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Drivers of Innovation Ambidexterity on Small Medium Enterprises (SMEs) Performance

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ABSTRACT The development of the broiler poultry industry has experienced a significant increase along with the increasing public demand for meat consumption. However, in 2019, many broiler poultry farmers are forced to close down their businesses because the price of broilers in living conditions continues to be below the Production Cost. Further, broiler poultry farmers also experience obstacles including unpredictable price fluctuations and intense competition. Innovation ambidexterity is the innovation capability in managing exploration and exploitation simultaneously to improve firm performance. Several influential factors in increasing innovation ambidexterity include technological capability, owner-manager characteristic, and environmental dynamism. This study aims to develop a model that describes innovation ambidexterity in broiler poultry farmers to improve firm performance. This study also analyzes the factors that can influence innovation ambidexterity and its effect on firm performance. This research mainly uses quantitative methods for its analysis. The sampling technique uses non-probability sampling with convenience sampling technique. Data collection was conducted by distributing 223 questionnaires to broiler poultry farmers in West Java. The analysis technique uses Partial Least Square - Structural Equation Modeling (PLS-SEM) which includes measurement model analysis and structural model analysis. The results of this study indicate that innovation ambidexterity has a direct influence on firm performance, while the influence of environmental dynamism on firm performance is partly mediated by innovation ambidexterity. In addition, technological capability and owner-manager characteristics have a positive influence on innovation ambidexterity and have an indirect influence on firm performance. In the near future, implications of this study will be discussed in a separate manuscript.

INDEX TERMS Firm performance, innovation ambidexterity, owner-manager characteristic, technological capability, environmental dynamism.

I. INTRODUCTION

The necessary of broiler poultry product in Indonesia continues to experience significant increase in every year. With the result, that to ensure that the supply of broiler poultry product remains facile, the development of broiler poultry farms needs serious attention. Based from data from the Indonesian Central Statistics Agency in 2018, the growth of broiler poultry product demand in Indonesia from 2008 - 2018 can be seen in the figure 1.

The population of poultry broilers in Indonesia reached 1.8 billion head per year which can be seen in Figure 2 [1], [2]. This number mostly comes from the province of West Java, which is 682 million head per year (Figure 3) where

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the largest population of broiler poultry is located along the northern route of Java which includes Subang Regency, Indramayu Regency and Cirebon Regency [3].

Based on data from the Indonesian Central Statistics Agency (Badan Pusat Statistik/BPS) in 2018, the population of poultry broilers in Indonesia reached 1.8 billion head per year which can be seen in Figure 2. This number mostly comes from the province of West Java, which is 682 million head per year (Figure 3) where the largest population of broiler poultry is located along the northern route of Java which includes Subang Regency, Indramayu Regency and Cirebon Regency [3].

Based on these data, the Indonesian poultry industry looks very prospective and potential, but in 2019 the conditions of broiler poultry farms do not show the facts above. Many number of broiler poultry farms have been forced to

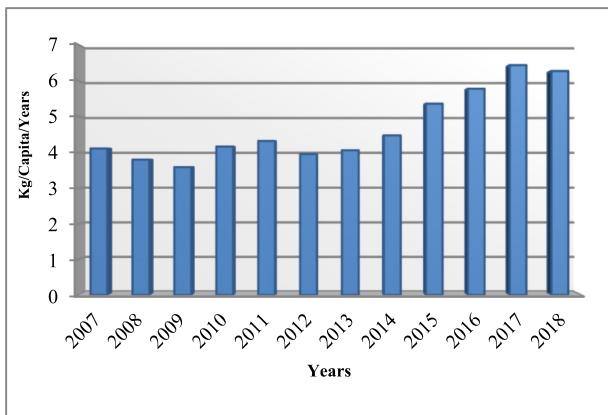


FIGURE 1. Growth of Broiler Poultry Product Demand (Kg/Capita/Years) In Indonesia from 2008 – 2018 [1].

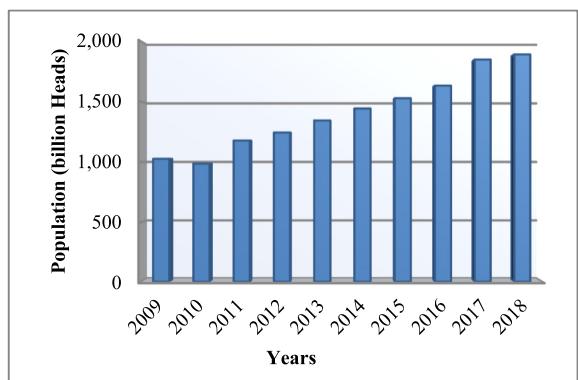


FIGURE 2. Population of Poultry Broilers (in billion heads) in Indonesia [2].

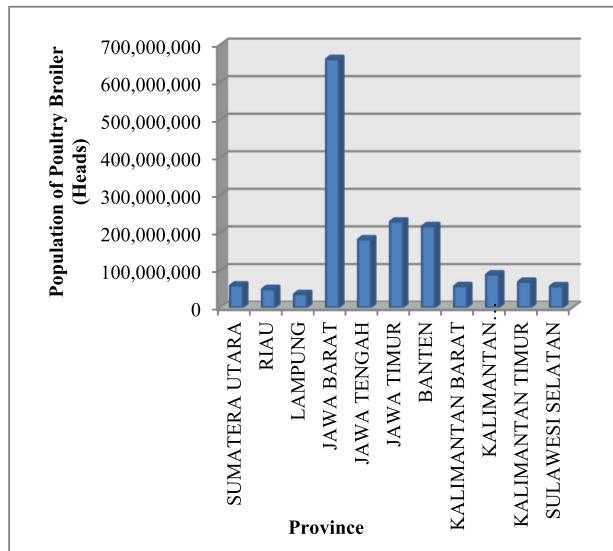


FIGURE 3. Distribution of Broiler Poultry Population by Province [2].

close their businesses because the price of the broiler poultry product continues to be below the Cost of Production (HPP). The broiler poultry farmers are forced to sell chickens for Rp. 8,000 per kg while the cost of production is Rp. 18,500 per kg.



FIGURE 4. The Average Price of Retail Broiler Chicken (Rp / kg) in 34 capitals in Indonesia [4].

Figure 4 shows that since the beginning of 2019, the price of broiler poultry product at retail in well-known traditional markets in 34 provincial capitals has decreased by 19.27% [4]. On January 6, 2019, the price of broiler poultry product reached IDR 28,000/kg and is the highest price in 2019. However, the steepest price decline also occurred in January 2019, where during one month the price of broiler poultry product fell to 17.16%, while the decline in prices in February and March 2019 was only 2.24% and 2.29% respectively [4].

Seeing the current condition of broiler poultry farmers, environmental forces generate great pressure in the strategy formulation process so that it is necessary to find new ways to survive the environment it faces. The fall in market prices which reached 17.16% within one month in January 2019 (Figure 4) demands increased operational efficiency. This increase in pressure is a theoretical and practical challenge to find new ways so that broiler poultry farmers can operate efficiently as a form of adjustment to the changing environment it faces.

Currently, organizations are trying to adapt to environmental changes that occur, explore new ideas or processes, and develop new products and services to enter new markets (exploration), and at the same time, they need stability to improve current competencies and exploit existing products and services (exploitation) [5]. The ability of an organization that simultaneously carries out innovation activities, both exploration and exploitation, is called innovation ambidexterity [6], [7].

Existing literature on innovative ambidexterity has focused primarily on large and multi-unit companies [8]–[10]. However, researchers acknowledge that empirical findings in large companies cannot be generalized to small companies. SMEs face more problems in achieving ambidexterity, because they have limited managerial expertise, unstructured procedures, and less formal systems for coordinating antithetical activities. Previous studies have found evidence that SMEs tend to achieve different innovation compared to large companies [11].

The amount of innovation ambidexterity ability in an organization will be greatly influenced by the main resources owned and the ability of other resources, such as

technological resources, human resources, and environmental conditions [12]. The exploration of innovation in this study includes activities to increase the capacity and efficiency of the production process, while the exploitation of innovation includes adjustment activities and expansion of competencies possessed by SME's actors in West Java.

The technological context in this study refers to the results of research conducted by [13], [14] which stated that in order to grow and develop and survive in a competitive business environment, an organization is required to be able to utilize its knowledge and technology effectively, not only in an effort to improve and develop products and processes, but also to increase the technological capabilities that are owned in producing new knowledge and skills. The organizational context in this study refers to the results of research which stated that is different from large companies because has more limited resources than other larger industries, therefore it can have competitiveness, and must be able to allocate its resources efficiently [15]. Based on these differences, business owners are required to develop the ability of innovation ambidexterity in exploiting existing competencies and exploring new opportunities in an effort to deal with environmental changes that occur [10], [16]. The environmental context in this study refers to the research conducted that a very dynamic environment will provide a stimulus to develop ambidexterity capabilities which will have a positive impact on firm performance [17], [18]. The competitive environment dynamically forces individuals to be ambidextrous and pursue both types of innovation simultaneously [5].

The purposes of this study is to explore how technological capabilities, owner-manager characteristics, and dynamic environment in developing the ability of innovation ambidexterity in broiler poultry farmers will ultimately have a positive impact on firm performance to survive in the face of environmental dynamism that occurs. This study offers several contributions. First, this research tries to understand how technological capabilities, owner-manager characteristic, and environmental dynamism can create and maintain innovation ambidexterity at broiler poultry farms. Secondly, the impact of technological capabilities, owner-manager characteristic, and innovation ambidexterity in increasing business firm performance in the face of a uncertainty caused by environmental dynamism in which their capability to balance explorative and exploitative innovation allows their businesses to survive in the face of environmental dynamism that occurs. Third, this study is one of only a few papers to examine innovation ambidexterity at broiler poultry farmers. In addition, this study is expected to be a guide for the government and poultry farmers in improving firm performance on poultry farming by considering the aspects of innovation, ambidexterity, technological capabilities, owner-manager characteristics, and dynamic environment.

II. LITERATURE REVIEW

Previous research has provided sufficient arguments that emphasize the difficulty of small companies in achieving

innovative ambidexterity, there are few studies that analyze this phenomenon in the specific context of SMEs [11], [17]. Thus, this study attempts to explore the drivers of innovation ambidexterity on SME business performance in facing the uncertainty caused by environmental dynamism in which their capability to balance explorative and exploitative innovation allows their businesses to survive in the face of environmental dynamism that occurs.

Moreover, although there is abundant research on the relationship between innovation and/or organization ambidexterity and firm performance [17], [19], [20], there is a need for further studies on the variables that moderate this relationship [8]. Innovation ambidexterity as dynamic capacity cannot be explained as a limited direct relationship of several factors on organizational performance. Existing research offers extensive theoretical argumentation about the potential of firms' technological capability to drive significant innovations in business processes, products and services of firms [13], [14], [16]. Besides technological factors, business owners are required to develop the ability of innovation ambidexterity in exploiting existing competencies and exploring new opportunities in an effort to deal with environmental changes that occur [21]–[24]. In the same venue, firms' ability to deploy exploratory and exploitative innovations in an ambidextrous manner may depend on the development of diverse internal capabilities, and, at the same time, on the quick response to external pressures such as environmental dynamism [8], [16].

A. OWNER-MANAGER CHARACTERISTIC

One of the unique characteristics possessed by SMEs is the owner of SMEs which significantly plays an important role in the establishment, development and progress of the organization [21]. In SMEs, the leaders play pivotal roles in primary decision in organizations and in almost the whole spectrum of business process [25]. Their commitment, both in terms of resources and change in the business strategic and process is imperative [26]. Small business owner-managers have a role in setting strategic direction, thus experiencing additional dissonance from competing demands in pursuit of ambidexterity [27]. Owner-manager capabilities are the basis for small companies in determining their performance [28]. Thus, the owner-manager characteristics have a significant role in determining the success of a business.

Owner-manager of a business is considered to have a significant influence on exploitation and exploration activities at the organizational level [22]. This occurs SME's have limited competence in exploiting and exploring new opportunities to meet challenges in developing market conditions, such as limited managerial expertise, less structured procedures and non-formal coordination systems [8], [16]. In fact, the owner-manager is required to be able to play various roles such as financial controller, human resources officer, IT engineer, and marketing. Thus, manager-owners need to have strong confidence in overcoming various challenges related to running their business [24].

The owner-manager can be a positive factor in innovation [29]. Business owner-managers are required to develop the ability of innovation ambidexterity in exploiting their competencies and exploring new opportunities as an effort to deal with environmental changes that occur [8], [16], [30]. Owner-manager characteristics such as entrepreneurial self-efficacy are the mechanisms by which marketing practices contribute to the growth-quality of work-life ambidexterity [26]. When making a decision, owner-managers can choose for certain technology sources internally or externally, based on considerations of costs incurred and the knowledge they have [31]. Therefore, SME's are more likely to make technological innovations when the owners are more innovative, have a positive attitude towards technology adoption, and have good technology knowledge [22]. Owners who have poor technological skills may perceive the technological innovation process as difficult [32]. Based on the literature, we propose the following hypothesis:

Hypothesis 1: The owner-manager characteristic has a positive impact on innovation ambidexterity

B. TECHNOLOGICAL CAPABILITY

Technological capability is the ability of a company to mobilize and use technological resources and combine them with other resources and capabilities they have [29]. Technological capability is very important for organizations to realize business value and maintain competitive advantage [30]. This statement was supported by the results of research which stated that in order to grow and develop and survive in a competitive business environment, an organization is required to be able to utilize its knowledge and technology effectively, not only in an effort to improve and develop products and processes, but also enhances the technology's ability to generate new knowledge and skills [10].

Previous research has argued that using the right IT solution can increase the speed of exploration and exploitation of knowledge, from individuals to organizational members [33], [34]. Information technology capabilities are positively related to innovation ambidexterity, which can increase the exploitation of capabilities to take advantage of existing market opportunities and explore new opportunities to meet the challenges of emerging markets [16]. Technological capabilities can also take advantage of exploratory innovation through increased use of organizational technology resources [35]. Organizations with a high level of technological capability tend to lead more exploratory innovations than exploitative innovations for three reasons [36]. First, technological capabilities empower organizations with many new technological resources, which are more positively associated with exploration than [35]. Second, technological capabilities are usually developed to respond to new external challenges or opportunities presented by new markets [37]. Third, exploratory innovation is usually driven by technology. And the nature of this exploratory innovation emphasizes the important role technology capability plays in implementing new innovations [38]. Therefore, we propose:

Hypothesis 2: Technological capability has a positive impact on innovation ambidexterity

C. ENVIRONMENTAL DYNAMICS

Dynamics is an important factor for companies wishing to pursue an ambidextrous orientation [39]. Environmental dynamism refers to the rate of change, absence of patterns and environmental uncertainty [40]. A firm's ability to deploy exploratory and exploitative innovations in an ambidextrous manner may depend on rapid response to external pressures such as the environment dynamism of the business [16]. A dynamic environment is characterized by several factors, including technological change factors, the large number of product variations in customer preferences, the number of product demands that are rapidly changing, and so on [9]. In a dynamic business environment, companies must be able to respond quickly to extreme changes and take advantage of emerging business opportunities to face unprecedented threats [41]. In a dynamic environment, exploration of innovation can generate competitive advantages for first mover companies and explore new opportunities to keep up with market development [31]. Organizational strength and environmental factors have a positive and significant relationship to firm performance [17], [18]. In addition, the relationship between organizational strength and environmental factors on company performance is partly mediated by innovation ambidexterity [17]. This shows that a very dynamic environment provides a stimulus for the development of innovation ambidexterity, which in the end will have a positive impact on firm performance [17], [18]. Based on the literature, we propose the following hypotheses:

Hypothesis 3a: Environmental dynamism has a positive impact on innovation ambidexterity

Hypothesis 3b: Environmental dynamism has a positive impact on firm performance

Hypothesis 3c: Environmental dynamism acts as a moderator for the relationship between innovation ambidexterity and firm performance

D. INNOVATION AMBIDEXTERITY

Currently, innovation has become a very important issue, and is seen as one of the key factors for companies to be able to grow and develop and survive in the face of market competition [32]. Organization must have an advantage in exploiting existing competencies and exploring new opportunities to encourage radical innovation [15]. Companies that are able to simultaneously exploit and explore innovations will have better performance when compared to companies that only carry out either exploitation or exploration of innovation [42]. Exploitation refers to the adaptation of existing products and business concepts, whereas exploration represents a fundamental change that leads to a shift from an existing product or concept to a completely new one [5]. The exchange management process to find a balance between exploration and exploitation of innovation is called innovation ambidexterity [16].

Innovation ambidexterity is a dynamic capability that can place a company in a privileged position in terms of competitive advantage. In a dynamic environment, exploration of innovation can be seen as a process of seeking new opportunities in following market and technology developments to increase competitive advantage for companies [31], [43]. Exploration and exploitation are important factors to create a company's competitive advantage through increased performance and competitiveness [19]. Companies that carry out the process of exploitation and exploration simultaneously have better advantages and competitiveness [42]. Successful exploration in a product or technology will increase exploitative efforts resulting in an indirect effect of exploration on short-term performance through exploitation as a form of adjustment to organizational circumstances [44]. Likewise, the company's ability to engage in exploitative activities can increase exploration efforts so that it will have a positive effect on long-term performance.

Exploration can increase a company's ability to update its knowledge base, but it can become an obstacle to business processes in identifying future opportunities [19]. Conversely, a one-sided focus on exploitation can improve short-term performance, but can become a competency trap because firms may not be able to adequately respond to market and technological developments [45]. Thus, it can be concluded that companies that have good competitiveness in the long run are companies that are able to simultaneously exploit existing competencies and explore new opportunities.

Radical innovation offers the greatest opportunity to produce significant performance, while incremental innovation has modest implications for performance [46]. Companies that are able to achieve ambidexterity allow companies to improve their performance and competitiveness. Meanwhile, that innovation ambidexterity will have a direct and positive relationship with performance [47]. This is supported by the results of a study which shows that innovation ambidexterity has a positive impact on firm performance [16]. Therefore, we propose the following hypothesis:

Hypothesis 4: Innovation ambidexterity has a positive impact on firm performance

III. RESEARCH METHODOLOGY

A. SAMPLE AND DATA COLLECTION

Data collection in this study was conducted in two stages. The first stage is a preliminary research (pilot test) to test the validity and reliability of the measuring instruments in this study. Questionnaires were distributed to 30 poultry farmers that were randomly selected from the database of Indonesian People Poultry Association. Based on the responses to the questionnaire obtained in the preliminary research, several improvements were made to the research questionnaire in this study. Based on the initial questionnaire that has been collected, there are several statement items or questions that must be changed in the sentence structure. changes in sentence structure on some question items are intended so that

TABLE 1. Summary of data collection.

Type of Data	Amount	Percentage (%)
Distributed questionnaire	352	100.00
Collected questionnaires	284	80.68
Questionnaire used	223	78.52
Number of Questionnaires Not Used	61	21.48

broiler poultry farmers can easily understand the meaning of the questions asked.

The questionnaire responses obtained in the preliminary research were not included in the final sample of the study. The second stage is data collection which is conducted from October 2019 - May 2020.

The population in this study are broiler poultry farmers in West Java. However, we do not have an exact data regarding the number population of broiler poultry farmers in West Java. The sampling technique used in this study is a non-probability sampling method with convenience sampling approach, where respondents were selected based on the ease of access and proximity to the researcher. The number of samples taken from the population is five to ten times the number of variables used in the analysis design, and at least 200 samples [48]. The summary of the results of this data collection can be seen in Table 1.

The number of distributed questionnaires is the number of questionnaires distributed by researchers directly, and through fellow researchers who are technical support for several poultry shops that have work areas in West Java. This number does not reflect the number of individuals who filled out the questionnaire because not all of the distributed questionnaires were completely collected. The number of questionnaires collected is the overall response filled out by broiler poultry farmers who are respondents to the research conducted. The answers used are the answers used in processing research data. A total of 284 questionnaires were received by researchers from a total of 352 questionnaires distributed, so that the response rate for this study was 80.68%. Meanwhile, based on the results of checking the quality of filling in the questionnaire, out of the 284 questionnaires received, only 223 (78.52%) of the questionnaires met the requirements for further processing. Answers not used are answers from respondents who do not meet the criteria for use in data processing. In this study, there were 61 (21.48%) questionnaire responses that were not used because 11 (4.93%) questionnaire responses were not filled in completely, 7 (3.14%) questionnaire responses came from outside West Java, and 43 (19.28%) questionnaire answers have an abnormal pattern because the distribution of answers to all questions in the questionnaire is on the same scale (e.g. all questions are filled in strongly agree / Likert scale 5 or all questions are filled with strongly disagree / Likert scale 1).

B. INSTRUMENT DEVELOPMENT

To ensure that the data collected is in the form of quantitative data, the answers in the questionnaire question items use a Likert scale of 1 to 5. A Likert scale 1 indicates strongly

disagree, while a Likert scale 5 indicates strongly agree. This scale was chosen with the consideration that the Likert scale is most suitable for general respondents, namely scale 5 [49].

C. OPERATIONAL OF CONSTRUCT

1) INDEPENDENT VARIABLES

The independent variables in this study consist of technological capabilities, owner-manager characteristics, and environmental dynamism. This study adapts eight question items which are used to measure the level of technology use that supports the production process and the level of knowledge and technological capabilities possessed by broiler poultry farmers [16]. Owner-manager are built on four main indicators, namely self-efficacy, passion for work, risk aversion and extraversion which are broken down into 13 question items [22], [24]. Meanwhile, environmental dynamics was translated into 13 question items built on three main indicators, namely Coercive Pressure, External Pressure, and External Support [16], [17].

2) DEPENDENT VARIABLE

Measurement of the innovation ambidexterity variable, using the measurement scale which stated that innovation ambidexterity is a construct consisting of two factors, namely innovation exploration, which includes activities that are oriented towards selection, improvement, and efficiency, which are built on the basis of search, discovery, experiments and new alternative experiments with uncertain returns; and exploitation of innovations that are seen as refinement and expansion of existing competencies, technologies, and paradigms with measurable and predictable returns [6], [16], [17].

SMEs that make innovations have different performance measures. The performance of SME is related to the innovations made, so that it can be measured from the innovation performance. Innovation performance is the extent to which innovation can reduce costs, improve product quality, production capacity, delivery time, sales, and profits [50]. Innovation performance as the result of a process of measuring efficiency and effectiveness as the impact of an action that leads to performance in the organization [51]. Based on the operational definition that has been built and adapted to the research context, in this study firm performance is measured through two main factors, namely financial performance production performance as a form of measuring efficiency and effectiveness which is the impact of an innovative action taken.

D. DATA ANALYSIS

Analysis of the measurement model was conducted as a measure to evaluate the goodness of the model using the PLS-SEM tools. The criteria tested on the measurement model are reliability (composite reliability and Cronbach alpha), validity (Average Variance Extracted) and discriminant reliability. In the reliability analysis, the measurement model for composite reliability must have a value above 0.7 and Cronbach alpha must be more than 0.6 [52], [53]. The validity of the measurement model is seen from the

TABLE 2. Profile of respondent.

Profile of Respondent	Category	Frequency	(%)
Respondent's Age	20 - 24 years	8	3.59%
	25 - 29 years	16	7.17%
	30 - 34 years	48	21.52%
	35 - 39 years	72	32.29%
	≥ 40 years	79	35.43%
Educational Background	Primary school	7	3.15%
	Junior high school	25	11.21%
	Senior High School	128	57.40%
	3-year diploma	6	2.69%
	Undergraduate	54	24.21%
Gender	Master Degree	3	1.34%
	Male	202	90.58%
	Female	21	9.42%

Average Variance Extracted (AVE) value. A variable is considered to have good validity if it has an AVE value of more than 0.5 [52], [53]. Discriminant validity is used to evaluate the discriminant validity of research instruments. The criterion used is the Fornel-Larcker Criterion. The value of the Fornel-Larcker Criterion in each construct must be greater than the highest squared correlation value with other constructs [53]. Another criterion for assessing discriminant validity is through a cross-loading matrix. If an indicator has a higher correlation with other latent variables than the variable it measures, then the suitability of the model needs to be reconsidered because it shows poor validity of the indicators [52]. The stages of SEM analysis include [54]: 1) Model specifications; 2) Identification; 3) Estimation; 4) Model evaluation (testing fit); 5) Respecification.

IV. RESULTS

A. PROFILE OF RESPONDENT

Based on Table 2 proven that broilers poultry farmers are mostly male (90.58%), aged more than 40 years (35.43%), with the largest level of education, namely Senior High School (57.40%). The results shows that the group of broilers poultry farmers aged 30-34 years is a much as 21.52%, aged 35-39 years is a much as 32.29%, and more than 40 years is a much as 35.43%, involved in the business sector, the slightly different number is indicated by an age group 20-24 years is as much as 3.59% and age group 25-29 years is a much as 7.17%. Generally, the young broiler poultry farmers do business with reasons as an extra income in addition to the primary income; while the old broiler poultry farmers do their business because they do not have other jobs and their businesses became main jobs. Thus, this indicates that the majority of broiler poultry farmers make effort to fulfill the family economy. The number of broilers poultry farmers who have bachelor degree or more is still very limited, the survey indicated 24.21%. This indicates that broilers poultry farmers still have the ability and limited knowledge about entrepreneurship, and only to meet the economic needs.

B. MEASUREMENT MODEL

The measurement model is considered to have good validity if it has a Cronbach's alpha value of more than 0.6 and a

TABLE 3. Reliability, validity and outer loading.

Laten Variable	Indicator	Outer Loading	Cronbach's Alpha	CR	AVE
Technological Capability	TKB-1	0.767	0.830	0.88	0.59
	TKB-2	0.755			
	TKB-3	0.790			
	TKB-4	0.785			
	TSO-1	0.760			
Owner-Manager Characteristic	EV	0.770	0.937	0.95	0.61
	PW-1	0.727			
	PW-2	0.730			
	PW-3	0.848			
	PW-4	0.775			
	PW-5	0.789			
	SE-1	0.778			
	SE-2	0.798			
	SE-3	0.800			
	SE-5	0.846			
Environmental Dynamism	SE-6	0.754			
	EP-1	0.789	0.912	0.93	0.66
	EP-2	0.872			
	EP-3	0.754			
	EP-4	0.851			
	ES-1	0.859			
	ES-2	0.826			
Innovation Ambidexterity	ES-3	0.713			
	PA	0.771			
	TWA	0.776			
	TRA	0.741			
	PI	0.725	0.840	0.88	0.56
Firm Performance	TWI	0.732	0.718	0.88	0.78
	TRI	0.728			
PI	0.901	0.864	0.718	0.88	0.78
RP	0.864				

composite reliability of more than 0.7 [52], [53]. The validity of the measurement model is based on the average variance extracted (AVE) value and discriminant validity, where the AVE value must be more than 0.5 for each variable. According to [52], the Fornell-Larcker criterion value of each variable must be greater than the correlation of these variables to other variables.

In Table 3 shown that Cronbach's alpha value was more than 0.6 for all constructs, where the lowest value was in the firm performance construct with a value of 0.718 and the highest value was in the owner-manager characteristic construct with a value of 0.924. Composite reliability for the entire construct has a value of more than 0.7 with the lowest value in the technological capability construct with a value of 0.825 and the highest value is in the owner-manager characteristic construct with a value of 0.936. From the two assessment parameters, it can be seen that the measurement model has good reliability, which means that the measurement model can provide consistent results and can represent the study population accurately.

Discriminant validity is used to measure the discriminant validity of the measurement model built. The criterion used in the evaluation of discriminant validity is the Fornell-Larcker Criterion which is generated from the PLS processing algorithm which is the root of AVE. The Fornell-Larcker criterion value which is higher than the correlation between variables representing the statement items of a variable has higher

TABLE 4. Fornell-lacker criterion.

	Technological Capability	Owner/Manager Characteristic	Moderating Effect IA*ED	Firm Performance	Environmental Dynamism	Innovation Ambidexterity	Moderating Effect Innovation Ambidexterity *	Environmental Dynamism	Owner/ Manager Characteristic	Technological Capability
Environmental Dynamism	0.81									
Firm Performance	0.55	0.88								
Innovation Ambidexterity	0.62	0.56	0.75							
Moderating Effect Innovation Ambidexterity *	-0.50	-0.44	-0.48	1.00						
Environmental Dynamism										
Owner/ Manager Characteristic	0.63	0.54	0.64	-0.49	0.78					
Technological Capability	0.61	0.53	0.65	-0.51	0.65	0.77				

variance than the statement items from other variables [52]. The Fornell-Larcker value criteria from the measurement model can be seen in Table 4.

Next, we examined the extent to which the indicators of formative constructs presented multicollinearity. Variance inflation factor (VIF) values below 10 suggest low multicollinearity; however, a more restrictive cut-off of 3.3 is used for formative constructs [56]. All values were below the threshold of 3.3, indicating an absence of multicollinearity.

As an improvement, to detect a lack of discriminant validity in general research situations. We propose an alternative approach, based on a multitrait-multimethod matrix, to assess discriminant validity using the heterotrait-monotrait correlation ratio (HTMT). There are two ways of using the HTMT to assess discriminant validity: (1) as a statistical test or (2) as a criterion. First, the HTMT can serve as the basis of a statistical discriminant validity test (which we will refer to as HTMT_{inference}). The bootstrapping procedure allows for constructing confidence intervals for the HTMT, in order to test the null hypothesis ($H_0: HTMT \geq 1$) against the alternative hypothesis ($H_1: HTMT < 1$) [54]. A confidence interval containing the value one (i.e., H_0 holds) indicates a lack of discriminant validity. Conversely, if the value one falls outside the interval's range, this suggests that the two constructs are empirically distinct [57]. Second, using the HTMT as a criterion involves comparing it to a predefined threshold. If the value of the HTMT is higher than this threshold, one can conclude that there is a lack of discriminant validity and indicating an absence of multicollinearity [54]. There are two opinions which state the threshold value of HTMT. Reference [58] suggested the threshold value of HTMT was 0.85, while [54] suggested that the threshold value for HTMT was 0.90. In this study, we used HTMT Ratio as a criterion

TABLE 5. Heterotrait-monotrait correlation ratio (HTMT).

	Firm Performance	Innovation Ambidexterity	Moderating Effect IA*ED	Owner/ Manager Characteristic	Technological Capability
Firm Performance	0.844				
Innovation Ambidexterity	0.848	0.893			
Moderating Effect IA*ED	0.531	0.514	0.524		
Owner/ Manager Characteristic	0.810	0.816	0.860	0.513	
Technological Capability	0.850	0.871	0.829	0.557	0.876

involving comparing it to a predefined threshold. The value of the HTMT ratio in this study can be seen in Table 5.

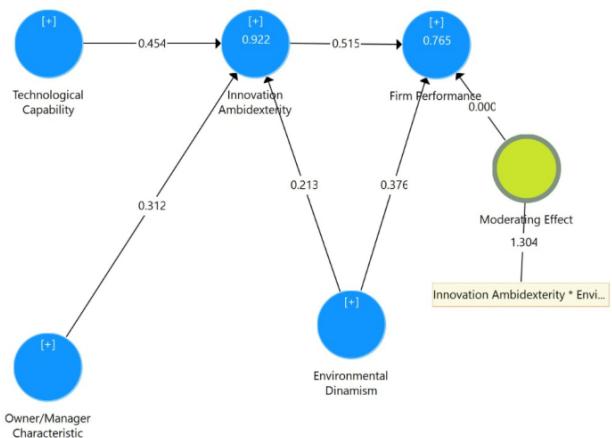
Table 5 shows that not all latent variables used in this study meet the threshold requirements for the HTMT value of 0.85 as determined by [58]. This suggests that there are several variables that are conceptually similar or lack discriminant validity. Several latent variables that are conceptually most likely to be similar are innovation ambidexterity and firm performance (0.893), technological capability and firm performance (0.871), Owner/Manager characteristics and innovation ambidexterity (0.860), and technological capability and Owner/Manager Characteristics (0.876). However, if we refer to the 0.90 threshold requirement stated by [54] that the path model includes constructs that are conceptually different. This indicates that all HTMT values in this study meet the requirements of discriminant validity.

C. STRUCTURAL MODEL

The structural model is verified by examining coefficient of determination (R^2) values, predictive relevance (Stone-Geisser Q^2), and the effect size of path coefficients. The significance of estimates (*t-statistics*) is obtained by performing a bootstrap analysis with 5000 resamples. The results of data processing in this study (Figure 5) show the path coefficient value of each proposed hypothesis. In this study, a confidence level of 0.05 was used so that the path coefficient was considered significant if it had a statistical *t-value* > 1.96 or a *p-value* < 0.05.

The structural model explains 92.2% of variance for innovation ambidexterity ($R^2 = 0.922$), and 76.5% of variance for firm performance ($R^2 = 0.765$). These coefficients of determination represent substantial predictive power [53].

In addition to examining the R^2 , the model is evaluated by looking at the effect size f^2 . The effect size f^2 allows us to assess an exogenous constructs contribution to an endogenous latent variable R^2 . Reference [48] states that the value of the effect size f^2 is 0.02 representing the small effect of exogenous latent variables on endogenous latent variables, if the value of the effect size f^2 is 0.15, representing the moderate effect of exogenous latent variables on endogenous

**FIGURE 5.** Conceptual model.

latent variables, if the effect size f^2 is 0, 35, represents a large effect of exogenous latent variables on endogenous latent variables, while if the effect size value below 0.02 indicates that there is no effect of exogenous latent variables on endogenous latent variables.

In this study, the effect size f^2 of the relationship between technological capability and innovation ambidexterity is 0.232 (moderate effect size), the relationship between the owner/manager characteristic and innovation ambidexterity is 0.085 (low effect size), the relationship between environmental dynamism variables and innovation ambidexterity is 0.086 (low effect size), the relationship between environmental dynamism variables and firm performance is 0.066 (low effect size), and the relationship between innovation ambidexterity and firm performance variables is 0.166 (moderate effect size).

In Table 6, it can be seen that the hypothesis 1-2-3a (H1: *t-value* = 2.955, *p* < 0.005; H2: *t-value* = 5.419, *p* < 0.001; H3a: *t-value* = 2.868, *p* < 0.005) shows that technological capabilities, owner characteristics and environmental dynamics have a positive influence and significant for innovation ambidexterity. In addition, Hypotheses 3b and 4 (H3b: *t-value* = 3.547, *p* < 0.001; H4: *t-value* = 4.781, *p* < 0.001), show a positive and significant relationship between innovation ambidexterity and environmental dynamics on company performance, while Hypothesis 3c (H3c: *t-value* < 1.96, *p* > 0.05), shows that environmental dynamics do not strengthen the positive effect of innovation ambidexterity on firm performance.

The final processing result used is the blindfolding analysis. The results of blindfolding processing cannot be represented in the visual image model. These results illustrate the value of crossvalidated redundancy or Q^2 . The value of Q^2 shows the predictive relevance value of the model. The only variables that get value in the blindfolding analysis are endogenous variables. Variables with a value of Q^2 more than zero indicate that these variables have good predictive relevance and exogenous variables are able to predict their endogenous variables [56]. The Q^2 value is divided into three

TABLE 6. The result of the proposed hypotheses.

Hypothesis	t-value	p-value	Result
H1 The owner-manager characteristic has a positive impact on innovation ambidexterity	2.955	< 0.005	Accepted
H2 Technological capability has a positive impact on innovation ambidexterity	5.419	< 0.001	Accepted
H3a Environmental dynamism has a positive impact on innovation ambidexterity	2.868	< 0.005	Accepted
H3b Environmental dynamism has a positive impact on firm performance	3.547	< 0.01	Accepted
H3c Environmental dynamism acts as a moderator for the relationship between innovation ambidexterity and firm performance	1.96	> 0.005	Accepted
H4 Innovation ambidexterity has a positive impact on firm performance	4.781	< 0.001	Accepted

TABLE 7. Stone-Geisser (Q^2) score.

	SSO	SSE	$Q^2 (=1-SSE/SSO)$
	123.000	123.000	
<i>Environmental Dynamism</i>	861.000	861.000	
<i>Firm Performance</i>	246.000	102.953	0.581
<i>Innovation Ambidexterity</i>	738.000	367.381	0.502
<i>Owner/Manager Characteristic</i>	1353.000	1353.000	
<i>Technological Capability</i>	615.000	615.000	

groups, namely small (0.02), medium / medium (0.15) and large (0.35). Table 7 shows the Q^2 value for the endogenous variables of innovation ambidexterity and firm performance. The results show that the model has a fairly large predictive ability.

SRMR as a measure of goodness of fit for PLS-SEM which can be used to avoid model specification errors [54]. SRMR is defined as the difference between the observed correlation and the model that states the correlation matrix. Thus, it is possible to assess the mean magnitude of the difference between the observed and expected correlations as the absolute measure of the fit criterion (model). A good model is a model that has an SRMR value of less than 0.08 [54]. According to [59], the SRMR value ranging from 0.08 to 0.10 is still acceptable. In this study, it can be seen that the SRMR value in the research model is 0.056 (less than 0.08) so it can be said that the model meets the model fit criteria.

D. DISCUSSION

This study proposes the integration of the technological capability, owner/manager characteristic, environmental dynamism, and innovation ambidexterity that have been proposed by several previous researchers to develop a model for the influence of innovation ambidexterity on the performance of broiler poultry farming in West Java in dealing with

environmental dynamics. The results of the study indicate that owner/manager characteristics have a positive influence on innovation ambidexterity, so that hypothesis 1 proposed in this study is supported. The results of the study show that poultry farmers who have innovative characters and good technological capabilities will have a positive attitude towards technological developments. Thus, they can make adjustments through exploratory and exploitative innovations to avoid falling behind in technological developments that are characteristic of dynamic environments. Conversely, those who have low technological skills and self-confidence may find the process of adapting through innovative and exploitative innovations to deal with environmental dynamics as difficult. The results of this study stated that a poultry farmer needs to have a strong self-confidence to overcome the various challenges associated with running their business, and play an important role in the development and progress of the organization. In facing the environmental dynamism that occurs, owners all at once managers of an organization, including poultry farmers, are required to have a dynamic attitude and be able to adapt to the conditions that occur, and quickly decide on strategic steps to take to sustain the business [17], [21], [24].

In the context of technology, the results of the study show that technological ability has a positive and significant effect on the innovation ambidexterity, thus the hypothesis 2 proposed in this study is supported. The results of this study are consistent with the results of research that stated technological capabilities of an organization have an impact on efforts to improve and develop products and processes, and to create new knowledge and skills [13], [30]. In poultry farming, farmers are proven to be trying to improve their technological skills and knowledge to continue to innovate. The technology capability aims to digitize various processes in poultry farming, thereby minimizing the number of mortality and increasing the quality of the poultry which in turn will increase the productivity of a farm. Thus, in the current condition, where environmental changes cannot be avoided, technological capabilities are an effort to increase the ability to develop innovation to survive.

In the environmental context, the results show that a dynamic environment has a positive and significant relationship with firm performance, where part of the relationship is mediated by the innovation ambidexterity, thus hypothesis 3a and 3c proposed in this study are supported. This shows that the internal organizational structure in a very dynamic environment provides a stimulus for the development of innovation ambidexterity which in the end will have a positive impact on company performance. Broiler poultry farming which has the ability of good innovation ambidexterity will be able to take advantage of the opportunities generated by environmental dynamics. A very dynamic environment will provide a stimulus to develop ambidexterity capabilities so that it has a positive impact on company performance [17], [18]. Dynamic environmental aspects can provide contradictory pressures for exploratory and exploitative

innovations [60], [61]. Thus, companies must be able to respond quickly to extreme changes that occur and take advantage of emerging business opportunities to face unprecedented threats [41], [61].

Meanwhile, hypothesis 3b proposed in this study where the dynamic environment has a direct positive effect on firm performance is not supported. The discrepancy between the results of the study and the theory is suspected because in carrying out all its operational activities, poultry farmers who are respondents in this study did not explore technological developments that have high risks. In addition, poultry farmers who were respondents in this study all run a maintenance system with a partnership pattern, so the problem of price fluctuations and demand that occurs is not fully felt by poultry farmers in West Java, because the selling price of the products has been determined in advance through a cooperation contract with a nucleus-plasma partnership pattern. During the current condition, the environment changed very dynamically, so that poultry farmers were required to continue to develop innovation ambidexterity capabilities which in turn could improve firm performance. In addition, poultry farmers are also required to expand their knowledge and information regarding the conditions of price fluctuations, so that they can immediately take preventive steps for possible risks.

Hypothesis 4 proposed in this study where innovation ambidexterity contributes positively to the firm performance of poultry farmers in West Java is proven to be supported. This study is consistent with the results of a study that state where exploitation and exploration capabilities are two important aspects to achieve a sustainable competitive advantage in a company [16], [44]. The environmental changes that occur today has shifted the strategic objectives of many organizations from “seeking profit” to “seeking resilience”, both absorbent and adaptive [62], [63]. Community broiler poultry farming are also under significant pressure in the face of the environmental changes. Thus, the ability to innovate ambidexterity is very much needed in the face of the environmental changes, based on the results of the study showing that poultry farmers in West Java have good innovation ambidexterity capability in improving their firm performance during the environmental changes that occur.

V. CONCLUSION AND RECOMMENDATION

The results show that firm performance is influenced directly by innovation ambidexterity and indirectly by technological capability, owner-manager characteristics and environmental dynamism. The research results also show that the innovation ambidexterity affects firm performance in poultry farms in West Java. This study identifies a moderate effect size of the relationship between technological capability and innovation ambidexterity, and innovation ambidexterity and firm performance. This shows that technology capability has a moderate contribution to innovation ambidexterity, and innovation ambidexterity has a moderate contribution to firm performance. Meanwhile, the low effect size is indicated by the relationship between owner / manager characteristics and

environmental dynamics on the innovation ambidexterity, and environmental dynamism on firm performance.

Based on the research results, there are several variables that must be considered by poultry farmers to increase the innovation ambidexterity which includes owner / manager characteristics and environmental dynamics. This study indicates that poultry farmer must increase the ability of innovation ambidexterity to be able to achieve superior performance results and achieve a sustainable competitive advantage. The poultry farmers must improve the ability of innovation ambidexterity so that they can continue to withstand environmental pressures that require increased operational efficiency. Broiler poultry farmers must broaden their knowledge and soft skills so that it motivates them to increase self-efficacy, passion for work, risk aversion and extraversion. Increasing the personal capacity of poultry farmers has an impact on increasing their ability to innovate. Meanwhile, poultry farmers must also expand their networks to get external support in a stressful situation by building good cooperation with poultry farmers and company partners. Their ability to manage uncertain conditions can increase the ability of innovation ambidexterity and firm performance.

This study provides insight into actions to balance innovation and efficiency in poultry farming in West Java. The variables identified in this study can serve as a reference for broiler poultry farmers in facing significant stress during the environmental changes. Thus, they can maintain their business performance so that it continues to be stable in uncertain conditions. In addition, this study can also be used as a guide for the government in determining policies related to the performance of poultry farming during an environmental change that occur today, so that the government can take strategic steps to develop programs that are in accordance with the variables identified in this study.

This research has several limitations, including the farmers who become respondents are all plasma breeders from the core company (poultry shop) where exploration of technology development is mostly carried out by the core company (poultry shop) so that most of the risks arising from the exploration process of technology development are also the responsibility from the core company (poultry shop). Poultry farmers who were respondents in this study received the results of the exploration of technology development carried out by the core company (poultry shop) in a condition that was ready to be applied so that the risk posed by the exploration process of technology development carried out could be minimized. Exploration of other factors not examined in this study can be carried out to complement the research results in this study.

This study has limitations and weaknesses that need to be considered for further research. Some suggestions that can be given include collect a more proportional number of samples in each area so that the samples collected can truly represent the area, explore other factors that can influence by adding references related to innovation ambidexterity as a source of its supporting model, and measuring the effect of the ability

of innovation ambidexterity on broiler poultry farms who operate independently, not a plasma from the core company that conducts coaching with a partnership pattern.

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