers can read and write.

The farmers experience of farmer in the study area varies, spanning from 6 to 52 years. Most farmers, representing 38.46 percent, have been farming for 16-25 years. Longer experience indicates that they have developed the knowledge and skills essential for successful farming. Farmers have also likely experienced various challenges and conditions, such as climate change, pest attacks, and market fluctuations, making them more resilient and adaptive.

Table 2. Characteristics of Respondents

Respondent Characteristics	Number of Farmers (People)	Percentage (%)
Age (years)		
26 - 36	10	8
37 - 47	28	22
48 - 58	42	32
59 - 69	26	20
70 - 77	24	18
Formal Education		
Primary school	60	46
Junior school	49	38
High school	20	15
Diploma / S1	1	1
S2/S3	0	0
Farming experience (years)		
6 - 15	30	23
16 - 25	50	38
26 - 35	30	23
36 - 45	18	14
45 - 52	2	2
Land tenure status		
Rent	96	74
Owned	34	26
Land Area (hectares)		
0.084-0.151	77	59
0.152-0.218	28	22
0.219-0.286	21	16
0.287-0.352	2	2
0.353-0.420	2	2
Family dependents (person)		
1	20	15
2	38	29
3	41	32
4	26	20
5	5	4
Side Job		
None	89	68
Entrepreneurship	16	12
Breeders	8	6
Labor	14	11
Seedling breeder	3	2

According to Table 3, the majority of shallot farmers (74%) cultivate on leased land, while only 26 per cent farm on their own land. In terms of cultivated land size, all respondents fall into the smallholder category, with less than 0.5 hectares of farmland. Most of the respondent farmers' cultivated land area is 0,084-0,151

hectares, with a percentage of 59 per cent. The next characteristic is the number otermsf family dependents, where most respondent farmers have a total of 3 family dependents, with a percentage of 32 per cent. When viewed from the type of farmer's job, all respondent farmers rely on shallot farming as their main job. As many as 68 per cent of farmers do not have side jobs, and another 32 per cent have side jobs outside agriculture, such as entrepreneurship, breeding, labourers, and seed breeding.

Outer Model Testing

Validity Test

One of the test requirements in SEM-PLS is the validity test using convergent validity analysis, which shows the measurement or correlation between the instrument and its construct score using the loading factor. Loading factor analysis requires a prerequisite that the value must be greater than 0.7. However, explained that a loading factor of 0,6 is still understandable in a model. Moreover, the convergent validity assessment can be determined through the average variance extracted (AVE) value for each variable in the model. A value above 0.50 indicates validity (Hair et al., 2021). The results of the validity test, using both the loading factor and AVE, are presented in Table 4.

Table 3. Validity Test Results (Loading Factor)

Variables	Indicator	Loading Factor	Description
Individual Characteristics	KI.1	0.867	Valid
	KI.2	-0.709	Invalid
	KI.3	0.886	Valid
	KI.4	0.712	Valid
	KI.5	0.772	Valid
	KI.6	0.774	Valid
Business Environment	LB.1	0.755	Valid
	LB.2	0.900	Valid
	LB.3	0.773	Valid
	LB.4	0.775	Valid
	LB.5	0.741	Valid
Entrepreneurial Behavior	PK.1	0.720	Valid
	PK.2	0.840	Valid
	PK.3	0.864	Valid
	PK.4	0.706	Valid
	PK.5	0.894	Valid
Farm Performance	KU.1	0.777	Valid
	KU.2	0.714	Valid
	KU.3	0.788	Valid
	KU.4	0.761	Valid
	KU.5	0.712	Valid

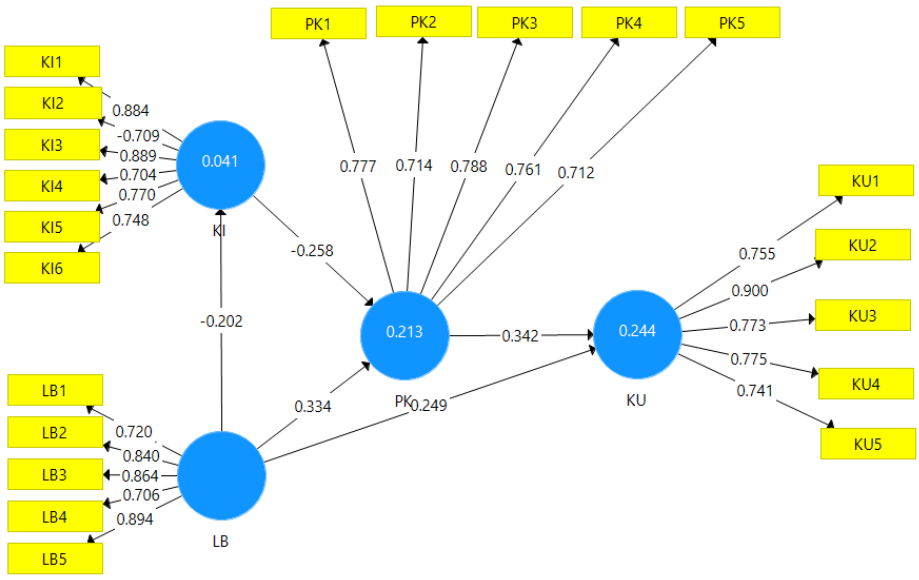

Figure 2.
Path Diagram Validity Test Results on The Model of The Influence of Entrepreneurial Behavior on The Performance of Shallot Farming

Based on the validity test (loading factor), it is known that all indicators in this study are declared valid, except for the age indicator with a loading factor value of -0.709 or less than 0.6, which means that the age indicator is invalid and cannot be used in hypothesis testing.

Apart from looking at the Loading Factor, the validity test is also seen from the AVE value. The AVE value also considers the achievement of the discriminant validity requirements of the model, with a requirement of more than 0.5. If it has a value of less than 0.5, it indicates that there is a weakness in the average variance of the variables (Hair et al., 2021). In addition, the convergent validity can be tasted by investigating the average variance extracted (AVE) of each construct in the model. Value over 0,5 indicates a valid variable.

Table 4. Validity Test Results (AVE)

Latent Variable	AVE	Description
Individual Characteristics	0.621	Valid
Business Environment	0.625	Valid
Entrepreneurial Behavior	0.564	Valid
Farm Performance	0.654	Valid

Reliability Test

Reliability test needs to be tested by the composite reliability above 0.7 and Cronbach's alpha greater than 0.6 (Hair et al., 2021). A few is the reliability of the model:

Table 5. Reliaility test results

Latent Variable	Composite Reliability	Cronbach Alpha	Description
Individual Characteristics	0.826	0.878	Reliable
Business Environment	0.903	0.893	Reliable
Entrepreneurial Behavior	0.866	0.904	Reliable
Farm Performance	0.893	0.866	Reliable

The tests of this study have shown that the composite reliability values for all the variables exceeded 0.7, meaning that the questionnaire validity of X and Y variables are estimated as reliable. All variables were found to have good threshold value for Cronbach's alpha greater than 0.6. Thus the reliability test results that questionnaire is appropriate to use due to fulfill with predetermined criteria. A reliable model is one that has a composite reliability value above 0,6.

Inner Model Testing

Goodness of Fit (GoF)

The next phase examines the internal model, which is required to test your model in an overall sense. Goodness of fit Goodness of fit is both an index and measure for explaining as to how well the latent variables, assume each other (Hair et al., 2021). Goodness of Fit (GoF) as the measure of a models ability to explain variances in observ- able indicators is based on relative and comparative fit evaluative criteria (Henseler & Sarstedt, 2013).

$GoF = \sqrt{\overline{AVE} \times R^2}$

$GoF = \sqrt{0{,}622 \times 0{,}168}$

$GoF = \sqrt{0{,}104}$

$GoF = 0.322$

The higher the GoF value, the better is the model in explaining variance of data. The value of GoF equals 0.25-0.36, indicating that the fit model is moderate Kock (2015).

Hypothesis Testing

Hypothesis testing is performed to find out the relationship that exists between latent variables by testing the path of the variable with comparison of p value and significance level used (p = 0.05), or a t statistic about >1.96. The number of p-value and t-statistics utilised may be obtained in smart pls by adopting bootstrapping technique. The criteria of hypothesis testing are if the p-value with significance level 5% is less than 0.05 or t-statistic is larger than t-table of 1.96, so accept the research hypothesis. The path coefficient is used to evaluate the strength of relations between variables reflecting the relationship existing between exogenous and endogenous variables (Hair et al., 2021).

Table 6. Bootstrapping Value Results

	Coefficient	T-statistic	*P-value*	Description
KI → PK	0.073	3.567	0.000	Significant
LB → PK	0.068	4.844	0.000	Significant
LB → KI	0.094	2.317	0.021	Significant
PK → KU	0.079	4.308	0.000	Significant
LB → KU	0.081	3.073	0.002	Significant

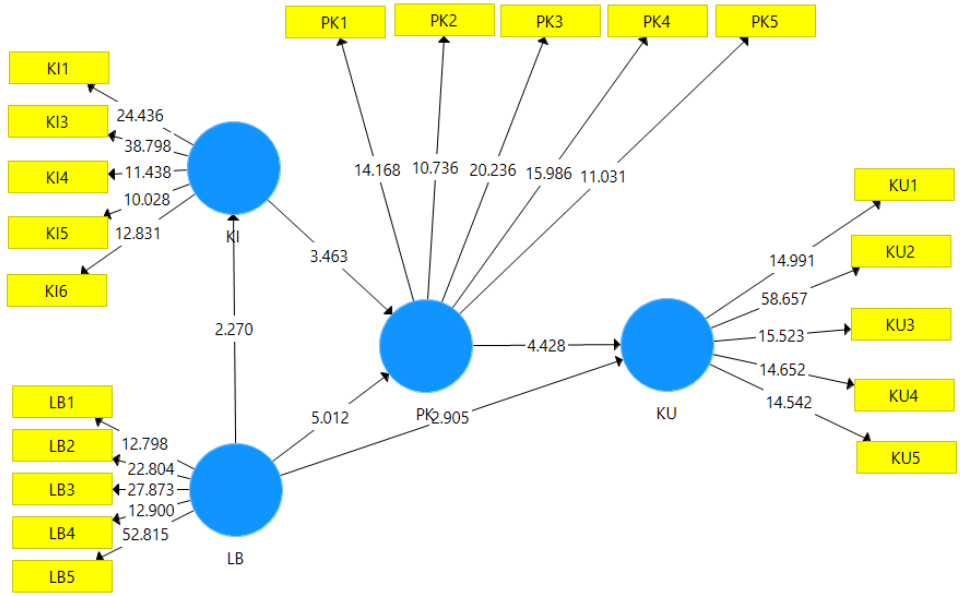

Figure 3.
Path Diagram Hypothesis Test Results (T- T-Statistics) on The Model of The Influence of Entrepreneurial Behavior on The Performance of Shallot Farming

Hypothesis test findings demonstrate that all the variables examined significantly affect each other. The coefficient of individual characteristics (KI) to entrepreneurial behaviour (PK) is determined to be 0.073 and the t-statistic value was 3.567 > 1.96 or their p-value = 0.000 1.96 or p-value 0.000 < 0.05, meaning that an improvement in the business environment can increase entrepreneurial behaviour as well (Table 2).

In addition, the business environment has a positive impact on individual traits with a coefficient 0.094 as well as t-value is 2.317 >1.96 or p1.96 or p-value =0.002. This suggests that farm performance and the business environment will strengthen. Entrepreneurial behaviour too has a positive and direct significant effect on farm performance with coefficient value 0.079, t-statistic 4.308 > 1.96 or p-value of 0.000 < 0.05, this implies that higher entrepreneurial behaviour will result in better farm performance= Table IV. In conclusion, the study reveals that business ecosystem, personal traits and entrepreneurial activity play a critical role in influencing farm productivity with strong inter-relationship among them.

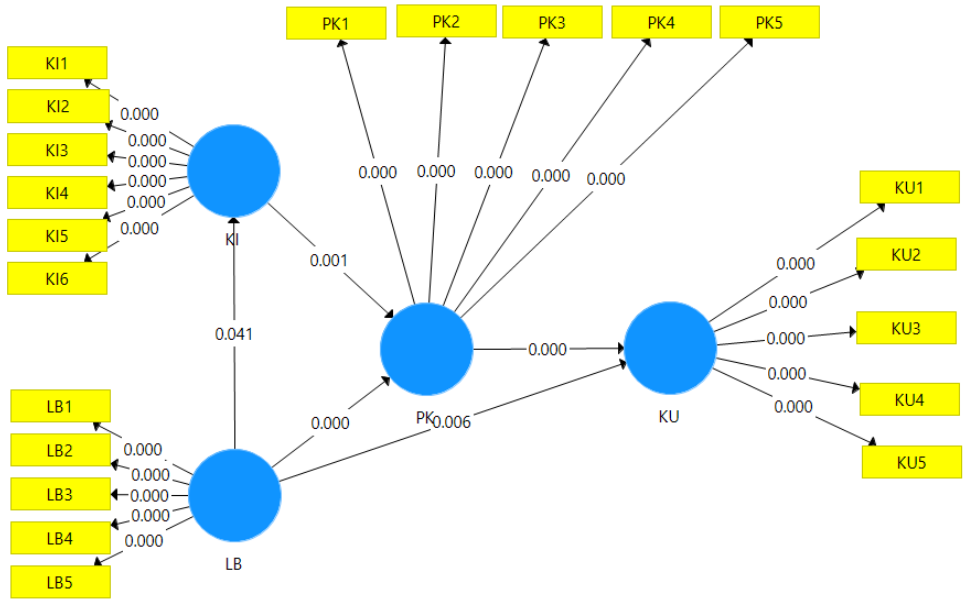

Figure 4.
Path Diagram Hypothesis Test Results (p-value) on The Model of The Influence of Entrepreneurial Behavior on The Performance of Shallot Farming

The business environment also has a positive and statistically significant impact on the individual's characteristics (coefficient = 0.094, t-statistic=2.317 >1.96) with p-value 0.021 1.96 or p-value =0.002 This suggests that as the business environment improves, farm performance will also improve. Direct effect of entrepreneurial behaviour on farm performance Entrepreneurial behaviour is also found to have a direct significant positive impact on farm performance with coefficient value 0.079, t-statistic (4.308) >1.96 or p-value 0.000 < 5, reflecting higher entrepreneurial behaviour will result in elevated farm performance. The findings of the study in other words indicate that business environment, individual attributes and entrepreneurial orientation play an active role in improving farm performance and that such relationships are strong for relationship between these constructs.

Influence of Individual Characteristics on Entrepreneurial Behavior

Individual characteristics significantly and positively impact entrepreneurial behaviour, with a coefficient value of 0.073. This implies that a one per cent improvement in the particular characteristics of shallot farmers enhances their entrepreneurial behaviour by 7.3 per cent. The coefficient value shows that indicators on individual factors such as education, farming experience, land area, motivation and perception can increase the entrepreneurial behaviour of shallot farmers. The most dominant indicators are farming experience and education, with a loading factor value of 0.886 and 0.867, respectively. Experience and education are dominant indicators in individual characteristics because both play a direct role in shaping farmers' ability to manage agricultural operations effectively and adaptively.

Farm experience is an important aspect in enhancing entrepreneurial behaviour because the longer one is involved in a farm, the more practical knowledge and skills they acquire. Farmers with more experience will have better skills in risk management, resource optimization, and decision-making based on field conditions. Mayr et al. (2020) stated that experience can significantly reduce the risk of bankruptcy of a business. In line with this, Slamet & Bintoro (2019) noted that the business experience of an entrepreneur can help increase business success, where, with sufficient experience, an entrepreneur will be able to face all the problems that come in the way of their business activities. This is relevant to the conditions of shallot farming, where weather and environmental conditions can cause crop failure, so that farmers with longer experience allow these farmers to be better prepared to face challenges.

Formal education also plays an important role in improving the capacity of individuals to access new information, innovate and adopt technology. Formal education provides a theoretical knowledge base that enriches farmers' insights into modern farming techniques, market access, and more efficient farm management. Although most shallot farmers in the study area have only an elementary education, it still provides them with basic literacy and numeracy skills, which are essential for daily farm management. Consistent with the research findings, Jaya et al. (2021) reveal that the higher the degree of education, the more correlated is it with farmers' knowledge. Formal education has been the primary and significant agent for shaping man's behavior. Educated farmers are most likely to be open to the possibility of compromisation and innovation: using fertilisers or pesticides that are more efficient and environmentally friendly, adopting technology which can boost crop yields.

Motivation, perception and land area were also predictors of the personal attribute of the individual for determining entrepreneurial behaviour among shallot farmers aside from experience and formal education. The motivation of shallot farmers in the study area is good, since they cultivate because they consider that shallot farming is better than other crops. So that with shallots the farmers are able to meet their life demands, educate themselves and elevate their social status. Instead the farmers consider that running shallot farms is what they have been good at for long time, then it shows a sense of having strong attachment to knowledge and skill that has been practiced for many years as well as a belief about there being some good resources which enable the farmers to be more efficient by using their own expertise.

Research by Khoshmaram et al. (2020), direct in-line with the present research is that family support and social capital are essential for entrepreneurial behaviour, pushing entrepreneurs to take risks for their business. To the extent that corporate actors continue to organise to satisfy their livelihood need speaks of strong motivation. Kristijuswati et al. (2024), Puspitasari et al. (2019), and Zainura et al. internal factors, namely motivation and perception of high business which can be encouraged entrepreneurial behaviour (Majumdar et al. Farmers with good willingness and high perception are more sensitive toward opportunities, more capable in dealing with operational problems better (Shahin et al., 2024) and they would be an early adopter of innovations and so more rival with other farmers/competition in the market (Puspitasari et al., 2019).

Influence of Business Environment on Entrepreneurial Behavior

The business environment has a positive and significant effect on entrepreneurial behaviour with the coefficient of 0.068, it shows that an increase in one per cent of the shallot farmers'business environment will incerase entrepreneurial behaviour by 6.8 per cent. The t-statistic value shows that indicators in the business environment, such as input availability, extension support, capital assistance, market access and farmer groups, can increase the entrepreneurial behaviour of shallot farmers. The most dominant indicator is extension support with a loading factor value of 0.900.

Extension support is the most dominant indicator in improving the entrepreneurial behaviour of shallot farmers because extension workers play an important role as motivators and facilitators who help farmers. Extension workers provide relevant knowledge insights related to technological developments, efficient cultivation techniques and market information. Based on field results, extension workers on average conduct counselling 3-4 times and monitoring 1 time. Increasing the capacity of farmers through extension will have a good influence on improving entrepreneurial behaviour. Then the results of evaluation and mentoring can be used as material in developing efforts to increase the capacity of farmers. The local BPP routinely conducts soil pH checks, providing farmers with clear information about the nutrients needed by the soil before planting. This enables them to better organise and manage their farming activities.

Furthermore, some new knowledge about production of organic fertilizer and pestisidas can be used in the long run through MTS (Manajemen Tumbuhan Sehat / Healthy Plant Management) that there has been not many farmers which have use it. Knowledge and skills acquired through these extension activities extend farmers' horizons to an extent so they can better deal with challenges in farming, hence be more willing to try innovations. The role of extension agent is important in influencing innovation adoption of shallot farmers that can increase productivity (Purba et al., 2024). In line with TAMSAN & Yusriadi (2022), the result of this study suggest that agricultural extension services play a very important role to increase competence of soft skills and indirectly increase productivity from farmers. Extension services also affect farmers' engagement in the determination of their commodity markets, as well improve their soft skills and productivity (Girma & Kuma, 2022). Thus, through the activities of extension workers, farmers can be at a better side to negotiate transactions during selling and may not incur some losses.

It is also found that business environment has a positive and significant influence on characteristics of individual with coefficient estimate as 0.094. This implies that a percent improvement in the business environment results into 9.4% increase in farmers' traits. A healthy business climate will offer many opportunities and services which can facilitate the building of farmers' capacity in knowledge, skills, technology and their market base. A favourable business environment comprises a large market, supporting government measures, access to credit as well as agricultural infrastructure that facilitates motivation, skills and management capacities.

Factors of business environment have less impact on entrepreneurial behaviour as compared with other factors. The reason is that the business environment includes more complex and extended external conditions like policies,

market entry and infrastructure. These effects take a long time and interventions are needed to influence the entrepreneurial behaviour of farmers". Research by Dai et al. (2014) and Diem et al. (2022) proved that there is an enabling business environment which creates a space for entrepreneurs to acquire the relevant skills and individual specificities in order to meaningfully manage their businesses well. Meanwhile, Porcar et al. (2018) stressed the relevance of the environment in sustainable entrepreneurship. Competitive and the changing business environment may encourage individuals to be more innovative and develop their skills which in turn, influences traits.

The Effect of Entrepreneurial Behavior on Farm Performance

The analysis indicates that entrepreneurial behaviour has a positive and significant influence on farm performance, indicated by a coefficient value of 0.079. This implies that a one per cent rise in entrepreneurial behaviour factors results in a 7.9 per cent improvement in farm performance. The findings of this study suggest that farm performance will increase in line with the increasing level of innovative, risk-taking courage, independence, management skills and the ability to develop, which is an indicator of entrepreneurial behaviour.

Field conditions show that the most dominant indicators of entrepreneurial behaviour are competitive ability and independent attitude, where shallot farmers in the research location tend to have the ability to adapt to pest attacks and fluctuating shallot selling prices. In addition, farmers also have a high independent attitude, where they actively seek information from other farmers, and they tend to be confident in their abilities. Independence and good management skills help farmers to manage finances and resources more effectively, while the ability to continue learning and developing strengthens their competitiveness. Most farmers have also started keeping simple records, which include recording sales volumes, selling prices, and purchases of agricultural inputs. Farm records are important tools in the management of farms, since through it farmers can assess cost effectiveness and returns obtained from different farm's inputs applied. This allows them to tweak their tactics for better success. According to Runyan et al. (2019), autonomous business management exerts high influence on business success, which also applies to agricultural context. This is further confirmed by Sigey et al. (2023), they have direct influence on farm level performance.

Farmers' decisions can influence planting and harvesting times—and farmers acting in response to market opportunities have incentives to save. This proactive approach also makes farmers sensitive to market needs because they can plant the commodities at better prices. This has largely been done by most farmers in the study communities, where different planting times were adopted in each village for avoiding price drops during the main season of harvest. Studies have indicated that farmers' capacities to cope with changes in the climate and in markets may be enhanced by pro-active responses to market opportunities. (Hilmi et al., 2024; Kibue et al., 2016). Such adaptations enable farmers to improve the technical efficiency as well as output despite uncertainties of the climate or market, which contribute towards more stabilized income.

Farmers can benefit from more favourable (economic) conditions by adjusting their cropping choices, in particular if prices for commodities are high.Farmers in the study area are risk takers and have high proactivity level for searching of finding/

experimenting with new ideas. But still, they haven't become calculating risk-takers that weigh opportunity risks as closely as each of their decisions. This result complies with Puspitasari et al's entrepreneurship behavior study. (2019) and Zainura et al (2016), this implies that risk-taking has a positive effect on business performance. Thus, inattentive decision-making or the idea that one is simply a gambler can be both a positive and negative trait - it would depend on whether other high risk instances of entrepreneurial action were involved.

Further, the business environment has a positive and significant effect on farm performance with a coefficient of 0.081 respectively. This means that for each per cent the business environment improves, farm performance improves by 8,1 per cent. Where the market and enabling environment promotion produces production inputs, market access, extension support and other services a capital provision can enable farmer managed farm intensification. Research of Faza & Solihin (2024) and Kristijuswati et al. (2024) suggests that the business performance is dependant from a good business environment. It is emphasized that the appropriate business environment has a positive effect on business operation. In an enabling business environment, farmers were more inventive in a partnership with extension personnel who can be the source of new knowledge and have better access to market information so that they can sell their crops at better prices.

Drawing on research results from Amrita et al., (2018); Elkhazimi (2022); Ernanda & Sumbari (2021); Khairiyakh et al., (2019); Kristijuswati et al., (2024) Nurdiani (2016), Nurlaela et al., (2020), Priyono & Burhanuddin(2020; Radegundo et al. This is consistent with Bidzakin et al. (2019) that entrepreneurial activities can improve farm performance are conditioned by social, economic and institutional endowments with smallholder farmers. Entrepreneurial activity can contribute to innovation in its activity of using and creating entrepreneurial potential. So that with this entrepreneurship, farmers can increase earnings and income as well as make shallot cultivation become more economically sustainable.

CONCLUSION

Based on the research findings on the influence of farmers' entrepreneurial behaviour on the performance of shallot farming, the following conclusions can be drawn: (1) Individual characteristics have positive and significant effect on entrepreneurial behavior. This shows that education, experience, farm size motivation and farmers' perception on farming have the potential to improve entrepreneurial behaviour. (2) The business environment has a positive and significant influence on entrepreneurial behaviour. This suggests that the availability of inputs, extension support, capital assistance, market access, and farmer groups can improve entrepreneurial behaviour.

Farmers' entrepreneurial behaviour has a positive and significant influence on the performance of shallot farming. Entrepreneurial behaviour plays a critical role in improving farming performance. Innovative attitudes, risk-taking, independence, management skills, and the ability to grow ultimately contribute to enhancing farming performance.

The results of this study are anticipated to provide a useful reference for various stakeholders. Therefore, the following recommendations are put forward:

1. The enhancement of entrepreneurial behaviour among farmers is influenced by internal factors (individual characteristics) and external factors (business environment), where the ability to grow and risk-taking are weak indicators in shaping entrepreneurial behaviour. This is due to farmers' limited capability to plan farming activities in the long term and take appropriate risks to address challenges such as climate change, pest infestations, and fluctuating market prices. These issues can be addressed through capacity-building initiatives for farmers, including training (support from agricultural extension workers) and the role of farmer groups in providing access to low-interest financing (KUR). A strong collaboration between extension workers and farmer groups can help improve farmers' skills, knowledge, and motivation, enabling them to carry out farming activities sustainably.
2. Farm performance can be improved through entrepreneurial behaviour, where farming commitment emerges as a weak indicator in shaping farm performance. Farmers often exhibit low commitment levels in running their farming activities due to unstable incomes. This instability is caused by the fluctuating prices of shallot commodities, which result in uncertain earnings over time. In such circumstances, the government and relevant stakeholders must provide support to farmers through price stabilization programs, such as partnership programs, to ensure market access with stable selling prices. These programs can facilitate farmers in selling their harvests at pre-agreed prices, thereby reducing price risks and enhancing income certainty for farmers.
3. Future research is recommended to explore the influence of other factors, beyond entrepreneurial behaviour, that significantly affect the improvement of shallot farming performance.

AUTHOR CONTRIBUTION STATEMENT

[Author 1] was fully responsible for the planning, implementation, and overall development of the research. This contribution included the identification and formulation of the research problem, literature review, methodological design, data collection and analysis, as well as the writing of the final research report.

[Author 2 and Author 3] served as academic supervisors who provided substantial contributions through continuous academic guidance. They actively offered scientific direction, conceptual input, and constructive suggestions at every stage of the research process, thereby playing a vital role in enhancing the content and overall quality of this study.

DECLARATION OF COMPETING INTEREST

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ETHIC STATEMENT

This research has been carried out under high ethical standards and following principles for academic research. Informed consent All participants were provided with information concerning the aims, procedures and possible risks/benefits of the study before data collection. All participation was voluntary and consented to by each participant.

Confidentiality The study strictly maintained anonymity and confidentiality of all participants. Personal information was managed with appropriate sensitivity and was kept on secure file available only to the project team. All identifying details have been revised to remove the names of the participants from any reports and publications that are based on this study.

The authors have no conflicts of interest to disclose and the study was performed with impartiality, transparency, and consideration for all subjects.

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