



Achieving organizational agility in situation of uncertainty through market sensing capability and innovation

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Abstract

The uncertainty of the business environment caused by the Industrial Revolution 4.0 and the emergence of the COVID-19 Pandemic has become a challenge for travel businesses. The rapid changes in technology and changes in tourist behavior have changed the competition in the tourism industry. Creating an agile organization is an essential factor in adapting to the rapidly changing business environment. Agile organizations can be pursued by utilizing the capabilities and innovations possessed by the organization. This research wanted to study the relationship between market sensing ability, innovation, and organizational agility. Data were obtained from 175 directors or managers of tour operators. Structural Equation Modeling (SEM) with WarpPLS 6.0 was used as a tool for data analysis. The results show that market sensing capability has a positive and significant effect on innovation and organizational agility. Empirical evidence also finds that innovation has a positive and significant impact on organizational agility. In the future, the director or manager of a tour operator urgently needs to consider market sensing ability and innovation as a key to achieving organizational innovation and agility. The originality of this research lies in the industrial setting and the nexus between market sensing ability and organizational agility, which is still not widely studied.

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Introduction

Currently, the industrial world is in the Industrial Revolution 4.0, where there are many changes due to technological advances. Rapid technological growth has led to intense competition and the acceleration of

innovative changes in the market. In the era of technology disruption, business actors were also surprised by the emergence of digital-based business platforms. This requires them to be ready with changes in business competition and changes in market behavior. This situation is made more complex by the emergence of the COVID-19

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Pandemic, which makes the tourism industry players have to adapt to new habits of tourists. The Industrial Revolution 4.0 which was followed by the COVID-19 pandemic has caused anxiety for business leaders. This anxiety arises because the business environment situation leads to uncertainty.

One of the industries affected by the Industrial Revolution 4.0 is tour operators. According to the study conducted by Dhakal and Tjokro (2021), and dan Do et al. (2022), tour operators experienced severe shocks during the Industrial Revolution 4.0 and the COVID-19 pandemic. On case studies in Indonesia, tour operators feel the impact of the ongoing environmental uncertainty. Many tour operators are threatened with going out of business due to the onslaught of new online-based business models in the era of the industrial revolution 4.0. This condition became worse when at the same time the COVID-19 pandemic occurred.

To deal with the current situation, tour operator leaders need to do something so that the business they run can adapt and be sustainable. The changes that arise in the business climate require tour operators to be able to optimize or update their capabilities. One of the primary keys for an organization to survive and thrive in a situation full of uncertainty is to create an agile organization (Lin et al., 2006; Nabatchian et al., 2014; Sambamurthy et al., 2007; Sharifi & Zhang, 2001). Agility is believed to enable organizations to proactively respond to dynamic and unpredictable environmental changes (Rachmawati et al., 2019). Therefore, agility can be used as a parameter for the success of business organizations in dealing with changing market needs and trends.

Furthermore, to adapt to environmental changes, tour operators also need to do market sensing, technology, and make various innovations. Market sensing is fundamentally needed to find changes in tourists' perceptions of travel safety and models after the COVID-19 Pandemic (Gössling et al., 2020; Jarratt, 2021; Yang et al., 2020). Innovation is vital for responding to technological changes and changes in tourist behavior (Tajeddini & Mueller, 2019). The company's ability to sense the market is one of the important dimensions for creating innovation (Strønen et al., 2017; Teece, 2007).

A number of previous research has looked into the effect of market sensing capability on innovation (Alshanty & Emeagwali, 2019; Khristianto et al., 2021). Aslam et al. (2018) have tested the impact between these two variables, but they focus more on the supply chain aspect. Conceptually, it is stated that market sensing capability and innovation can encourage the creation of agility in the organization (Eckstein et al., 2015;

Lim & Mavondo, 2000). Furthermore, there are also several previous studies that examine the effect of innovation on organizational agility in large-scale companies (Cepeda & Arias-Pérez, 2019; Ravichandran, 2018). However, there are not many studies that discuss the effect of market sensing capability on organizational agility.

Based on the background and the research gaps that can be explored, this study explores the construct that market sensing capability optimized by tour operators can play a role in innovation and create organizational agility. Testing the effect of market sensing capability on organization agility is a novelty in this study. Moreover, there are still very few studies that integrate market sensing, innovation, and organizational agility in the context of the tourism industry in Indonesia.

Literature Reviews

Market Sensing Capability and Innovation

As one of the fundamental elements of dynamic capabilities, sensing capability has a contribution to create, expand, or modify the main resources owned by the company (Helfat et al., 2009). Sensing activities of the organization include research and development, the process of scanning, interpreting, and learning on a regular basis from the ecosystem that exists both internally and externally to the organization. Organizations can monitor the market environment, technology developments, and respond to market changes through market sensing capability (Day, 1994; Olavarrieta & Friedmann, 2008). This capability has a crucial role in studying market behavior, responding to opportunities and threats, and supporting to make business decisions according to technology change and market environment (Bayighomog Likoum et al., 2020; Levinthal & Nardi, 1993).

Searching factual data or facts about market situations, consumer or buyer enthusiasms, and technological developments is a necessity for companies that want to stay innovative (McKelvie et al., 2018; Rakthin et al., 2016). By analyzing the environment through market monitoring and technological opportunities, companies can learn, analyze information as source of innovation, and see opportunity for the emergence of new products and innovative processes (Teece, 2009). At the same time, consumers need various innovations of products or services in accordance with market desires or trends. Business organizations that are able to understand the development of their business environment are predicted to tend to be more innovative

organizations than their competitors (Calantone et al., 2002; Keskin, 2006). Empirical evidence exposes that market sensing capability encourages innovative product sharing (Zhang & Wu, 2013). In another study, Khristianto et al. (2021) also found that this capability has a positive and significant impact on the types of innovation. Based on this description, the following hypothesis is proposed:

H1: Market sensing capability has a positive and significant effect on innovation.

Market Sensing Capability and Organizational Agility

Lim et al. (2000) argue that market sensing capability is related to agility. Theoretically, the link between market sensing and agility is found in terms of dynamic capabilities. Teece (2007) specifically states that the ability to monitor market situations and technological changes is a major prerequisite for organizations to develop and deploy other capabilities. This capability is a superior ability to absorb information that is critical to a company's success, to identify changes, and to set up organizations for adequate responses. Market sensing capability plays a vital role for companies to know the changing environment and respond to these conditions (Overby et al., 2006). Organizations that have the ability to sense the market are considered to be more agile and have proactive behavior towards the uncertainty of the market environment (Tse et al., 2016).

As emphasized by Ngai et al. (2011) that through market sensing, it is possible that organizations will become more prepared and able to expand the structures, skills, technologies, and types of policies they will use. Several previous studies prove that market sensing capabilities have an essential role in adapting to environmental changes (Mu, 2015). Organizations with good market-sensing abilities tend to be more agile because they can understand market trends and respond to market uncertainties (Tse et al., 2016). Then, Aslam et al. (2018) also suspect that market sensing capability can act as an antecedent of agility in organizations. So far, no empirical research has been found to examine market sensing capability's effect on agility. Based on this description of reasoning, we postulate:

H2: Market sensing capability has a positive and significant effect on organizational agility.

Innovation and Organizational Agility

It is believed that innovation can be developed into a tool to express how an organization is agile. Innovations

made by the organization will be a differentiator from other organizations in dealing with uncertain situation. Conceptually, Yusuf et al. (1999) argue that innovation is one of the basic elements that can affect the level of organizational agility. The concept of Yusuf et al. (1999) is reinforced by Zitkiene and Deksnys (2018) that the level of organizational agility can be increased by combining innovation with other factors, such as various types of reconfigurable resources and knowledge. By combining these capabilities, organizations can adapt to changing consumer needs and market conditions. Hurley et al. (1998) also stated that innovative companies will tend to strengthen the learning process and encourage various experiments to be carried out. The learning process and experiments are aimed at enabling business organizations to be able to face risks and uncertainties in the business circumstances.

Through innovation, the leaders of business organizations can explore their products and processes to cope with trends in the market. The ability of innovation that comes from developing ideas, knowledge, and skills can create organizational agility (Iddris et al., 2014). In addition, innovation allows business organizations to identify market opportunities and encourage the emergence of new products to market more quickly (Ravichandran, 2018). Innovation also allows the emergence of new ideas on processes within the organization that encourage organizational agility. Therefore, the following hypothesis was formulated:

H3: Innovation has a positive and significant effect on organizational agility.

Methodology

Measurement

All of the research instruments in the questionnaire were adapted and modified from earlier studies. Market sensing capability adopts 12 items from Olavarrieta (2014), concentrating on four activities (information acquisition, information dissemination, information interpretation, and information storage-retrieval). Innovation is measured using 6 items from OECD/Eurostat (2005) focusing on two types of innovation (product and process innovation). Organizational agility refers to the 12 modified items from Sharifi et al. (2001) and Tahmasebifard et al. (2017). All instruments were scaled using a 5-point Likert where point 1 is strongly disagrees and point 5 is strongly agree.

The data were analyzed using SPSS version 23 and WarpPLS 8.0. The outer model parameter estimation algorithm is basically a calculation process to produce latent variable data sourced from item, indicator or dimension data. In this study, the outer model algorithm used is PLS Regression, which is an inner model that does not affect the outer model. The parameter estimation algorithm in the inner model is simply the method and process of calculating the path coefficient, which is the effect of the explanatory/predictor variables on the response/related variables. The estimation algorithm for the inner model used is Warp3 with the relationship between latent variables in the form of an S curve while the algorithm for hypothesis testing uses the Stable3 type resampling algorithm. Thus, it produces conjectures that are consistent.

Data Collection

This research was conducted on tour operators located in East Java, Indonesia. Purposive sampling with several sampling criteria was used as a sampling technique: tour operators had been working for a minimum of 2 years and have a license from the government. A total of 190 questionnaires were distributed to tour operators then filled out by the directors or

managers. The number of questionnaires that can be used for analysis is 175.

Results

Respondent Profile

In this study, a sample of 175 tour operators in East Java was used. The profiles of respondents in this study include: gender, status, age, education, period of business, and marketing area coverage. The respondent's profile is shown in [Table 1](#).

Validity and Reliability

The validity and reliability of the measurement instruments were cross-tested by applying average variance extracted (AVE), composite reliability (CR), and Cronbach's alpha (Hair et al., 2017). [Table 2](#) shows the convergence of the validity and reliability of the factors in the first order. The value of all AVE and item loading factors is ≥ 0.5 . This proves to have met the requirements of convergent validity. Reliability requirements are also met because the CR value is > 0.7 , and the Cronbach's alpha value is ≥ 0.6 (Ghozali & Latan, 2012).

Table 1 Respondent profile

Item	Description	Frequency (<i>N</i> = 175)	%
Gender	Male	99	56.6
	Female	76	43.3
Status	Owner/Director	94	53.7
	Manager	81	46.3
Age (years old)	18–24	17	8.9
	25–31	48	25.1
	32–38	39	20.4
	39–45	49	25.7
	46–52	27	14.1
	53–59	9	4.7
	60–66	1	0.5
	67–73	0	0
	74–80	1	0.5
Education Degree	Senior High School	33	18.9
	Diploma	17	9.70
	Bachelor	115	65.70
	Postgraduate	10	5.70
Period of Business (year)	2–7	94	53.7
	8–13	45	24.6
	14–19	23	13.1
	20–25	10	5.7
	26–31	3	1.7
	32–37	0	0
	38–43	1	0.6
	44–49	0	0
	50–55	1	0.6
Marketing area coverage	Inbond	85	48.57
	Inbond & Outbond	90	51.43

Table 2 Validity and Reliability of the first order

Variables	Dimensions	Items	Loading Factors	AVE	CR	Cronbach's alpha
Market Sensing Capability	Information acquisition activities	3	0.656–0.838	0.559	0.790	0.600
	Information dissemination activities	3	0.869–0.919	0.784	0.916	0.861
	Information interpretation activities	3	0.795–0.870	0.700	0.875	0.784
	Information storage-retrieval	3	0.821–0.893	0.751	0.900	0.834
Innovation	Product innovation	3	0.872–0.920	0.813	0.929	0.885
	Process innovation	3	0.884–0.931	0.811	0.928	0.883
Organizational Agility	Responsiveness	3	0.818–0.920	0.781	0.915	0.859
	Competency	3	0.831–0.908	0.775	0.912	0.854
	Flexibility	3	0.804–0.890	0.731	0.891	0.815
	Quickness	3	0.902–0.941	0.845	0.942	0.908

Measurement Model

The second order is shown in Table 3. The convergent validity measurement shows the loading factor and AVE, CR, and Cronbach were used to examine the validity and reliability. The results show that all loading factors and AVE values are > 0.6 , CR values ≥ 0.7 , and Cronbach's alpha values ≥ 0.6 . Based on the results, it can be interpreted that all the research instruments used have met the validity and reliability requirements.

This study also uses validity testing using the Heterotrait-Monotrait Ratio (HTMT) parameter. Based on this test, the HTMT value of all constructs must be lower than 0.85 (Henseler et al., 2015). The results of the validity test of the HTMT values obtained from all constructs are smaller than 0.85 (Table 4). Based on the validity test using the HTMT parameter, the value of all HTMT parameters of each variable is < 0.85 (in accordance with the criteria) so that each indicator is declared valid in measuring its variables.

Structural Model

The Goodness of Fit measures the suitability of the input observations with the predictions of the proposed model. Evaluation of the Goodness of Fit Model in

WarpPLS uses the Fit and Quality Indices Model as shown in Table 5. The criteria used are rule of thumb, so they should not apply rigidly and absolutely. The criteria for each of the fit and quality indices models include: Average path coefficient (APC), Average R-squared (ARS), Average adjusted R-squared (AARS), Average block VIF (AVIF), Average full collinearity VIF (AFVIF), Tenenhaus GoF (GoF), Sympson's paradox ratio (SPR), R-squared contribution ratio (RSCR), Statistical suppression ratio (SSR), and Nonlinear bivariate causality direction ratio (NLBCDR). These criteria are a summary of the observed and expected values (Solimun et al., 2017).

Based on the results in Table 5, the model compiled has met the model fit criteria where the p value of APC and ARS $< .001$, which means it is significant while the AVIF value is 1.625. The RSCR value, which reaches 1.000, shows the ideal model's strength. Similarly, other parameters follow the specified requirements so that the model built meets the fit indicator requirements. As the results shown in the Table 5, the model provides good data criteria and quality indicators that meet WarpPLS standards.

Table 3 Validity and Reliability of the second order

Variables	Dimensions	Loading Factors	AVE	CR	Cronbach's alpha
Market Sensing Capability	4	0.740–0.896	0.684	0.896	0.896
Innovation	2	0.944	0.892	0.943	0.943
Organizational Agility	4	0.855–0.887	0.765	0.929	0.929

Table 4 Discriminant validity with HTMT criteria

Variables	Market Sensing Capability	Innovation	Organizational Agility
Market Sensing Capability	-	-	-
Innovation	0.625	-	-
Organizational Agility	0.815	0.849	-

Table 5 Model fit and quality indices

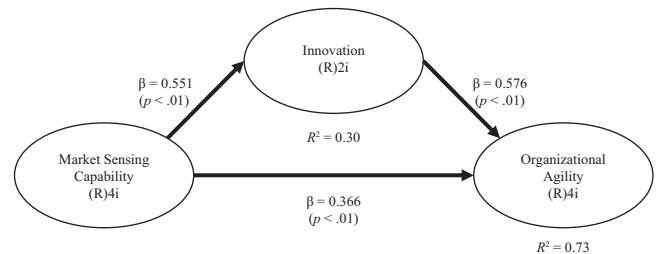
Model Fit and Quality Indices	Result	Criteria
APC	0.498, $p < .001$	p -value < level of significance (5%)
ARS	0.517, $p < .001$	p -value < level of significance (5%)
AARS	0.514, $p < .001$	p -value < level of significance (5%)
AVIF	1.652	acceptable if ≤ 5 , ideally ≤ 3.3
AFVIF	2.551	acceptable if ≤ 5 , ideally ≤ 3.3
GoF	0.635	small ≥ 0.1 , medium ≥ 0.25 , large ≥ 0.36
SPR	0.635	acceptable if ≥ 0.7 , ideally = 1
RSCR	1.000	acceptable if ≥ 0.9 , ideally = 1
SSR	1.000	acceptable if ≥ 0.7
NLBCDR	1.000	acceptable if ≥ 0.7

Hypothesis Test Results

The direct path between market sensing capability and innovation has a positive and significant effect ($\beta = 0.551, p < .001$). Thus, H1 is supported. The results show that market sensing ability has a positive and significant effect on organizational agility ($\beta = 0.366, p < .001$). Thus, H2 is supported. Furthermore, innovation has a positive and significant effect on organizational agility ($\beta = 0.576, p < .001$). Thus, H3 is supported. The result of hypotheses tests is shown in Figure 1 and Table 6.

To determine the estimated effect of mediation, it can be tested through the Variance Accounted For (VAF) method. The test criteria state that if the VAF value is > 80 percent then the mediating variable is declared as full mediation, if the VAF value is between 20 percent and 80 percent then the mediating variable is declared as partial mediation, but if the VAF value is ≤ 20 percent then the intervening variable cannot mediate the effect of exogenous on endogenous. Based on Table 7,

it can be seen that the VAF value for testing the effect of market sensing capability on organizational agility through innovation is 46.4 percent. This shows that the VAF value is between 20 percent and 80 percent. Thus, it can be stated that the innovation variable is able to partially mediate the effect of market sensing capability on organizational agility.

**Figure 1** Results of hypothesis test**Table 6** Summary of hypotheses tests and results finding

Hypothesis	Direct path relationship	β	p value	Conclusion	Decision
H1	Market Sensing Capability \rightarrow	0.551	$< .001^*$	Significant	Supported
H2	Market Sensing Capability \rightarrow	0.366	$< .001^*$	Significant	Supported
H3	Innovation \rightarrow	0.576	$< .001^*$	Significant	Supported

Note: * $p < .05$. ** $p < .01$. *** $p < .001$.

Table 7 VAF Value

Exogenous	Mediator	Endogenous	β	Indirect Coefficient	Total Coefficient	VAF
Market Sensing Capability	Innovation	Organizational Agility	0.366	0.317	0.683	46.4%

Discussion

Based on Table 6, there are several results from studies that can be discussed in this article. The first finding, this study demonstrates that market sensing capability has a positive and significant effect on innovation. This result means that the higher the various activities of market sensing capability, the more innovation will increase. These results also indicate that tour operators actively monitor tourist behavior and market environment conditions. Market sensing activities are carried out by tour operators from searching for information about market conditions, followed by conducting internal discussions related to tourism trends and types of tours that are in demand. Based on the results of market sensing analysis, tour operators gain new insights related to technological changes after the Industrial Revolution 4.0 or the COVID-19 Pandemic. In addition, tour operators can also characterize changes in tourist behavior. From these activities, tour operators then take innovative actions (process and product) to react to emerging changes in the business climate. Success in innovation (process and product) reflects the tour operator's ability to conduct market sensing. This is in line with the opinion that innovation will occur when the company can sense changes in the market and see new opportunities (Williams et al., 2021).

The first findings of this study confirm idea from Teece (2009) that market sensing capability can be an important source of innovation. This result is also congruent with the findings from previous studies (Alshanty et al., 2019; Eckstein et al., 2015; Khristianto et al., 2021) that market sensing capability can encourage the creation of new products and processes innovation within the company. Through this capability, companies can identify markets and address new opportunities created by the changing business landscape. The findings of this study support the belief of Foray et al. (2009) that market sensing capability plays a vital part in the market scanning process. If companies can recognize changes in the business environment, they will quickly identify market trends that need to be realized into various innovations. The ability for market sensing in tour operators is very likely due to the educational background of the owners/directors and managers. In the respondent profile, it was found that 9.70 percent had a diploma background, 65.7 percent had a bachelor's background, and 5.70 had a postgraduate background. So, it can be concluded that the majority of respondents have a higher education background. This educational background will support

their ability to conduct market analysis, understand technological developments, and current trends, so that they can formulate the various innovations needed.

The second finding from the results of this study indicates a positive and significant effect between market sensing capability and organizational agility. These results confirm assumption from Teece (2007) and describe that the activities of directors or managers of tour operators to detect market fluctuations and actively monitor product or service developments play a vital part in improving organizational agility. These findings support the concept proposed by Sharifi (2001) that market sensing capability may play a significant role in increasing company agility. Through market sensing, tour operators can obtain the latest information on the market and monitor fluctuations in the business environment. In addition, tour operators can identify potential opportunities and exploit them commercially.

Market sensing capability can be a driving force for the company's agility to respond and make changes quickly related to products or services needed by the market (Overby et al., 2006). In addition, activities in market sensing play a role in mapping market trends and behavioral patterns that emerge in the market (Du & Kamakura, 2012; Teece, 2007) so that companies can anticipate changes that occur (Mu, 2015). This study also proves that market sensing capability can play an optimal role for knowledge creation so that tour operators can quickly respond to uncertainties that occur in their business environment. The ability to collect and process information obtained from the market owned by tour operators is very likely supported by the experience of the owners/directors and managers. Based on the age composition of the company, 53.7 percent operated for 2–7 years, 24.6 percent operated for 8–13 years, while the rest were more than 13 years old. This suggests that when the operational age of tour operators can be predicted, it contributes to creating agility in tour operators. Moreover, as part of small and medium enterprises, tour operators are also predicted to be more agile than large companies.

Furthermore, the third finding of this study confirms that innovation has a positive and significant effect on organizational agility. This result supports the idea presented by Yusuf et al. (1999) and Zitkiene and Deksnys (2018). It is relevant with Teece (2007), that innovation is a key element for creating organizational agility. These results mean that the higher the innovation (process and product), the higher the organizational agility. The uncertainty of the situation prompted the tour operators to make changes in their working methods, such as maximizing coordination through video calls

and online communication. In this way, tour operators can use their time optimally and speed up the decision-making process. Tour operators also strive to update their technology and improve the quality of online service processes as a form of process innovation through owned media, such as websites, blogs, social media, and the adoption of online reservation platforms. Innovation efforts made by tour operators are also carried out by introducing products more quickly, offering products that are not yet on the market, and developing old products into new products. The innovation capabilities of tour operators are likely to be supported by directors/owners and managers who are relatively young. From the respondent profile, it is known that most of them are in the age range of 18–45 years. Young leaders are more capable of creating creativities, innovative environments (Kozioł-Nadolna, 2020), and are predictors of employee innovation within the company (Hughes et al., 2018).

The third finding in this study is conformable with Ravichandran (2018) that innovation encourages the emergence of new products to the market faster so that companies can become agile in meeting market demands. This result also strengthens Lau's (2020) opinion that in the Industrial Revolution 4.0 era and the COVID-19 Pandemic, businesses tend to run with the support of digital applications to reduce risk. Furthermore, the findings of this investigation empirically support the assumption of Iddris et al. (2014) that innovation originating from the development of ideas, knowledge, and skills can contribute to creating organizational agility. Innovation can create value for the organization so that tour operators can remain agile by responding appropriately and appropriately to market changes.

This study also found several other relevant results to present, namely: (1) Table 7 shows that the effect of market sensing capability on organizational agility is mediated by innovation. This indicates that innovations made by tour operators can increase the role of market sensing capability to achieve organizational agility. Innovation can be done through value creation, so that it becomes a catalyst for various market information to create an organization that is more adaptive, responsive and quick to make changes; (2) Based on the outcome of the *R*-Square determinant in Figure 1, the result obtained, $R^2 = 0.30$, indicates that market sensing capability contributes innovation by 30 percent. The results show that there is still a 70 percent contribution from other factors that have contributed to innovation. Then, $R^2 = 0.73$ indicates that market sensing and innovation contribute 73 percent for achieving organizational agility. These results also demonstrate that market

sensing capability and innovation can be used to predict organizational agility for tour operators.

Conclusion

This study has academic implications on the nexus between market sensing capability, innovation, and organizational agility. The research results obtained provide new insights, especially in the case of tour operators in East Java in situations of uncertainty due to the Industrial Revolution 4.0 and the COVID-19 Pandemic, which has not been found in previous studies. Based on the study results, there are practical implications that the directors or managers of tour operators need to strengthen market sensing capability and innovation because both have been proven to contribute significantly to the creation of organizational agility. In a dynamic and unpredictable market environment, organizational agility is a requirement for tour operators to adapt themselves to market changes.

The point of limitation in this study is the fact that there are still many other variables that affect innovation and organizational agility. The results of this study cannot be simplified to all tour operators in East Java due to the relatively small number of samples. In the future, it is necessary to research broader-scale tour operators in other provinces. In addition, in further research, it is also essential to test the influence of leader role, firm age, customer sensing and environmental sensing on innovation and organizational agility.

Conflict of Interest

The authors declare that there is no conflict of interest.

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