

# THE EFFECT OF FIRM CHARACTERISTICS AND COLLABORATION EXPERIENCE ON THE RELATIONSHIP BETWEEN DECISION-MAKERS BEHAVIORAL PREFERENCES AND UNIVERSITY'S INNOVATIONS ADOPTION

JAM

18, 3

Received, May '20

Revised, May '20

June '20

Accepted, June '20

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**Abstract:** This study aims to determine the effect of moderator variables on the relationship between decision-makers behavioral preferences and innovation adoption. Moderator variables are collaboration experience with university and firm characteristics such as ownership of the firm, size of the firm, and status of the firm. There is still a limited understanding of decision-makers behavioral preferences in the adoption of innovations from university, even though this understanding is needed to enhance the success of university and industry collaboration. This study explores several moderator variables that have not been previously studied together before on the relationship between decision-makers behavioral preferences and innovation adoption. This study distributes questionnaires to 365 respondents who are decision-makers of food and beverage firms in Jakarta and surrounding areas. Quantitative analysis of SEM data was carried out with LISREL. The results showed that decision-makers behavior preferences have a significant relationship with innovations adoption and only the status of the firm and collaboration experience with university influence the relationship between decision-makers behavioral preferences and innovations adoption. The results of this study reflect that some moderator variables have a significant effect on the relationship between decision-makers behavioral preferences and innovations adoption. Future research may employ other moderator variables such as government regulations to find out its influence on the adoption of innovation from the university.

**Keywords:** decision-makers behavioral preferences, innovations adoption, firm characteristics, collaboration experience.

**Cite this article as:** Kuntadi, Yahya Agung, Ujang Sumarwan, Mukhamad Najib, and Siti Jahroh. 2020. The Effect of Firm Characteristics and Collaboration Experience on The Relationship between Decision-Makers Behavioral Preferences and University's Innovations Adoption. *Jurnal Aplikasi Manajemen*, Volume 18, Number 3, Pages 475–485. Malang: Universitas Brawijaya. <http://dx.doi.org/10.21776/ub.jam.2020.018.03.07>



Journal of Applied  
Management (JAM)  
Volume 18 Number 3,  
September 2020  
Indexed in Google Scholar

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Bogor, DOI: [http://dx.doi.org/  
10.21776/ub.jam.2020.018.  
03.07](http://dx.doi.org/10.21776/ub.jam.2020.018.03.07)

University and industry collaboration is one form of open innovation that firms can use to gain a competitive advantage in the market (Bloedon and Stokes 1994; Ireland *et al.* 2002, Ankrah and Al-Tabbaa 2015). However, there are still many challenges faced for the success of university and industry cooperation. One of the challenges is that there is still a limited understanding of the behavior of decision-makers in the firms that are built from reciprocal communication on a regular, timely, adequate and accurate basis (Bstieler 2015). Decision-makers play an important role in the process of innovations adoption in the firms (Vagnani and Volpe 2017, Damanpour and Schneider 2009). Decision-makers in the firms are agents who have the authority of shareholders as the principal to maximize profits, including in the decision to adopt innovations that can encourage the achievement of the firm's competitive advantage (Jensen and Meckling 1976, Porter 1985).

Several factors in decision making of innovations adoption influence decision-makers behavior, such as attributes of innovation, social networks of decision-makers, decision-making criteria, the hierarchy of decision-makers and the characteristics of decision-makers (Kimberly and Evanisko 1981, Miller and Friesen 1984, Meyer and Goes 1988, Damanpour and Schneider 2009, Vagnani and Volpe 2017, Urquhart *et al.* 2019). Although some factors have been investigated as moderating variables on the relationship between decision-makers behavioral preferences and innovations adoption, such as the hierarchy of decision-makers and firm size (Vagnani and Volpe 2017), yet there is no empirical research that employing ownership of the firms, size of the firms, the status of the firms and collaboration experience with the university at the same time as a moderating variable on the relationship of decision-makers behavioral preferences and adoption of innovation from the university. This research has become important to increase understanding of decision-makers behavioral preferences towards innovations adoption to support the success of the future university and industry collaboration.

The aims of this research are, first, to find out the relationship between the behavioral preferences

of decision-makers and the adoption of the innovation from university; second, to find out the effect of status of the firms on the relationship between decision-makers behavioral preferences and innovations adoption from university; third, to find out the effect of ownership of the firms on the relationship between decision-makers behavioral preferences and innovations adoption from university; fourth, to find out the effect of size of the firms on the relationship between decision-makers behavioral preference and innovations adoption from university; and lastly, to find out the effect of the collaboration experience with the university on the relationship between the decision-makers behavioral preferences and innovations adoption from the university.

In this article after the introduction, the second part will discuss the theoretical background and research hypotheses, then in the third part will discuss the research method, the research findings, and discussion are presented in the fourth part and finally is conclusions and suggestions.

## **THEORETICAL BACKGROUND & HYPOTHESES DEVELOPMENT**

### **Decision-Makers Behavioral Preferences**

Takayama and Watanabe (2015) define behavioral preference as the chosen pattern of action. Therefore in this research the decision-makers behavioral preferences are defined as the pattern of actions chosen from decision-makers in adopting innovations from the university. The adoption of innovations in the firms is influenced by the behavioral preferences of decision-makers (Vagnani and Volpe 2017). This argument can be understood since the decision-makers in the firms are rational individuals. The rational people have relevant knowledge about their environment, have an orderly and stable preference system, and also the ability to calculate alternative options available to achieve the highest scale of their preferences (Simon 1955). Hambrick and Mason (1984) argued strategic decisions that determine the competitiveness of the firms are made following the principle of bounded rationality. Decisions related to the adoption of innova-

tion are strategic decisions since they create a competitive advantage (Angelmar 1990).

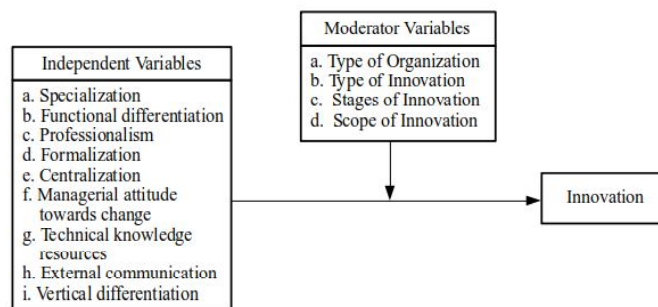
Decision-makers often face choices in dealing with complex situations. Decision-makers preferences are unavoidable to be involved in decision making over the choices (Dyer and Jia 2013). Taylor and Todd (1995) found that the adoption of innovation in firms is based on the preferences of the decision-maker for several innovation attributes offered.

**Moderating Variables and Innovations Adoption**

Koeske (1993) argued that the moderator variable is the third variable that affects the size and

nature of the relationship between the dependent and independent variables. The strength and shape of the relationship between the two variables depend on the value of the moderator variable (MacKinnon 2011). Furthermore, Cook and Campbell (1979) said that moderator variables have relevance to the validity of conclusions drawn empirically.

The moderator variables on the relationship between independent variables and innovations that have been studied by Damanpour (1991) are presented in Figure 1.



Source: Damanpour, 1991

**Figure 1** Moderating Variables on The Relationship of Independent Variables and Innovations

Ngongo *et al.* (2019) reported that characteristics of top executives in hospitals in Kenya such as sex, education level, and knowledge of m-health applications as moderating variables significantly affected to the relationship between independent variables (technology, organization, and environment) and dependent variables (adoption of m-application innovation health Patient-Centered type and Facility Centered type). Kousar *et al.* (2017) found that government intervention as a moderator variable was significant to the relationship between innovation attributes (relative advantage, complexity, and trialability) and the adoption of green innovation.

University and industry collaboration is a source of innovation for the firms to gain competitive advantage (Perkmann and Walsh 2007). Therefore collaboration experience with the university is a strategic factor to be considered in advancing innovation of university to the firm. The experienced firms will have better handling in identifying partners, negotiating and making contractual agreements and knowing when to end cooperation (Simonin 1997).

**Hypothesis Development**

This study is based on a conceptual model as presented in Figure 2. The constructs of behavioral

preferences of decision-makers have a direct relationship to the adoption of the innovation. The relationship is moderated by the status of the firms, size of the firms, ownership of the firms, and collaboration experience.

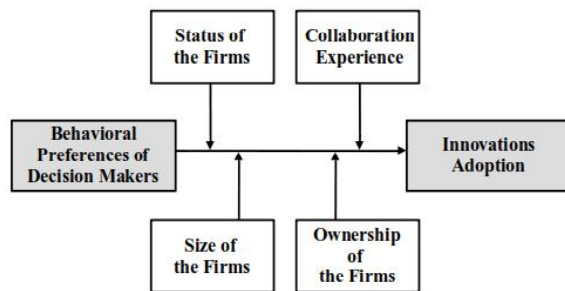


Figure 2 The Conceptual Model of The Effect of Moderation Variables on The Relationship of Decision-Makers Behavioral Preferences and Innovations Adoption

Behavioral preferences of decision-makers are an individual preference as representations of attitudes, subjective norms, and perceived behavioral control of decision-makers over innovations that lead to adoption decisions. Vagnani and Volpe (2017) argued that the behavior preferences of decision-makers have a positive influence on the adoption of innovation. Therefore based on these arguments, the study hypothesizes that:

H<sub>1</sub> : Decision-makers behavioral preferences have a positive influence on

**Innovations Adoption**

The status of the firm consists of private firms whose share ownership is not listed on the stock exchange and public firms whose shares are listed on the stock exchange. Karim *et al.* (2013) stated that private firms do not raise equity from the public and therefore are not subject to the rules of having to disclose their financial information while the listed firms are required to follow the rules of disclosure from the stock market to disclose information related to corporate actions including financial information. Therefore based on these arguments, the study hypothesizes that:

H<sub>2</sub>: Status of the firm has a positive influence on the relationship between decision-makers behavioral preferences and innovations adoption.

The ownership of the firm consists of local firms that only have domestic investment and foreign firms that have foreign investment. Vishwasrao and Bosshardt (2001) stated ownership of the firm is an important issue in technology transfer and foreign-owned firms tend to adopt many new technologies. Therefore based on these arguments, the study hypothesizes that:

H<sub>3</sub>: Ownership of the firm has a positive influence on the relationship between decision-makers behavioral preferences and innovations adoption.

The size of the firm in this study follows the OECD (2017) definition that a large firm is a firm with several employees above 250 people and a small firm is a firm with employees numbering less than 250 people. Barbosa *et al.* (2013) found that the tendency of large firms to adopt innovations is related to their accumulated knowledge and abilities. Akcigit and Kerr (2010) found that large firms were more involved in exploitative research and development activities, while small firms involved in exploratory research and development activities. Therefore based on these arguments, the study hypothesizes that:

H<sub>4</sub>: The size of the firm has a positive influence on the relationship between decision-makers behavioral preferences and innovations adoption.

The experience of collaborating with universities in this research refers to the experience of the firms collaborating with innovations offered by universities. Findik and Beyhan (2015) found that firms involved in external collaboration during the innovation process got improvements in their products and markets. Powell *et al.* (1996) stated that in the biotechnology industry, collaborative experience makes firms more open to new partnerships. The firms that have collaborative experience will be better in the handling of identifying potential partners, negotiating and making contractual agreements and know-

ing when to end cooperation (Simonin 1997). Therefore based on these arguments, the study hypothesizes that:

H<sub>3</sub>: The collaboration experience with the university has a positive influence on the relationship between decision-makers behavioral preferences and innovations adoption.

**METHOD**

**Sampling and Data Collection**

This research is explanatory research with the research’s population is decision-makers of food and beverage firms in Jakarta, Bogor, Tangerang, and Bekasi regions. The food and beverage firms involved in this survey are members of GAPMMI (the Indonesian Food and Beverage Association). This research is a survey of 365 decision-makers with positions of at least managers. The sample selection is done by purposive sampling using personal contacts at several food and beverage firms. The questionnaire was filled out and distributed through surveyors who interviewed decision-makers. Respondents who participated in this study had the following profiles: 64% men and 36% women; 86% managers, 2% directors and 12% other positions between manager and director levels; 22% work experience is less than 5 years, 48% work experience is between 5-10 years, 24% work experience is between 10-15 years and 6% work experience is more than 15 years. The main products produced by respondent firms are 45% food products, 28% beverage products, and 27% food and beverage products.

**Measurement of Variables**

The variables employed in this study are Behavioral Preference of Decision-Makers (BPDM), which is defined as the preference of decision-makers for innovation from university considered to be adopted based on the measurement of attitudes (X1: Evaluation of innovation cost-benefits which has standardized loading value = 0.75), subjective norms (X2: Consideration of innovation value from the perception of other parties, which has standardized loading value = 0.76) and perceived behavioral control (X3: Assessment of internal capacity for innovations adoption, which has standardized loading value = 0.76). The value of AVE (Average Variant Extracted) and CA (Cronbach’s Alpha) for BPDM are 0.57 and 0.79. Innovations Adoption (IA) which is defined as the decision to adopt innovations from universities, has AVE = 0.68, and CA = 0.81. The IA variable is measured by the preparation of collaboration contracts (Y1), which has standardized loading value = 0.84: and technical training related to innovations to be adopted (Y2), which has standardized loading value = 0.81. A value of AVE above 0.50 is said to be valid, and likewise, a CA value above 0.70 is said to be reliable. All standardized loading values of the above indicators are 0.70, which means the convergence validity prerequisite has been fulfilled. The statements in the questionnaire stated with a 5-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree.

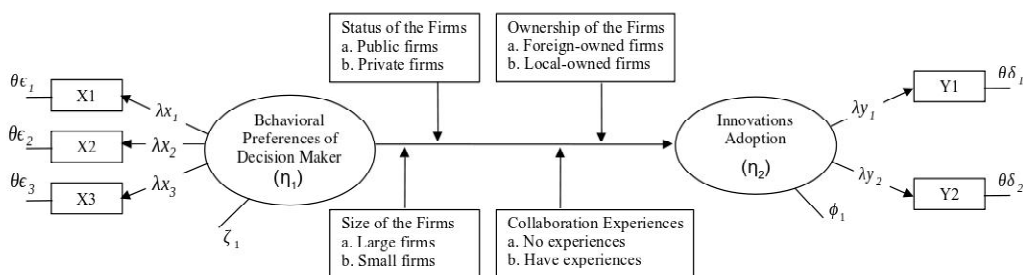


Figure 3 The Measurement Model of The Effect of Moderation Variables on The Relationship of Behavioral Preferences of Decision-Makers and Innovations Adoption

**Data Analysis**

Data obtained from the survey are grouped according to moderating variables in this study to determine the effect of moderating variables on the relationship between BPDM and IA variables which are then processed using SEM LISREL.

**RESULTS**

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

As presented in Table 1, the results of the evaluation of the reliability and validity of the model are satisfactory. The standardized factor loading indicator value for each variable is above 0.70 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. Secondly, the indicator R<sup>2</sup>, which is a measure of the accuracy of model predictions, where the results are all Variables above 0.50. Hair *et al.* (2014) argued, in the rule of thumb, there are three categories of R<sup>2</sup> values, namely above 0.75 is substantial, between 0.50-0.75 is moderate and between 0.25-0.50 is weak. Therefore, the results of the above study show that all variables have moderate prediction accuracy. The AVE value for all variables above 0.50 is obtained so that all variables in this study are reliable because they can explain more than half of the diversity of indicators (Hair *et al.* 2014). Another reliability indicator, CA shows above 0.70 for all variables, which means all variables have consistency and are reliable.

The structural measurement results of the model as presented in Table 2, show the relationship between behavioral preferences of decision-makers and innovations adoption is significant because the t-value is above the t-table value.

**Table 1 Measurement Models Evaluation**

Indicators	Standardized Factor Loading	Error Variance	R <sup>2</sup>	AVE	CA
BPDM				0.57	0.79
X1	0.75	0.43	0.56		
X2	0.76	0.41	0.58		
X3	0.76	0.43	0.57		
IA				0.68	0.81
Y1	0.84	0.31	0.70		
Y2	0.81	0.37	0.66		

**Table 2 Structural Model Evaluation**

Relationship	Path Coefficient	Standard Error	t-Value
BPDM → IA	0.91	0.08	9.48*

\* α = 5% (t-table = 1.96)

**Table 3 Moderation Variables Evaluation**

Moderating Variables	Model 1		Model 2		(1) – (2)
	Chi-Sq. (1)	DF	Chi-Sq. (2)	DF	
Ownership	507.3	336	506.6	335	0.7
Status	438.8	337	433.7	336	5.1*
Size	1360.3	334	1362.1	333	1.8
Experience	537.9	335	519.9	334	18.0*

\* α = 5% (Chi square with DF(1) = 3.84)

Table 3 which is the evaluation of moderator variables, shows that the status of the firms and the collaboration experience have a significant influence on the relationship of decision-maker behavioral preferences and innovations adoption since each

their Chi-square value difference is above 3.84. Whereas ownership of the firms and size of the firms do not influence the relationship between decision-maker behavioral preferences and innovations adoption.

Table 4 Standardized Path Coefficient BPDM to AI

Moderating Variables	Status of The Firms		Collaboration Experience		Size of The Firms		Ownership of The Firms	
	Public Firms	Private Firms	Yes	No	Small Firms	Large Firms	Domestic Firms	Foreign Firms
Standarized path coefficient BPDM → AI	0.79	1.07	0.71	1.01	0.83	0.89	0.96	0.83

**DISCUSSION**

First of all, based on the results of the research presented in Table 3, it is known that the first hypothesis (H1) of this study: behavioral preference of decision-makers has a positive relationship with the adoption of the innovation is accepted. The findings of this study support the findings of previous studies that the behavioral preference of decision-makers have a significant relationship with the adoption of the innovation (Vagnani and Volpe 2017). These findings showed that decision-makers in the firms have an important role in the decision to adopt innovations, especially managers because most of the respondents of this study were managers. Managers in all the food and beverage firms that participated in the survey, have to make decision routinely according to their authority and job description, including to make a decision about innovations adoption such as new product development when it is needed. From the work experience of the respondents, most of the managers between 5-15 years can be understood that the length of work experience of firm employees, including managers as decision-makers, has a positive influence on the adoption of the innovation (Ng and Feldman 2013). This evidence supports the significant relationship between decision-makers behavioral preferences and innovation adoption since, the longer year work of

decision-makers in the firms, especially in this research is food and beverage firms, the more familiar they are in handling many issues including innovation adoption which gives benefits to the firms.

Secondly, related to the influence of moderator variables on the relationship of behavioral preferences of decision-makers and innovations adoption, it is known from Table 4, that the second hypothesis (H2) and the fifth hypothesis (H5) of this study were accepted since the only status of the firms and collaboration experience had a significant influence, where for the status of the firms the effect is positive even though it is not strong and the influence of collaboration experience is positive and quite strong. These findings showed that there are differences in the behavioral preferences of decision-makers between the listed firms and private firms. Table 5 showed the standardized path coefficient values between the behavioral preference of decision-makers and the innovation’s adoption for public firms is greater than for private firms. These findings showed that the relationship between behavioral preferences of decision-makers and innovation adoption has a more significant effect on private firms.

The differences may come from the demand for the openness of listed firms is greater than private firms due to the stock exchange regulation

(Karim *et al.* 2013). The openness of the listed firms in adopting innovation becomes a subject of attention because it is a strategic action to achieve the firm's competitive advantage in the market. The opposite happens to decision-makers in the private firms who are not required to disclose information on the action of innovations adoption to the public so that they can keep the innovation products confidentially until they are launched on the market. The other explanation of this evidence is the public firms have to follow prudence principles in doing business since managing the investor's trust including when in deciding innovations adoption which may affect the firms' profitability. Especially in the food and beverage industry which has a high turnover of new products in the market. Therefore the status of the firms has a significant influence on the relationship between decision-makers behavioral preferences and innovation adoption.

The moderator variable of collaboration experience turned out to have a significant positive effect on the relationship between behavioral preferences of decision-makers and innovations adoption. These findings in Table 4 showed that the differences in behavioral preferences of decision-makers between the firms that have experience collaboration with external parties, such as universities and the firms that have not yet had experience collaboration. Table 5 showed that the coefficient value of the standardized path between the behavioral preferences of decision-makers and innovations adoption for the firms that have no collaboration experience with universities is greater than for the firms that have collaboration experience. This finding showed that the relationship between the behavioral preferences of decision-makers and innovations adoption has a more significant effect on the firms that have no collaboration experience.

The results of this study are following the findings of Simonin (1997), firms that have experience working with external parties will be better at identifying potential partners, making collaboration agreements, and knowing when to terminate collaboration. University and industry collaboration has a formation process which is must be followed thoroughly as the experience of both parties. The for-

mation process is as follows: 1. Partnership identification, 2. Make contact, 3. Partner assessment and selection, 4. Partnership negotiation, and 5. Agreement signing (Ankrah and Al-Tabbaa 2015). The good experience will encourage the decision-makers in innovations adoption decision, otherwise will make innovations adoption harder to be taken place.

The other explanation of these findings is food and beverage firms must develop collaboration in formulating a new product with external parties including suppliers and research institutes such as a university to get success in the market. The high collaboration standard of food and beverage firms is not easy to be met by the external collaboration partners including university. Therefore the firms which have experience collaborating with the university have a lower coefficient value of the standardized path since they may have some unpleasant experience in terms of standard collaborations.

Based on Table 4, the third (H3) and fourth (H4) hypotheses were rejected. The ownership of the firms does not influence the relationship decision-makers' behavioral preferences and innovations adoption. These findings showed that decision-makers in domestic investment firms behave no different from their colleagues who work in foreign investment firms. These findings can be explained because decision-makers are rational individuals who have a work contract with shareholders to maximize profits regardless of domestic or foreign shareholders. Pittayasophon and Intarakumnerd (2013) found similar findings that local-owned and foreign-owned firms did not significantly influence the decision to collaborate with universities.

The ownership of the firms in the food and beverage industry may not have a great influence on decision-makers, especially when deciding innovation adoption since the market may the prime determinant in deciding which innovation will get success in the market. Therefore both domestic and foreign-owned firms in the food and beverage industry mostly take a closer look at the local market in regards to adopting innovation for instance.

The size of the firms does not influence on the relationship between decision-maker behavioral preferences and innovations adoption. These find-



ings showed that between decision-makers who work for the large firms and those who work for the small firms do not have differences in behavioral preferences related to the innovation's adoption. These findings are in line with the study of Vagnani and Volpe (2017) that the moderating effect of the organization size on the relationship of decision-makers behavioral preferences and innovations adoption was found not significant. Furthermore, Hambrick and Mason (1984) argued that decision-makers use their values and cognitive bases for strategic decision making. Both large and small firms are challenged to survive in market competition. Therefore the decision to adopt an innovation is a strategic decision that must be taken by large and small firms. Both large and small firms must develop their competitive advantage as well through innovations.

The other explanation of these findings is the product standard in the food and beverage industry is the same for large and small firms. Therefore decision-makers behavioral preferences in large and small food and beverage firms are no different when adopting innovation, especially product innovation.

This study makes a significant academic contribution, because (1). There is still not much knowledge about the relationship between the constructs of decision-makers' behavioral preferences in the firms and innovations adoption decisions within the framework of university and industry collaboration. This study found that there is a positive relationship between the decision-makers behavioral preferences and innovations adoption, in this study the innovations are from university; (2). There is still not much knowledge about the influence of moderator variables on the relationship of various variables related to innovation (independent variables) with innovations adoption (the dependent variable). This study found that the status of the firms and collaboration experience as moderator variables have a strengthening influence, at different levels, on the relationship between decision-makers' behavioral preferences and innovations adoption.

## CONCLUSIONS AND RECOMMENDATIONS

### Conclusions

This research has succeeded in revealing the influence of some moderating variables on the relationship between decision-makers' behavioral preferences and innovations adoption. The nature of the relationship between decision-makers' behavioral preferences and innovation adoption can be known by some moderating variables.

Decision-makers' behavioral preferences influence innovation adoption significantly. The status of the firms and collaboration experience has a significant effect on the relationship between decision-makers' behavioral preferences and innovation adoption. Whereas the size of the firms and ownership of the firms do not affect the relationship of decision-makers' behavioral preferences and innovation adoption.

Besides supporting previous studies, this study also enhances the knowledge and understanding of firms and universities to work together in innovation adoption.

### Recommendations

The implications of this research for the firms are to provide an understanding that decision-makers by using their preferences, they can play an important role in the innovation's adoption, especially from the university. However, the decision to adopt such innovation can be influenced by the status of the firms and the collaboration experience. External parties, especially university, can use the results of this research to increase the success of innovation collaboration with industry. Especially in offering innovation to a non-listed firm and a firm with no-collaboration experience before, it will increase the success of innovation adoption. The government as the third party in the triple-helix model should consider behavioral preferences of decision-makers in making regulation and policy related to university and industry collaboration.

This study has several limitations that can make it difficult to generalize the results of research findings. The limitation is a cross-sectional approach of this study has not yet been able to fully capture the phenomena that occur in the field related to the behavior of decision-makers in the firms. Therefore it will be a suggestion for further research to examine the behavior of decision-makers in the firms using a longitudinal approach to get a comparison of behavioral preferences of decision-makers towards the innovation's adoption in the firms. Another limitation of the research is the study is conducted in the food and beverage industry sector, which may have different results if the study is carried out in other industrial sectors. Future research can consider several industry sectors involved to be a comparison of behavioral preferences decision-makers towards the innovation's adoption across industrial sectors. Besides, future research should look into other moderating variables that may influence the adoption of innovations from a university such as government regulations.

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