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The Effect of Innovation Success Factors Towards Organizational Performance in Automotive Industry

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Abstract: Organizational performance is essential and necessary for every organization to properly create and sustain a healthy and effective results-oriented culture. In an economy increasingly driven by technological change, businesses need to stay abreast of the latest innovations to keep their competitive edge and access new market opportunities. Therefore, to excel in business, organizations must pay attention, especially to their technology implementation process. This study aims to analyze the effect of technology innovation that contributes to organizational performance. The innovation success model was adapted, focusing on three factors (technology selection, technology capability and technology management capability), and this study also added a successful technology implementation into the new framework. 131 questionnaires were distributed to 8 automotive companies in Shah Alam, Selangor. Based on the data analysis, the result showed that all the innovation success factors and successful technology implementation positively influence organizational performance. Technology capability is shown to be the strongest effect on organizational performance, among others. This study will hope to provide a guideline to the management of the automotive industry on how to improve their organizational performance through innovation.

Keywords: *Innovation success factors, organizational performance, technology innovation, automotive industry*

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INTRODUCTION

In a rapidly changing trend in the automotive industry today, maintaining an excellent performance is crucial for the organizations. In order for organizations to cope with a rapidly changing business environment, they must invest in technology innovations (Binuyo & Landsberg, 2014). The reason for the investment in technology innovation is not only to sustain in the business arena, but also to fulfill the customer's need and expectation. The automotive company is one example of the companies that focus on market orientation where customers satisfaction and demand is a priority. Therefore, implementing technology innovations in the automotive industry is highly recommended (Rodríguez, Montes, Fernández, & Morant, 2018).

However, the implementation of technology in an organization is not an easy process. Many studies show that the failure of technology implementation in the organization has caused a negative impact and carried several potential risks to the organization (Akhundzadeh & Shirazi, 2017). Hence, before implementing the new technology, the organization

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must carefully evaluate the technology in order to gain the expected benefits based on these three innovation success factors; technology selection, technology capability, and technology management capability. Technology selection is a process of choosing the right technology to be implemented in the organization (Akhundzadeh & Shirazi, 2017). The selection of which technology to use is a critical decision in order to gain competitive advantage between competitors. The technology capability is about the knowledge of the employee on the technology operated by the organization (Hao & Yu, 2011; Willy, 2017). The ability to use and to understand the technology is crucial because everyone in the organization will perform their daily tasks by using this technology. Moreover, the technology management capability is the ability to adjust and exploit the technology implemented so that it can be aligned with the organizations objectives (Unsal & Cetindamar, 2015). It is important for organizations to empower this technology management capability because the organization can adjust technology performance according to organizations desire. Therefore, this study is concerned with the following research question:

i) Do technology innovation success factors contribute to the organizational performance in the automotive industry?

DEVELOPMENT OF RESEARCH HYPOTHESES AND FRAMEWORK

Organizational Performance

According to Madella, Bayle, and Tome (2005), organizational performance is the ability to acquire and to process human financial and physical resources properly to achieve the goals of the organization. The importance of organizational performance does not limit to only achieve its goal and objective, but also has a significant impact on competitive advantage (Ebrahimi, Moosavi, & Chirani, 2016; Huang, Wu, Lu, & Lin, 2016). Competitive advantage is the ability for an organization to increase profits while facing competition pressure. Organization's competitive advantage can come from various factors that are directly contributing to organizational performance. One of the competitive advantages factors that contribute to organizational performance is an innovation (Jiménez & Valle, 2011). Innovation is defined as the process where creating, acquiring, sharing and utilizing the knowledge for developing organizational performance takes place (Matzler, Bailom, Friedrich von den Eichen, & Kohler, 2013). In addition, innovation can lead the organization against its competitor and also can directly improve the organizational performance (Huang et al., 2016).

The technology innovation is one of the key factors for the organizations to meet the business and customers oriented goal. According to Lancker, Mondelaers, Wauters, and Huylenbroeck (2016), it is important for the organization to emphasize on innovation in terms of technology used due to the rising demand versus resource efficient and sustainable production process. An organization must implement innovation in its technology from time to time, as it will bring a significant and positive impact on the organizational performance (Atalay, Anafarta, & Sarvan, 2013; Ayuningrat, 2016).

Innovation Success Factors

As defined by Proctor, Powell, and McMillen (2013), implementation of technology is a method or technique used by an organization to enhanced technology adoption, implementation and sustainability of technology usage practice. According to Tajuddin, Iberahim, and Ismail (2015), innovation in technology is one of the factors of innovation success. Through innovation in technology, a process that is not practical anymore will be replaced with a new process. For instance, manual process in the production activities usually takes a longer time to produce a number of products and is not efficient for big organizations. Therefore, the organization needs to change their production activities by replacing the manual process with an automated process that involved technology. The innovations become necessary when the production activities are shortened and the cost for the Research and Development (R&D) is increased. By doing so, the complexity of the technology and the time taken for the production process can be reduced (Dasig Jr, 2017; Lancker et al., 2016).

Since the environment of the automotive industry is extremely competitive, the organization must maintain their productivity and competitive advantage (Newman, Rand, Talbot, & Tarp, 2015). It is important for the organization to keep their technologies up to date and maintain them from time to time (Gagnon & Dragon, 1998).

Technology selection: According to Akhundzadeh and Shirazi (2017) technology selection is the process where an organization needs to choose which technology can be implemented within an organization. The process of technology selection involves obtaining information from many sources about technology options, and then evaluating the technology to determine the best choice guided by a set of criteria. The aim is for the organization to obtain new

knowledge, new components and systems that enable the organization to create a more competitive product and service. The right choice of technology determines the right mix of technology components that create a sustainable competitive advantage for the organization (Akhundzadeh & Shirazi, 2017). Additionally, technology selection introduces new technology that can provide an opportunity for the organization to focus on the problematic area in order to improve its performance (Hao & Yu, 2011). Failure to select the best technology to be implemented in the organization, will cause irreparable consequences. Xia, Yu, Gao, and Cheng (2017) have found that technology selection has a significant impact on organizational performance as it improves organizational performance. Based on previous studies, the following hypothesis was constructed.

H1: *There is a positive effect between technology selection and organizational performance*

Technology capability: Technology capability is the second factor of innovation success that leads to organizational performance (Hao & Yu, 2011). Technological capability is defined as the ability of users to understand, to use and to exploit any relevant state of the art technology internally (Hao & Yu, 2011). The technological capability enables organizations to produce a new and better innovative product and service to compete with other competitors (Latip, Salleh, Habidin, Sapengin, et al., 2014). Therefore, the organization must ensure that their employees will follow the organization's innovation decision in order to evaluate and get their feedback on their ability to use the technology. An organization that possesses a high level of technological capability tend to be more successful rather than an organization that have a low technological capability (Hao & Yu, 2011). The research done by Reichert and Zawislak (2014) indicated that Brazilian firms achieved their organizational performance by investing in technological capability. Thus, the following hypothesis was constructed.

H2: *There is a positive effect between technology capability and organizational performance*

Technology management capability: Technology management capability as defined by Unsal and Cetindamar (2015) is a dynamic capability of an organization to adjust their technology based on its strategic planning and objectives. Previous research also shows that technology management capability contributes an improvement to organizational performance (Hao & Yu, 2011). Managing and improving technology in one organization is crucial because, through this, an organization can be able to embrace an environment with rapid changes as well as able to achieve its organizational performance (Inan & Bititci, 2015). It is also beneficial for an organization to create its own identity and branding itself to be different from other organizations. The capability of managing its own technology is important in an organization and failure to do so can bring a negative impact on the relationship between technology innovation and organizational performance. Thus, the following hypothesis was constructed.

H3: *There is a positive effect between technology management capability and organizational performance*

Successful Technology Implementation

It is important for an organization to ensure that the financial investment in the technology implementation is worthy. R&D department also must carry out investigations to identify and study the current problems and the area that needs to be improved in the organization. This is to avoid a waste in technology implementation to the area that less needs attention and also to maximize technology usage in the organization.

Hao and Yu (2011)stated that successful implementation of technology contributes to organizational performance. The successful technology implementation is also derived from the collaboration between an organization with another party. Salim, Razavi, and Afshari-Mofrad (2017), stated that when an organization invests in Foreign Direct Investment (FDI), an organization must show their capabilities to manage the technology so that, it will attract other parties to get involved with the organization for beneficial reasons. International collaboration can help to increase the organizational performance by allowing the organization to access the latest technology.

The process of technology selection is a critical part when choosing the technology to be implemented in the organization (Xia et al., 2017) especially in automative industry. This is because the success of technology implementation also relate with technology selection process where the organization needs to select the technology that is suitable for its environment. By choosing the right technology, the implementation process will be more effective and thus contribute to organizational performance. Therefore, the fourth hypothesis for this study is developed as stated below.

H4: *There is a positive effect between successful technology implementation and organizational performance*

Based on the literature review discussion, this study proposed a new research framework, namely Innovation Success Factor Performance Model as shown in Figure 1. Figure 1 illustrates the relationship between innovation success factors (Technology Selection, Technology Capability, Technology Management Capability, and Successful Technology Implementation) and organizational performance.

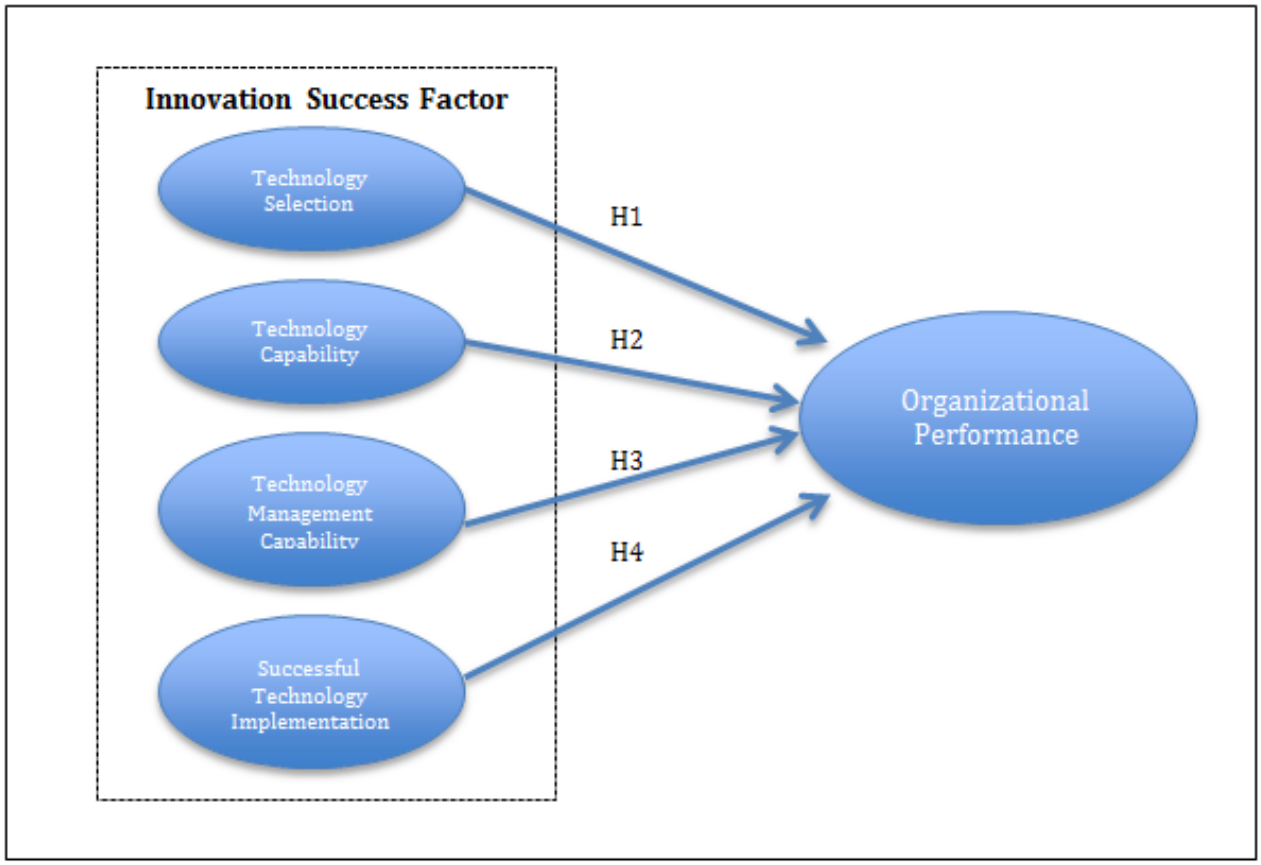

Figure 1 *Innovation Success Factor Performance Model*

RESEARCH METHODOLOGY

The questionnaire survey was personally distributed to all respondents. Total numbers of population in this study is 131 employees who are working in various managerial positions including the supervisors, managers, and directors at several automotive companies in Shah Alam, Malaysia. Gpower calculation was used to calculate the minimum number of respondents that is suitable for this study. Based on the Gpower calculation, it shows that the minimum sample size for the study is 129. Therefore, researchers took all of the 131 employees in the population as the respondents for this study.

Based on the demographic details, 53.4% of the respondents are female while 46.6% of the respondents are male. Most of the respondents' age is between 30-39 years old. For the respondents' race, 84.7% of the respondents are Malay as compared to Indian (3.1%), Chinese (8.4%) and others (3.8%). 55% of these respondents are married while the other 43.5% of the respondents are still single. As this study focuses on the respondents that held managerial positions, 43.5% of them are managers and follows by the other positions (supervisor - 35.1%, engineer - 19.1% and Chief Executive Officer - 8%).

Survey items of this study were rated by using a 7 point scale ranging from strongly disagree (1) to strongly agree (7). For model assessment, Partial Least Square-Structural Equation Modelling (PLS-SEM) version 3.0 was used to test the measurement model and structural model of the study (Henseler, Ringle, & Sarstedt, 2015).

RESEARCH FINDINGS

Measurement Model

Confirmatory Factor Analysis (CFA) began with the cross loading test between constructs, and it showed that most of the indicators measuring a particular construct had loading values more than 0.7 of their respective constructs as shown in Table 1. Then, the Composite Reliability (CR) and the Average Variance Extracted (AVE) were examined as shown in Table 2. The range of CR values was from 0.854 to 0.905 for each construct, which exceeded the cut of the value of 0.7. Meanwhile, the AVE for each construct ranged from 0.602 to 0.731, which is greater than 0.5. Finally, the discriminant validity was tested by examining the squared correlation between the measures of the potentially overlapping constructs as shown in Table 2. The results showed that all the diagonal values in bold were higher than the values in rows and columns.

Table 1 *CROSS LOADING*

Items	OP	STI	TC	TMC	TS
OP1	0.750	0.460	0.409	0.443	0.401
OP2	0.818	0.458	0.437	0.444	0.394
OP3	0.791	0.583	0.427	0.522	0.405
OP4	0.849	0.558	0.571	0.620	0.553
OP5	0.822	0.587	0.614	0.639	0.569
STI1	0.594	0.804	0.497	0.578	0.538
STI2	0.454	0.768	0.429	0.497	0.406
STI3	0.417	0.720	0.382	0.507	0.364
STI4	0.436	0.797	0.524	0.630	0.422
STI5	0.609	0.788	0.538	0.611	0.521
TC1	0.556	0.485	0.832	0.498	0.562
TC4	0.552	0.549	0.903	0.591	0.553
TC5	0.482	0.553	0.827	0.468	0.504
TMC1	0.391	0.562	0.387	0.744	0.294
TMC2	0.462	0.556	0.468	0.756	0.322
TMC3	0.607	0.585	0.442	0.850	0.388
TMC4	0.569	0.608	0.568	0.839	0.467
TMC5	0.644	0.651	0.579	0.857	0.469
TS1	0.391	0.463	0.505	0.346	0.779
TS2	0.511	0.461	0.546	0.380	0.822
TS3	0.514	0.520	0.495	0.454	0.837

Structural Model

After the measurement model was evaluated, the analysis is continuing with the structural model assessment. Before we proceed with the assessment, a collinearity test assessed the presence of highly correlated constructs. The results showed that the VIF values of all constructs ranged from 1.820 to 1.645, which is below the suggested threshold of 3.3 Diamantopoulous and Siguaw, (2006) as cited by (Chuah, Rauschnabel, Marimuthu, Thurasamy, & Nguyen, 2017), indicating there is no issue of multicollinearity in this study.

To assess the hypothesized relationship between the constructs, bootstrapping analysis of 500 was employed. The bootstrapping analysis showed that the technology management capability has the most significant influence on the organizational performance (β = 0.326, *t*-value = 3.216, *p* value <0.001), followed by the technology selection (β = 0.201, *t*-value = 2.224, *p* value <0.001), the successful technology implementation (β = 0.198, *t*-value = 1.830, *p* value <0.003) and the technology capability (β = 0.174, *t*-value = 2.074, *p* value <0.001). Thus, all hypotheses were accepted as shown in Table 3.

Table 2 *CONVERGENCE AND DISCRIMINANT VALIDITY*

Variables	MEAN	*SD*	AVE	CR	R^2	CA	OP	STI	TC	TMC	TS
Organizational Performance (OP)	5.634	0.800	0.651	0.903	0.577	0.867	0.807				
Successful Technology Implementation (STI)	5.715	0.724	0.602	0.883		0.836	0.662	0.776			
Technology Capability (TC)	5.633	0.937	0.731	0.891		0.815	0.622	0.617	0.855		
Technology Management Capibility (TMC)	5.651	0.900	0.657	0.905		0.871	0.674	0.731	0.609	0.811	
Technology Selection (TS)	5.537	0.829	0.660	0.854		0.745	0.587	0.592	0.633	0.488	0.813

The results also revealed that 57.7% (R^2) of the variance in organization performance were explained by innovation success factors (Technology Selection, Technology Capability, Technology Management Capability, and Successful Technology Implementation). For substantial impact, we tested the effect size ($\hat{r}^2$) of each construct on organizational performance as suggested by Hair, Ringle, and Sarstedt (2013). We used the magnitude of the effect size guideline ($\hat{r}^2$ values of 0.02, 0.15 and 0.35 represent small, medium and large effects) suggested by Gagnon and Dragon (1998).

Table 3 *CONVERGENCE AND DISCRIMINANT VALIDITY*

Hypothesis	Relationship	Std. Beta	SE	*t*-value	*p*-value	f^2	R^2	Q^2
H1	Technology Selection -> Organizational Performance	0.201	0.090	2.224	$p < 0.01$	0.051		
H2	Technology Capability -> Organizational Performance	0.174	0.084	2.074	$p < 0.02$	0.034		
H3	Technology Management Capability -> Organizational Performance	0.326	0.101	3.216	$p < 0.01$	0.107		
H4	Successful Technology Implementation -> Organizational Performance	0.198	0.108	1.830	$p < 0.03$	0.035	0.577	0.355

Note: Significant value of one tailed t-value ≥ 1.65, t-value ≥ 1.96, t-value ≥ 2.58

The results indicated that all the exogenous constructs have small effects on organizational performance as shown in Table 3. Moreover, an omission distance (D) of 7 was used to evaluate the predictive relevance of the model. This study obtains a Q^2 of 0.335, which is more than the cut off value 0.0 (Hair et al., 2013), thereby indicating that the model has predictive relevance.

DISCUSSION AND CONCLUSION

The rapid advancement of intelligent and connected technologies has made the automotive industry development changing faster today than before. Although the demands on the business have never been greater, customers expectations of vehicle quality, reliability, safety, and utility are at an all-time high. At the same time, worldwide demands have put pressure on the industry to maintain, and even reduce, vehicle prices. Therefore, technological

innovation is crucial to be implemented by the organizations in this industry so as to sustain in the business and to keep abreast with emerging technologies. Due to these reasons, the study developed a new theoretical innovation success model that will assist the management of the organization to evaluate and ensure the organization can perform well in the business arena. In this study, all the innovation success factors positively influence organizational performance. However, the results of effect size indicated that all the indicated factors are less important. Previous studies claimed that the indicated factors can lead to the organizational performance (Reichert & Zawislak, 2014) and play an important role for the organization to gain competitive advantage (Azar & Ciabuschi, 2017; Shanker, Bhanugopan, Van der Heijden, & Farrell, 2017). In order for the organization to achieve this, they must also innovate their production process. The innovative production process should begin with the capability of the organization to manage their technology implementation, which should be aligned with the organization goal. Moreover, for the organization to embrace the Industrial 4.0 where smart technology plays an important part, it is recommended that the organization should pay attention to the technology selection process. It is crucial for the organization to implement the right technology based on its capability because it will effect the sustainability of the organizational performance.

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