

Adaptation of Technology Capability with Special Attention to ASEAN NCAP in Strategic Design and Manufacturing a New Car with Safety Features

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Abstract – This research aims to investigate the relationship between the technology capability and car manufacturer understanding and awareness of the New Car Assessment Program for Southeast Asian Countries (ASEAN NCAP). The surveys were performed to collect the data among Malaysian car manufacturers and 90 sets of questionnaires were returned and analysed using SPSS software with the main statistical analysis highlighted are Pearson correlation and multiple regression to examine the research hypothesis. Interviews were also conducted among the car manufacturers to investigate further the research objective. The research findings concluded that there is a significant relationship between the technology capability and car manufacturers on their understanding and awareness of the ASEAN NCAP requirements. Hence, this study proved that technology capability is the essential factor for car manufacturers and it is one of the main concerns for them in producing a new safer car design.

Keywords: Technology capability, ASEAN NCAP, new car, design, manufacturing, automotive industry

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1.0 INTRODUCTION

In the current world situation, business entities must be able to compete globally while serving their domestic and global customers. The global competitions have opened new approaches in business transactions that allow companies to increase their profits and flattens the playing fields of their competitors. Business entities such as car manufacturers are ready to remain competitive in the automotive market. Malaysia, in aligning with its National Automotive Policy (NAP) and road transport regulations, has pushed car manufacturers to constantly improve and establish their core competencies to succeed in the automotive market (Jawi et al., 2017; Abdul Wahab et al., 2017). This can be done by increasing their technology capabilities such as adopting new technology and innovations in their research and development (R&D) projects. The car manufacturers must also choose and use the best technology that they can acquire so that this new technology can become their competitive advantage.

One of the areas that in need of technology capabilities will be car safety. A recent statistic from the Royal Malaysia Police shows that the total number of reported road accidents had increased from 363,319 cases in 2007 to 533,875 cases in 2017 (RMP, 2018). The increasing trend has raised government concern not only on the attitude of the drivers but also on the car safety manufactured in Malaysia. The directly affected stakeholder that need to address this government concern will be car manufacturers. As car manufacturers are responsible to offer the end product to market, the safety features of the car must now become their most important priority. The car manufacturers should know that they hold legal liability to make sure the newly designed car offer to their customers is safe by using enhanced technology although, from the customers' perspectives, safety might only become their second priority after car performance and appearance. Thus, this study aims to analyse how manufacturers improve car safety. This study also aims to explore the perceptions and attitudes of car manufacturers towards car safety and how they transform their understanding and awareness of ASEAN NCAP by embedded them in their daily routine tasks. Moreover, there is a dearth in literature exploring the issue of car safety from the manufacturer's perspective in the local context.

1.1 ASEAN NCAP

ASEAN NCAP is a collaborative effort between the Malaysian Institute of Road Safety Research (MIROS) and Global NCAP since December 2011 (Jawi et al., 2013). It is a program targeted to create and improve the awareness about car safety standards among the automotive customers. This program is hoped to inspire a better market for safer cars in the Southeast Asian region (Jawi et al., 2013).

Based on the star rating given in the ASEAN NCAP assessment, special concern is given to four areas that are frontal impact crashes, side-impact crashes, the effect of crashes on child occupant and Safety Assist Technologies (SATs) of the car (Abu Kassim et al., 2017). The test reports will provide automotive consumers with independent information and transparent advice on the level of safety of the car's occupants and other road users for every car model as well as variants. This will encourage the car manufacturers to pay special attention to car safety in order to promote their cars as one of the safest vehicles as well as fulfilling their legal responsibilities in designing and manufacturing car that is safe to be used by the users.

1.2 Technology Capability

According to Lewis et al. (2016), technological influences relate to advances and refinements in any of the hardware devices and their associated software that are used in conjunction with conducting business. Technological capability is also explained as the technology that is required and useful in developing and producing an advanced product based that can meet certain specific requirements. The term technological capability also refers to activities that enable firms to choose and use the technology to create their business competitive advantage. A variety of current new technologies in the automotive industry such as the intelligent system for Alcolock and seatbelt lock, Global Positioning System (GPS), braking and steering system are fuelling innovations and at the same time influence strategic planning decisions for better products for the market. This has been proved when Malaysia's OEM's undertake the same strategy decision of car safety following the current market trends (David & David, 2016).

Keeping pace with all the planning on these advanced technologies, Malaysia too is planning ahead when it implements National Automotive Policy (NAP) with its main focuses are on green initiatives automotive, development of automotive technology and human capital, market expansion and enhancement of the automotive industry ecosystem (Jawi et al., 2017). This requires the car manufacture to develop their technical capability in producing the safest car for all parties win-win benefits for the government, manufacturer, and customers themselves. However, for car manufacturers to implement these technology capabilities, intelligent and proper planning, eloquent vision and regulatory reforms are needed to ensure it is in line with the country's direction (Abu Kassim et al., 2016). Nelson (2007) has pointed out that technological capability development consists of much more than the imitation of the industrial technologies and institutions of advanced economies. He suggested that the adaptation of technology to the local environment results in the development of new capabilities in developing country firms.

Usually, the effectiveness and efficiency of an organization can be heavily influenced by the technology capability of the organization. Technology capability enables an organization to execute its business strategy in achieving the organization's objectives (Byrd et al., 2006). Furthermore, the study of technology capability has been recognized as the main element for more research as it creates business value for organizations (Kohli & Grover, 2008). Greater technology capability is very crucial for the sustainability of an organization that creates values and customer loyalty towards the organization (Chae et al., 2014). It is shown that the technology capability is important in ensuring the organization performance strategically (Mithas et al., 2011).

The boost the technology capability inside an organization is a strategic investment of organization that needs to be considered as an important expenditure of the organizations as the organization will always seek the best method to gain competitiveness in its respective industry (Arora & Rahman, 2017; Mithas & Rust, 2016; Mithas et al., 2012; Sampler & Earl, 2014). Therefore, this research will investigate in depth the importance of technical capability in improving the design and manufacturing a new car that is safe among car manufacturers.

1.3 Research Framework

Based on the literature review and the research framework (Figure 1), thus the hypothesis is:

H1: There is a significant relationship between technology capability and understanding of ASEAN NCAP among car manufacturers.

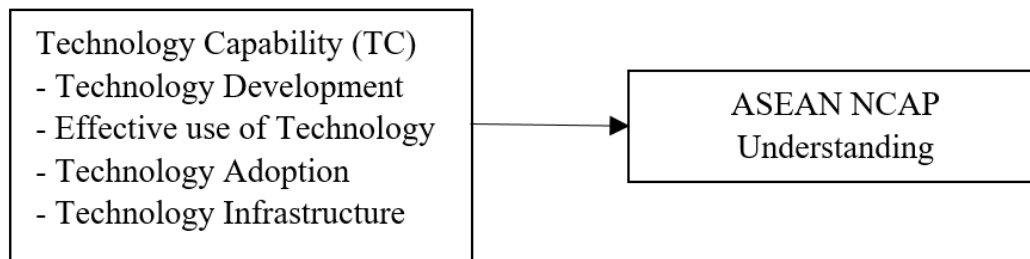


Figure 1: Research framework

2.0 METHODOLOGY

The mix method of data analysis is the combination of quantitative and qualitative methods. It is an approach or technique that can be implemented by one study to help the researcher to better answer research questions.

Therefore, the quantitative research method was applied during the first stage of collecting the data among Malaysian car manufacturers specifically aim for executives, engineers and a higher level of management officers who are involved in designing, manufacturing as well as making the decision in an organization. It is done by using the questionnaire survey form which is divided into three parts. Part A in questionnaire survey form is the respondents' demographic profiles, while part B and C were used to measure technology capability and ASEAN NCAP variables by using a 5-point Likert scale where 1 represents strongly disagree and 5 represents strongly agree. 90 set of questionnaires was returned and analysed by using SPSS software.

In the same way, reliability test analysis was done during the pilot study to test the consistency and reliability and to see the consistency of the items used that shows that the instrument used is reliable, valid and consistent to measure the variables.

Furthermore, in the second stage, the semi-structured or guided interview method was adopted in interviewing participants. A checklist of questions was used to ensure the questions were answered during the interview session. The interview also was conducted to obtain opinions, reflections and comments from those who have special knowledge, expertise and information in their areas of expertise (Collis & Hussey, 2013). The interviews were conducted among engineers, executives, assistant managers as well as managers in one of the car manufacturing firm in Malaysia. The Malay language was used as the communication medium due to respondents' convenience.

3.0 RESULTS AND DISCUSSION

This section shall discuss the results including the qualitative finding from the interview.

3.1 Demographic Analysis

The seventy-two male (80 %) respondents had participated in this research study to compare to eight-teen female (20 %) respondents. They are all from various positions in car manufacturer organization which are three of them respectively are the head of the department (3.33 %) and manager/supervisor of the department (3.33 %), fifty-five are executives (61.12 %) and twenty-nine of them are engineers (32.23 %).

They are all from different departments where 25 of them from administration (27.78 %), 33 are from production (36.66 %), eight from research and development department (8.88 %), 21 are from the marketing department (23.34 %) and three of them are from human resource department (3.34 %).

The majority of the respondents (81.1 %) hold degree certificates and a few of them with master's degrees (10 %) and diploma (8.9 %) level. This shows that almost all respondents are at the tertiary education level.

3.2 Reliability Analysis

Reliability analysis is used to measure internal consistency between items in scale by looking at the stability, validity and reliability of research instruments. For Cronbach Alpha, α -value for ASEAN NCAP and technology capability was at 0.944 and 0.935 respectively. Both results are considered as very good and excellent as the α -value is more than 0.8.

Table 1: Reliability analysis

Variables	No. of Items	Cronbach's Alpha
ASEAN NCAP	9	0.944
Technology Capability	4	0.935

3.3 Descriptive Analysis

Both mean values have high scores with 3.51 and 3.99 respectively while standard deviation is ranging between 0.73 and 0.85.

Table 2: Descriptive analysis

Variables	n	Mean	Std. Dev.
ASEAN NCAP	90	3.99	0.73
Technology Capability	90	3.51	0.85

3.4 Pearson Correlation Analysis

This analysis was used to measure p-value to test the relationship between technology capability and ASEAN NCAP understanding and awareness among car manufacturers. Table 3 below exhibits a moderate relationship ($r = 0.560$, $p < 0.05$) between technology capabilities and ASEAN NCAP understanding among car manufacturer.

Table 3: Pearson correlation table

Variables		ASEAN NCAP	Technology Capability
ASEAN NCAP	Pearson Correlation	1	.560**
	Sig. (2-tailed)		.000
Technology Capability	Pearson Correlation		1
	Sig. (2-tailed)		

** Correlation is significant at the 0.01 level (2-tailed). n = 90.

3.5 Regression Analysis

Linear regression analysis is used for a single independent variable to predict the value of a dependent variable. Meanwhile, the regression analysis above shows that there is a significance (sig = 0.000) negative (Beta = -0.592) relationship between technology capability and car manufacturer understanding of ASEAN NCAP. The negative relationship represents that when the latest and advanced technology has been used, the manufacturer becomes less concerned about ASEAN NCAP requirements due to other related factors such as their confidence level towards the technology used by their organization as this technology will automatically elevate and enhance the car safety standards. As for the manufacturer, ASEAN NCAP is a must as the minimum standard for them to fulfil. However, there are still other internal initiatives that have been taken by their organization to make sure the car is safe to enter into the market. Initiatives also were made to create awareness among their staff. Furthermore, $R = 0.88$ shows that the technology capability variance is about 88 % which explained about ASEAN NCAP awareness.

Table 4: Linear regression

Model	Beta	Sig.
ASEAN NCAP	-1.006	.000
Technology Capability	-.592	.000

$R = 0.88$

3.6 Interview Analysis

Based on the interviews conducted among five respondents from one of the car manufacturers in Malaysia, apart from fulfilling the requirement under Vehicle Types Approval (VTA) regulations by the Road Transport Department Malaysia (RTD/JPJ), all of them have admitted that ASEAN NCAP is very important to be observed by car manufacturers.

Participant 1 explained that:

“...dalam group kami memang kita orang tengok dua regulations, satu dari JPJ, satu daripada ASEAN NCAP...”

(“... for us, we do refer to two regulations, one from JPJ, another one from ASEAN NCAP...”)

Participant 2 mentioned that:

“...sebab saya dalam group safety engineering, jadi safety tu is number one priority la....”

(“... since I am from engineering safety group, safety is number one priority...”)

All participants believed the use of new technology and technology capability itself will automatically enhance the production of a safer car. For that reason, the organization has initiated its own plan to achieve these aims.

Participant 3 explained that:

“...kita ada kita punya additional safety features yang kita letak which is inside regulations...”

(“...we have our own additional safety features which we follow which become inside (organization) regulations...”)

The participants' awareness level is high towards the ASEAN NCAP standard. They are also well informed about the latest requirements of ASEAN NCAP 2021-2025 (Abu Kassim, 2018). Proactively their organization has started to work towards fulfilling ASEAN NCAP 2021-2025 protocols by making sure that their organization's action plan is in line with ASEAN NCAP's future requirements.

According to Participant 4, an engineer said that:

“...action yang kitorang ambik sekarang, kalau internally la kitorang target ASEAN NCAP punya 2021-2025 assessment baru tu...ada benda-benda baru seperti...akan pastikan ada dalam product planning features-features yang akan ada pada 2021-2025 nanti...”

(“...actions that are taken by us, internally, we focus on ASEAN NCAP 2021-2025 new assessments... there are new things like... will make sure all features are addressed in product planning and make available in 2021-2025...”)

This proved their active and direct involvement and contribution towards the development and manufacturing of the new safer car. Their awareness of ASEAN NCAP 2021-2025 has strengthened their competitive advantage when new safety features of the car will become their main selling point to potential customers (Abu Kassim, 2018).

Participant 5, a lead engineer in safety mentioned that:

“...kami buat internal knowledge sharing dengan group-group luar...group engineering design, group marketing, ...because dia interact dengan customers...kita nak make sure dia tau...supaya dia boleh jual...”

(“...we conduct internal knowledge sharing between external groups... engineering design group, marketing group, because they will internal with customers... we need to make sure they know... so that they can sell...”)

4.0 DISCUSSION AND CONCLUSION

This study aims to understand the framework with regards to car manufacturer understanding and their awareness towards ASEAN NCAP by looking at the impact of technology capability own by the car manufacturing firms on ASEAN NCAP.

To conclude all the findings, therefore, *H1: There is a significant relationship between technology capability and understanding of ASEAN NCAP among car manufacturers*, is accepted with a significant negative relationship.

To sum up, the current research finding may be beneficial to the organization especially to a car manufacturer in Malaysia as guidance in considering the technology that will be embedded in their organization when fulfilling ASEAN NCAP. Apart from that, as the car manufacturer, it is also important to explore and later invest in new advanced technology infrastructure with special attention to car safety as this will benefit the organization in the long run. This will allow the organization to achieve sustainability in the national market as well as to remain competitive in the global market.

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