

The effects of gender and tenure on the relationship between decision-makers' behavioral preferences and university's innovations adoption

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ABSTRACT

The purpose of this empirical study is to determine the effect of gender and tenure of decision-makers as moderator variables on the relationship between decision-makers' behavioral preferences and innovations adoption. This study is motivated by a limited understanding of decision-makers' behavioral preferences on university's innovations adoption which is needed to increase the success of university and industry collaboration. The gender variable consists of males and female while the tenure of decision-makers consists of < 5 years and ≥ 5 years. The study distributed questionnaires to 365 decision-makers of food and beverage firms in Jakarta and its surrounding areas. Quantitative data analysis was conducted using SEM PLS. The results show that decision-makers' behavioral preferences had a significant relationship with innovations adoption. However, none of the moderator variables had any effect on the relationship between decision-makers' behavioral preferences and innovations adoption. Therefore, the study infer that the gender and tenure of decision-makers did not influence the relationship between decision-makers' behavioral preferences and innovations adoption.

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1. Introduction

Innovations adoption has been acknowledged as part of firms' efforts to gain competitive advantage. One of the sources the innovation adoption is called open innovation through university and industry collaboration (Ankrah & Al-Tabbaa, 2015; Ireland et al., 2002; Bloedon & Stokes 1994; Urquhart et al. 2019). Therefore, the university may offer some innovations to be adopted by the firms. However, the success of innovations adoption by the firms faces some challenges in which one of them is a limited understanding of decision-makers' behavior and the innovation adoption process itself needs various approaches for making decisions (Gutierrez et al., 2008). It is acknowledged that decision-makers have an important and strategic role in the process of innovations adoption (Morgan & Finegan 2008, Vagnani & Volpe 2017). Managers as the decision-makers in the firms are agents who have authority from shareholders to maximize profits through various strategic decisions, including innovations adoption that can enhance the firm competitive advantage in the market (Jensen & Meckling, 1976; Urquhart et al., 2019). The decision-makers' behavior on innovations adoption has been influenced by the characteristics of decision-makers (Kimberly & Evanisko, 1981; Bantel & Jackson, 1989; Castle & Banaszak-Holl, 1997; Damanpour & Schneider, 2009). Furthermore, Vagnani and Volpe (2017) investigated the moderating effects of decision-makers' hierarchy and firm size on the relationship between decision-makers' behavioral preferences and innovations adoption. However, there is no empirical research yet that employed gender and tenure as moderator variables on the relationship between decision-makers' behavioral preferences and adoption of innovations from the university. Hambrick and Mason (1984) argued that the managerial background characteristics of decision-makers can predict some organizational outcome including

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strategic choices of decision-makers. Therefore this research will increase the understanding of the effect of gender and tenure of decision-makers on the relationship between decision-makers’ behavioral preferences and innovations adoption. This study also becomes important to enhance the success of university and industry collaboration. This research has aims tri-folds. First is to find out the relationship between decision-makers’ behavioral preferences and university’s innovations adoption, second is to find out the effect of gender as a moderating variable on the relationship between decision-makers’ behavioral preferences and university’s innovations adoption, and last is to find out the effect of tenure as a moderating variable on the relationship between decision-makers’ behavioral preferences and university’s innovations adoption. After the introduction, then this article will discuss theoretical background and research hypotheses. The third part of this article will discuss research methodology and the research result. Before conclusions, the research findings and their implications, research limitations and future research suggestions are discussed in final part of the article.

2. Literature review and hypothesis development

2.1. Literature review

The adoption of innovations in the firms is influenced by the decision-makers’ behavioral preferences (Vagnani & Volpe, 2017). This is understandable considering that decision-makers in firms are rational individuals, that is, people who have relevant knowledge about their environment have an orderly and stable preference system, and the ability to calculate alternative options to achieve the highest scale of their preferences. Adoption of innovation is a strategic decision since it creates a competitive advantage of the firm (Angelmar, 1990). Therefore, according to Hambrick and Mason (1984) strategic decisions that determine the competitiveness of firms are made following the principle of bounded rationality. The process of making strategic decisions under the principle of limited rationality is presented in Fig. 1.

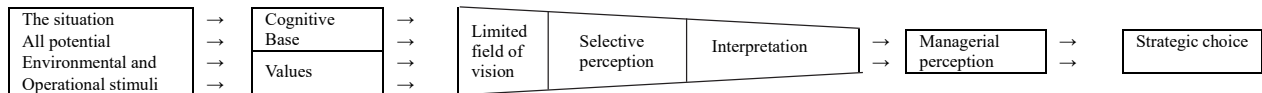


Fig. 1. Strategic choice under condition of bounded rationality (Source: Hambrick & Mason 1984)

In dealing with complex situations, decision-makers use their values and cognitive bases as filters at the stages of the production process of managerial perception which are then used for strategic decision-making. The process takes place with limited views on responding to field phenomena, selective processing of field phenomena and the interpretation of processing results based on values and cognitive bases of decision-makers to become managerial perceptions (Hambrick & Mason, 1984). Decision-makers are often faced with choices in dealing with complex situations. To make decisions from choices it is inevitable the involvement of decision-maker preferences. Therefore, this can be understood through the theory of preferences that studies two fundamental aspects of individual behavior in choosing: 1). Identification and quantification of preferences for a number of alternatives; 2). Development of a decision-making function that represents these preferences. Basically, preference studies can be categorized into two broad themes which are studies of characterization of preferences under certainty or risk conditions as well as studies of a number of alternatives described by a single or multiple attribute (Dyer & Jia, 2006). Adoption of innovation in the firm includes a study of a number of alternatives that are described by some attributes since they are based on the decision-makers' preferences for a number of innovation attributes offered (Taylor & Todd, 1995). The moderator variable is the third variable that influences the relationship between nature and the magnitude among the independent and dependent variables (Koeske 1993). Furthermore, MacKinnon (2011) stated that the strength and form of relationship between the two variables depend on the moderator variable value. According to Cook and Campbell (1979), moderator variables have pertinence to the conclusion validity drawn empirically. Four things can influence the conclusion that the independent variable X affects the dependent variable Y, namely: diversity of sampling, internal validity, experimental construct validity and external validity. The moderator variable influences the validity of the relationship between the independent variables X and the dependent Y, because it shows the real impact of the X and Y relationships in one group context that cannot be generalized to other groups with different contexts.

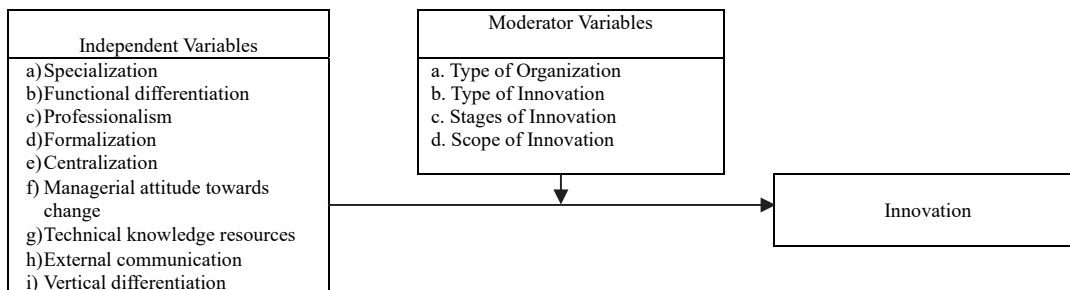


Fig. 2. Moderating variables on relationship of independent variables and innovation (Source: Damanpour 1991)

The study of moderator variables on the relationship between independent variables and innovation has been investigated by Damanpour (1991) as presented in Fig. 2. While the results of the study regarding the influence of moderator variables: type of organization, type of innovation, stages of innovation and scope of innovation on the relationship between independent variables and innovation are presented in Table 1. Damanpour and Schneider (2009) studied the managers' characteristics of public sector organizations namely demographic and personal characteristics as moderator variables on the relationship between innovation adoption and innovation characteristics. The findings of the study are that moderator variables of manager's personal characteristics do not affect, but some of the demographic characteristics of managers which are tenure and education, influence the relationship of innovation attributes on innovation adoption. In another study, Kousar et al. (2017) reported the use of government intervention as a moderating variable to the relationship of green innovation attributes as independent variable and adoption of new environmentally friendly production methods for SMEs in Pakistan as dependent variable. The study found that government intervention in the form of regulation, training, financial support and encouragement of the use of environmentally friendly technology as a moderator variable was significant to the relationship of green innovation attributes and the adoption of green innovation. In a study of adoption of mobile application innovations in hospitals in Kenya, Ngongo et al. (2019) disclosed the use of the hospital's top executives characteristics, namely: sex, education level, and knowledge of m-health applications as moderating variables to the relationship between a group of independent variables which are technology, organization and environment and a group of dependent variables which are adoption of m-application innovation health type Patient- Centered and Facility-Centered. The research found that all moderator variables significantly affected only the relationship of the independent variables and the adoption of the m-health application type Patient Centered (Cheng & Lok, 2015; Braun et al., 2018).

Table 1
The influence of moderator variables on the relationship of independent variables and innovation (Source: Damanpour 1991)

Moderator Variables	Independent Variables								
	Specialization	Functional Differentiation	Professionalism	Formalization	Centralization	Managerial Attitude Towards Change	Technical Knowledge Resources	External Communication	Vertical Differentiation
Type of Organization									
Manufacturing	Positive			Positive	Negative	Non-			Negative
Service	Positive			Negative	Negative	Positive			Positive
For-non profit	Positive	Non-significant		Negative	Negative	Positive			
For-profit	Positive			Positive	Negative	Non-significant			
Type of Innovation									
Administrative	Positive	Positive	Positive	Non-significant	Negative			Positive	Positive
Technical	Positive	Positive	Positive	Non-significant	Negative			Positive	Non-significant
Product	Positive		Non-significant	Positive	Negative		Positive		
Process	Positive		Positive	Positive	Non-significant		Positive		
Radical	Positive		Positive	Non-significant	Non-significant	Non-significant	Positive		
Incremental	Positive		Positive	Non-significant	Non-significant	Positive	Positive		
Stage of Innovation									
Initiation	Non-significant		Positive	Negative	Negative			Positive	
Implementation	Positive	Positive	Positive	Non-significant	Negative			Positive	
Scope of Innovation									
Low	Positive		Non-significant	Non-significant	Positive	Positive		Positive	
High	Positive		Positive	Negative	Negative	Positive		Positive	

2.2. Development of research hypotheses

This research is based on a conceptual model as presented in Figure 3. The constructs of decision-making behavior preferences have a direct relationship to innovation adoption. The relationship is moderated by moderator variables: gender and tenure.

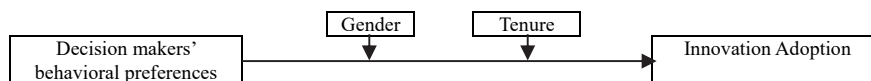


Fig. 3. The conceptual model of the effect of moderation variables on the relationship of decision-makers' behavioral preferences and innovations adoption

Behavioral preferences are defined as the type of action that people will prefer in doing something (Takayama and Watanabe 2015). In this research context, decision-makers' behavioral preferences are defined as the pattern of selected action of decision-makers in adopting of innovations from university. Vagnani and Volpe (2017) argued that the behavior preferences of decision-makers influence the adoption of innovation positively. Therefore, in this research model hypotheses are arranged:

H₁: Decision-making behavior preferences have a positive relationship with innovation adoption.

The gender effect on innovation is still diverse. Damanpour and Schneider (2009) found that the gender of public sector managers does not influence the relationship between innovation attributes and innovations adoption. However, the gender composition on the board of directors of firms as decision-makers make a difference. The women directors in addition to bringing expertise, knowledge, and skills, also bring work styles, experiences, and perspectives that are a benefit to the firms. (Daily & Dalton 2003; Huse 2007). Especially according to Kang et al. (2007), women on the board of directors as decision-makers have a better understanding of consumer needs, consumer behavior, and firm opportunities to meet those needs. Besides, the existence of women in the top management of firms in certain contexts improving firm performance (Dezso & Ross, 2012). Therefore, in this research model hypotheses are arranged:

H₂: Gender has a positive effect on the relationship between decision-maker behavioral preferences and innovation adoption.

The tenure understanding in this study is the year amount of employee's organizational that is the tenure of decision-makers working in the firm. The decision-makers' tenure as moderator variable in this study are less than 5 years and more or equal to 5 years (Liu et al. 2016). The decision-makers' tenure follows an inverse U-shape relationship with innovation. The shorter working lives of decision-makers negatively affect innovation because they are not yet familiar with the work characteristics and the work environment. Furthermore, decision-makers get experience over a longer work period, so that they can handle various critical issues that arise during the innovation process (Kearney et al., 2000; Damanpour & Schneider, 2009). Therefore, in this research model hypotheses are arranged:

H₃: The tenure of a decision-maker has a positive effect on the relationship between the decision-maker's behavioral preferences and innovation adoption.

3. Methodology

3.1. Sampling and data collection

This research is explanatory research which is carried out in a survey of 365 decision-makers with positions of at least managers in firms throughout Jakarta and its surroundings. The sample selection is Implemented by purposive sampling using personal contacts and professional researchers at several food and beverage firms in Jakarta, Bogor, Tangerang, and Bekasi regions. The questionnaire was filled out and distributed through surveyors who interviewed decision-makers with minimal positions of a manager. The data collected was 365 respondents. Respondents who participated in this study had the following profiles: 64% men and 36% women; 86% of managers, 2% of directors and 12% of other positions between manager and director levels; 22% work experience is less than 5 years, 48% work experience between 5-10 years, 24% work experience between 10-15 years and 6% work experience is more than 15 years. The main products produced by respondent firms are 45% of food products, 28% of beverage products, and 27% of food and beverage products.

3.2. Variable measurements

The variables involved in this study as presented in Fig. 4, are: Decision-Makers' Behavioral Preference (DMBP) which is defined as the tendency of decision-makers' preferences for innovation from universities which are considered to be adopted based on measures of attitude (X1: Evaluation of the costs of innovation benefits), subjective norms (X2: Consideration of the value of innovation from the perception of others) and perception of control of its behavior (X3: Assessment of internal capacity for adoption of innovations), as well as the Innovation Adoption variable (IA) which is defined as the decision to adopt innovations from the university, measured from Y1: Drafting of cooperation contracts and Y2 : Technical training related to innovation to be adopted. Respondents of this study to the statements in the questionnaire stated with a 5-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree.

3.3. Data Analysis

Data obtained from the survey are grouped according to moderator variables in this study (gender and tenure of decision-makers) to determine the effect of moderator variables on the relationship of DMBP and IA variables which are then processed using SEM PLS. SEM technique is used for several reasons, including: robust with little identification issues, focus on prediction of the dependent variable, the model involves moderator variables, few indicators of model measurement, and measurements are reflective.

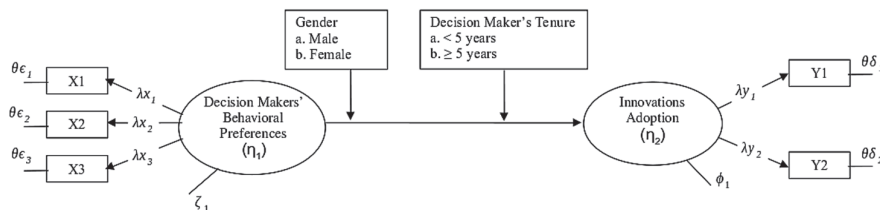


Fig. 4. The measurement model of the effect of moderation variables on the relationship of behavioral preferences of decision-makers and innovations adoption

4. Research result

Data processed by SEM PLS presents two parts, namely the results of the evaluation of the reliability and validity of the measurement model and the results of the evaluation of the structural model and the evaluation of moderator variables.

Table 2
Measurement model evaluation

Indicator	Standardized Loading Factor	t-Value	Conclusion	AVE	CR
DMBP					
X1	0.83	48.50*	Significant	0.71	0.88
X2	0.86	52.38*	Significant		
X3	0.84	52.85*	Significant		
IA					
Y1	0.92	114.89*	Significant	0.84	0.88
Y2	0.92	114.32*	Significant		

* $\alpha = 5\%$ (t-table: 1.96)

It appears as presented in Table 2, the results of the evaluation of the reliability and validity of the model are satisfactory. For the reliability of the model it was found that the DMBP variable has the value of AVE (Average Variant Extracted) = 0.71 and the AI variable has AVE = 0.84 which means that all the variables in this study are reliable because the value is above 0.50 which can explain more than half of the diversity of indicators (Hair et al., 2014). For the validity of the model it is found that the DMBP variable has a CR value (Composite Reliability) = 0.88 while the AI variable has a CR = 0.91 which means that all variables have consistency and are reliable because they show values above 0.70 (Hair et al., 2014). Then, each indicator of these variables has a standardized factor loading value above 0.70 which means the convergence validity has been fulfilled as stated by Hair et al. (2014), that in the confirmatory factor analysis each factor is declared valid if the value of the standardized loading factor is greater than 0.70. The structural measurement results of the model, as presented in Table 3, show the relationship between the decision-makers' behavioral preferences (DMBP) and the innovations adoption (IA) is significant because the t-value is 9.48 which is above the t-table value of 1.96.

Table 3
Structural model evaluation

Relationship	Path Coefficient	Standard Error	t-Value	Conclusion
DMBP → IA	0.91	0.08	9.48*	Significant

* $\alpha = 5\%$ (t-table: 1.96)

For the evaluation of moderator variables, which are presented in Table 4 and Table 5, they show that gender and years of service do not have an influence on the relationship between decision-makers' behavior preferences and innovations adoption. The t-value of the gender difference is 0.88 which is smaller than the t-table value of 1.96 so that the conclusion is that there is no difference between the male and female groups on the relationship of DMBP and AI. Furthermore, the value of t-count difference in the tenure of decision-makers is 0.67 which is smaller than the t-table value of 1.96 so that the conclusion is that there is no difference between the < 5 year working group and the working group >= 5 years of the DMBP and AI relationship .

Table 4
Evaluation on gender as moderator variable

Relationship	Group 1 (Male)		Group 2 (Female)		Group 1 vs Group 2		
	Path Coefficient (1)	Path Coefficient Standard Error (1)	Path Coefficient (2)	Path Coefficient Standard Error (2)	PC (1) – PC (2)	t- Value	Conclusion
DMBP → IA	0.58	0.06	0.66	0.07	0.08	0.88	There is no differences
Sample size (n)	240		125				

If t-Value > 1.96 ($\alpha=5\%$) then there is a difference between the groups

Table 5
Evaluation on tenure as moderator variable

Relationship	Group 1 (< 5 years)		Group 2 (≥ 5 years)		Group 1 vs Group 2		
	Path Coefficient (1)	Path Coefficient Standard Error (1)	Path Coefficient (2)	Path Coefficient Standard Error (2)	PC (1) – PC (2)	t- Value	Conclusion
DMBP → IA	0.55	0.09	0.62	0.05	0.07	0.67	There is no differences
Sample size (n)	80		285				

If t-Value > 1.96 ($\alpha=5\%$) then there is a difference between the groups

5. Discussion

Based on the results of the study as presented in Table 3, it is known that the first hypothesis (H1) of this study: Behavioral preference of decision-makers has a positive effect on the adoption of innovation is accepted. The findings of this study are in line with the study of Vagnani and Volpe (2017) which found that the behavioral preferences of decision-makers positively influenced the adoption of innovation. This finding shows that decision-makers in the firm have an important role in innovation adoption decisions, especially managers because most respondents of this study are managers (86%) as Damanpour and Schneider (2009) also stated that the characteristics of firm managers influence innovation adoption. The measurement of decision-maker behavior preferences in this study was carried out through three indicators: evaluation of the cost of innovation benefits, consideration of the value of innovation from the perception of others and an assessment of internal capacity for the adoption of the proven innovation. Evaluation of the costs and benefits of innovation is used considering that in general innovations from universities are still at an early stage so firms will need further development according to their needs (Thursby & Thursby, 2003). Consideration of perceptions from other parties in deciding the adoption of innovations requires decision-makers in the firm to get effective results as organizational decisions that are decisions that result from individual decisions in the context in which individuals make decisions (Carley & Behrens, 1999). An assessment of a firm's internal capacity is important so that the adoption of innovations by firms can be successful because innovations from universities need to be adapted to the resources of the firm, especially human resources (Fabrizio, 2009). Therefore based on the research findings presented in Tables 2 and 3, that the decision-makers' behavioral preferences towards the innovations adoption have a significant relationship with the cost and benefits of innovation, perceptions of the value of innovation from other parties in the firm and internal capacity for adoption of innovations that are in line with the results of several previous studies (de Jong et al., 2003; Khoubati et al., 2014; Valente, 1996; Berta et al., 2005; Aarons et al., 2011).

Associated with the effect of gender as a moderating variable on the relationship of decision-making behavior preferences and innovation adoption, it is known that the second hypothesis (H2) of this study was rejected because from Table 4 it is known that there were no significant differences between the male decision-making group and the female decision-making group on the relationship between behavioral preferences of decision-makers and adoption of innovations. This finding shows that there is no difference in the behavior preferences of decision-makers in firms between male and female decision-makers in adopting innovations from university. Although according to Hudgens and Fatkin (1985) that at the individual level, women have lower risk preferences than men. Sexton and Bowman-Upton (1990) stated that female entrepreneurs were less willing to be involved in uncertain situations than male entrepreneurs. But at the organizational level, according to Wallach et al. (1964) individual preferences can change due to the diffusion of responsibilities. Therefore, it can be understood why there is no difference in the behavior preferences of decision-makers in firms between male and female decision-makers due to the diffusion of responsibilities as managers or directors of firms related to strategic decisions on innovation adoption. Cooper and Kagel (2005) reinforced this argument since groups of people in organizations are more rational and risk neutral than individuals. The moderator variable of the tenure of the decision-maker also has no influence on the relationship between the decision-makers' behavioral preferences and innovation adoption. Therefore, the third hypothesis of this study (H3) was rejected because Table 4 shows no differences in the behavior preferences of decision-makers with working tenure less than 5 years and decision-makers who have worked more than or equal to 5 years in deciding the adoption of innovations from university. The result of this study is not in line with the findings of Damanpour and Schneider (2009) that the shorter tenure of decision-makers will negatively affect innovation but as time progresses the decision-makers gain experience so that they are accustomed to various critical issues that arise during the innovation process and have a positive influence on innovation. A possible explanation for the absence of a difference between decision-makers who have worked for less than 5 years and those who have worked for more than or equal to five years on the relationship between decision-maker behavioral preferences and innovations adoption from university is the influence of culture and corporate value on the behavior of decision makers in the adoption of innovations. This argument is consistent with the findings of Liu et al. (2016) that firm culture influences the innovative behavior of employees. This study makes a significant academic contribution, because (1). There is still a limited understanding of the relationship between the constructs of decision-makers' behavioral preferences in firms and innovations adoption decisions within the framework of university and industry collaboration. This study states that there is a positive relationship between the behavior of decision-makers in firms towards the adoption of innovations, especially from university; (2). There is still a limited understanding of the influence of moderator variables on the relationship of various independent variables related to innovation with the innovation-adoption dependent variable. This research increase the understanding about it. The findings this research revealed that gender and the tenure of decision-makers as the moderating variables do not influence the relationship between decision-makers' behavioral preferences and innovation adoption.

6. Conclusion

This research has successfully revealed the significant influence of the relationship between the behavioral preferences of decision-makers on the adoption of innovations from the university. However, it turns out that none of the moderator variables in this study, namely gender and the tenure of decision-makers, had any effect on the relationship between decision-makers' behavioral preferences and innovation adoption. In addition to supporting previous studies related to the adoption of innovations in firms that are related to behavioral preferences of decision-makers, this research adds a better understanding for firms and universities to work together to adopt innovations. The implications of this research for firms, among others, will provide an understanding that decision-makers in firms using their preferences can play an important role in the adoption

of innovations, especially from the university. However, the decision on adopting the innovation was not influenced by gender and the working period of the decision-maker. External parties, especially universities, can use the results of this research to increase the success of innovation cooperation with industry. For the government as a third party in the Triple-Helix collaboration model, this research provides input in the formulation of regulations and policies that pay attention to the behavior preferences of decision-makers in the firm. This study has several limitations that can make it difficult to generalize the results of the research found. These limitations include: a cross-sectional approach has not been able to fully capture the phenomena that occur in the field related to the behavior of decision-makers in the firm. Therefore, it will be a suggestion for further research to examine the behavior of decision-makers in firms using a longitudinal approach to get a comparison of decision-makers' preferences towards the adoption of innovations in the firm. Another thing is the limitations of research conducted in the food and beverage industry sector, which may have different results if carried out in other industrial sectors. Future research may be suggested to include several industry sectors as a comparison of decision-makers' behavioral preferences towards the adoption of innovations.

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