

THE ROLE OF NATIONAL AUTOMOTIVE POLICY
IN IMPROVING INNOVATION AND AUTOMOTIVE
VENDOR PERFORMANCE IN MALAYSIA

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DEDICATION

This thesis is dedicated to my late mother, Timah Bt. Chek who raised me and sacrificed for me until her last breath, in my second semester of PhD journey on 8 January 2014, *Al-Fatihah*.

It is also dedicated to my wife, Zulaikha Jamalludin who taught me that even the largest task can be accomplished if it is done one step at a time.

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ABSTRACT

The National Automotive Policy (NAP) which was launched in 2006 and subsequently revised in 2009 and 2014 has been adopted as a development policy for the automotive industries in Malaysia. Automotive industries basically consist of two sectors which are the automotive manufacturing industry and the automotive components and parts industry. This research aims to study the role of NAP as a mediator in improving innovation and vendor performance in automotive components and parts industry in Malaysia. One of the NAP objectives is to develop globally competitive and sustainable automotive vendors by increasing the value added and export volumes of the components. However, after the policy has been implemented and running for more than thirteen years, the Malaysian automotive components and parts industry is still under performed and globally not as competitive as expected. It has been reported that parts and components produced locally are generally very much lower in quality. In addition, the quantity of imported parts is more than exported ones resulting in an economic deficit situation. The inferior quality products manufactured and lower production volumes have caused major difficulties to most of the automotive vendors in the sector. At present, most of the studies on this industry are focused mainly on the competitiveness of the national automobile manufacturer Proton with very limited attention and effort being paid to the automotive vendors. This study deployed Innovation Performance (IP) theory which has been widely applied in measuring the innovation that leads to the increased performance of manufacturing industries. In order to determine the effectiveness of NAP to the automotive vendors, the researcher had embedded National Innovation System (NIS) theory and NAP to act as a mediator in innovation and performance relationship. Ten hypotheses were developed to study the mediating effect of NAP to vendor's innovation performance. In studying the complex relationship, the research had deployed SEM (Structural Equation Model) technique to justify the multivariate analysis. Four sub-constructs of innovation; product, price, marketing and organization were tested in the direct relationship path. Product and process innovation were found to be significant and this finding was confirmed by many previous studies on manufacturing industries. For the indirect relationship, innovation and performance were mediated by six sub-constructs in the NAP model. Based on the sample population size of 300 vendors, a mediation test was conducted on the model and the four strategies which are found to be significant and important to the automotive vendors are market expansion, supply chain, human capital development, and safety, security and environment strategy. The study concluded that most of the NAP strategies were found to be highly and critically important to the parts vendors and the effects were found to vary according to different categories of the vendors.

ABSTRAK

Dasar Automotif Negara (DAN) yang dilancarkan pada tahun 2006 dan kemudian di kaji semula pada tahun 2009 dan 2014 telah diguna pakai sebagai polisi pembangunan industri automotif di Malaysia. Industri automotif secara asasnya terdiri daripada dua sektor iaitu industri pembuatan automotif dan industri pembuatan alat dan komponen automotif. Kajian ini bertujuan untuk mengkaji peranan DAN sebagai perantara dalam meningkatkan inovasi dan prestasi vendor dalam industri pembuatan alat dan komponen kereta di Malaysia. Salah satu objektif DAN adalah untuk membangunkan vendor automotif yang berdaya saing di peringkat global melalui peningkatan nilai tambah dan kapasiti eksport komponen automotif. Walau bagaimanapun, setelah polisi dilaksanakan dan dilancarkan selama lebih daripada tiga belas tahun, industri pembuatan alat dan komponen automotif didapati masih lagi kurang berdaya saing secara maju seperti yang diharapkan. Sesetengah laporan mendapati bahawa komponen kereta yang dikeluarkan di dalam negara kebanyakannya adalah rendah kualitinya. Di samping itu, kuantiti bahagian yang diimport lebih daripada yang dieksport yang seterusnya menyebabkan keadaan ekonomi yang defisit. Produk berkualiti rendah yang dihasilkan dan jumlah pengeluaran yang lebih rendah telah menyebabkan kesukaran utama kepada kebanyakan vendor automotif di sektor ini. Pada masa ini kebanyakan kajian mengenai industri ini memberi tumpuan terutamanya kepada daya saing pengeluar kereta nasional, Proton dengan perhatian dan usaha yang sangat terhad telah dinilai kepada vendor automotif. Kajian ini menggunakan Teori Prestasi Inovasi (IP) yang telah digunakan secara meluas dalam mengukur inovasi yang membawa kepada peningkatan prestasi industri perindustrian. Untuk menentukan keberkesanan DAN terhadap vendor automotif, penyelidik telah menggunakan teori Sistem Inovasi Nasional (NIS) dan DAN untuk bertindak sebagai pengantara dalam hubungan inovasi dan prestasi. Sepuluh hipotesis telah dibangunkan untuk mengkaji kesan perantara DAN terhadap prestasi inovasi vendor. Dalam mengkaji hubungan yang kompleks, penyelidikan telah menggunakan teknik Model Persamaan Struktur (SEM) bagi tujuan analisis multivariasi. Empat sub-konstruk inovasi; produk, harga, pemasaran dan organisasi telah diuji dalam laluan hubungan langsung. Inovasi produk dan proses didapati sangat signifikan terhadap prestasi vendor dan penemuan ini disahkan oleh banyak kajian terdahulu mengenai industri perindustrian. Hubungan tidak langsung, inovasi dan prestasi telah dimediasi diantara enam sub-konstruk dalam model DAN. Berdasarkan saiz populasi sampel sebanyak 300 vendor, ujian pengantaraan dilakukan pada model dan empat strategi yang didapati penting bagi vendor automotif adalah pengembangan pasaran, rangkaian bekalan, pembangunan modal insan dan keselamatan, strategi ketahanan dan alam sekitar. Kajian ini menyimpulkan bahawa kebanyakan strategi DAN didapati sangat penting kepada prestasi vendor dan kesannya adalah berbeza mengikut kategori vendor yang berlainan.

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LIST OF ABBREVIATIONS

AFTA	-	Asia Free Trade Agreement
ASEAN	-	Association of Southeast Asian Nations
APCIMEX	-	Automotive Parts & Components for Market Expansion
CEO	-	Chief Executive Officer
COO	-	Chief Operating Officer
DIN	-	Distribution Information Network
FDI	-	Foreign Direct Investment
GOM	-	Government of Malaysia
HICOM	-	Heavy Industry Corporation of Malaysia
JV	-	Joint Venture
KVP	-	Kelab Vendor Perodua
LMCP	-	Local Material Content Policy
MDP	-	Mandatory Deletion Program
MAI	-	Malaysia Automotive Institute
MARii	-	Malaysia Automotive Robotics IoT Institute
MACPMA	-	Malaysia Automotive Components and Parts Manufacturer
MATRADE	-	Malaysia External Trade Development Corporation
MDI	-	Mandatory Delete Items
MITI	-	Ministry of International Trade and Industry
MIDA	-	Malaysia Industrial Development Authority
MNC	-	Multi National Corporation
NAP	-	National Automotive Policy
NEP	-	New Economic Policy
NIS	-	National Innovation System
OECD	-	Organization of Economic Co-Operation and Development
OEM	-	Original Equipment Manufacturer
OES	-	Original Equipment Supplier
PROTON	-	Perusahaan Otomobil Nasional
PERODUA	-	Perusahaan Otomobil Kedua
PVA	-	Proton Vendor Association

REM	-	Replacement Equipment Manufacturer
R&D	-	Research and Development
SLR	-	Systematic Literature Review
SME	-	Small and Medium Entrepreneurship
TNC	-	Transnational Corporation
TPPA	-	Trans Asia Pan Pacific Agreement
UTM	-	Universiti Teknologi Malaysia
VDP	-	Vendor Development Programme
WTO	-	World Trade Organization

LIST OF SYMBOLS

β	-	Beta
R^2	-	Coefficient of determination
f^2	-	Level of effect size
Q^2	-	Predictive relevance

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CHAPTER 1

INTRODUCTION

1.1 Overview

This chapter briefly describes the nine inter-related sections which start from the overview of the study to the organization of the thesis. This chapter looks into the preliminary view on the research issues such as background of the study, problem statement, research questions and the definition of terms used in the study. The research looks into the role of National Automotive Policy (NAP) in improving innovation and vendor's performance.

The NAP was launched by the Government of Malaysia (GOM) with the aim to improve the competitiveness of the overall automotive industry in Malaysia. The automotive industry can basically be categorized into two categories which are the automotive companies and automotive vendors which produce the components and parts to support the automotive industries. There are twenty three automotive companies in Malaysia and being supported by 800 automotive component manufacturers, producing a wide range of components, such as body panels, brake parts, engine parts, transmission and steering parts, rubber parts and electrical and electronic parts (MIDA, 2018). The overall automotive sectors in Malaysia provide employment to nearly 710,000 people and contributes almost RM 30 billion to Malaysia's GDP in 2018.

All these automotive companies form a complex relationship which is sometimes referred to as automotive ecosystem. For example, there are three types of automotive companies in Malaysia which are the importer of completely built-up unit (CBU) from overseas, assembler of completely knocked-down (CKD) unit and a full locally manufactured unit (FLM) (MIROS, 2012).

As for the vendors, there are basically three types of automotive vendors which exist in the automotive components and parts industry which are tier-1, tier-2 and tier-3 vendors. These vendors are operating in the same ecosystem. For instance, tier-1 vendor supply in a complete automotive system such as transmission system, braking system and air-condition system to the automotive manufacturers. As for tier-2 vendors, these companies supply components and parts to tier-1 vendor to be assembled in the complete system components. And lastly for tier-3 vendors, they usually supply the supporting components in the system consisting of lower value parts such as rubber-based products to complement in the automotive ecosystem. These automotive vendors work in the same ecosystem, complement or compete with each other.

These vendors fundamentally operate in four market situations which are Original Equipment Manufacturer (OEM), Replacement Equipment Manufacturer (REM), Own Design Manufacturer (ODM) and lastly as Own Brand Manufacturer (OBM) which are elaborated further in chapter two. Besides the different types of vendors operating in different market, there are three types of ownership structure of vendors which are the locally owned company, multi-national companies and completely foreign owned vendors operating in Malaysia. Therefore, the design of NAP strategies should not be customised to one type vendor. Meaning to say, due to its complexity of automotive ecosystem, automotive policy initiatives offered should be designed distinctly to various types of vendors.

1.2 Background of the Study

Automotive industry has been regarded as an important main industry that provides opportunities for Small Medium Entrepreneurs (SME) to be involved in this sector as well as work opportunities to local people. On that note, GOM sees that this industry needs to be protected from the presence of foreign automotive producer. The protection measures of this industry have been discussed by many economic and academic scholars.

In fact, the automotive protectionist policy has been practiced by many developed countries like United Kingdom, Germany, France and US which protected their automotive industry in the 1950s (Chang, 2007). Other country like South Africa also has its automotive policy called the Motor Industry Development Program (MIDP) started in 1961 which succeeded in developing the country into automotive business(Barnes, Kaplinsky, and Morris, 2004). Philippines' strategy in automotive policy was the Car Development Programme (CDP) that allowed the entry of new assemblers and attracted multinational car companies to invest and set up production in the country (Quimba and Rosellon, 2012).

In Malaysia automotive industry has been recognized as an important source of revenue to a country and provides many benefits. This industry has been mentioned two times in the Malaysia Third Industrial Master Plan (IMP3) under Chapter 3 on External trade and Chapter 13, Transport Equipment Industry. It is mentioned in IMP3 paragraph 3.103 it is the aspiration of the GOM to promote the trade in motor vehicles, parts and components. The IMP3 aims to drive industrialization to a higher level of global competitiveness through the transformation and innovation of the manufacturing and service sectors within the period of 15 years between 2006 and 2020 (MITI 2006).

The automotive industry was contributed by the transport and equipment sub-sector. The manufacturing sector averagely accounted some total of 29% of the total GDP, out of which, inclusive of motor vehicles and automotive parts and components, accounted for 65% of the Transport and Equipment subsector whilst the balance were contributions from other industries. The automotive industry is one of the main contributors to Malaysian economy. This can be noticed from published economy data in 2012. This industry is contributing some 3.2 % to GDP in 2012, accounting for RM5.3 billion in exports, investments of RM5 billion (January-October 2013: RM3 billion) (NAP 2014). In the year 2015, the contribution of the automotive sector towards GDP had increased to 4.0%. (MAI, 2015).

As for the automotive components and parts industry, it contributes some 8.5% growth towards the manufacturing sector. It was reported that seventy thousand workers receive the benefits directly from the national automotive industry in Malaysia by which ten thousand workers are working with Proton, the national car industry and another sixty thousand workers were reported to work in the supporting industry like the automotive components and parts industry (MIDA, 2018).

However, after three decades of the establishment of Proton, the performance of the overall automotive industry in Malaysia is still not able to become a globally competitive industry. According to one press statement made by the Former Minister in Ministry of International Trade and Industry, Dato Sri Mustapha Mohamed, dated 1st April 2016, he elaborated on the challenges faced by the automotive vendors to be in the challenging automotive business: *“Proton should have graduated from the National Automotive Policy programs and further government assistance has to be reviewed. He added that the local automotive vendors are facing serious problem. Last year, a number of Proton vendors came to see me on a few occasions and shared their problems. Following that, MITI injected RM100 million to provide soft loans to alleviate their burden. Even then, it has come to my attention that some of the vendors may face serious challenges if Proton continues to operate at the current level of production and sales. A few of them might be out of business in the next three to four months”* (New Straits Times -1st April 2016).

Among the challenges faced in the automotive components industry in Malaysia is firstly the trade deficit of the volume of automotive parts imported. Figure 1.1 shows for the past five years between 2013 and 2017, Malaysia imported values of automotive components are around RM 20.5 billion compare to exported value recorded at around RM 7.1 billion. Although the trading values of the automotive components shows an inclining trend, the value of imported components are still higher than exported values which creates a trade deficit situation.

The situation indicates that GOM is still not able to achieve the objectives as outlined in the NAP, which is to develop the local automotive vendor into globally competitive vendors. Thus, the GOM needs to take more economics measures to close the gap and to increase the export activities of the industry.

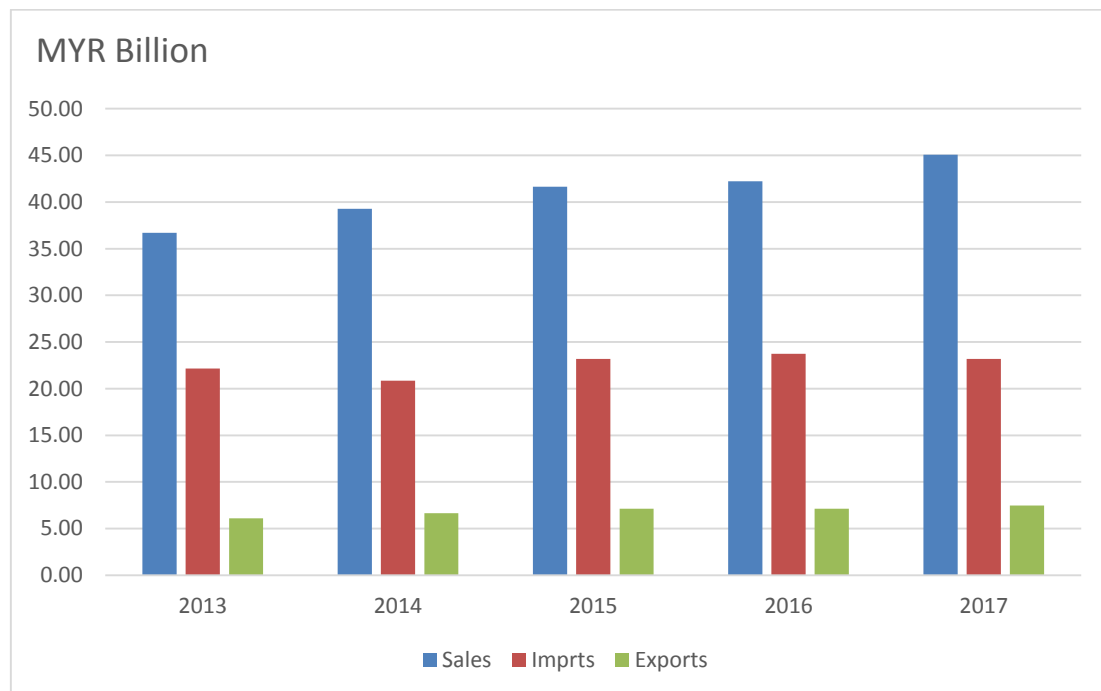


Figure 1.1 Sales, Imports and Exports Value of Malaysia Automotive Components (MIDA 2018).

Second challenge faces by the automotive vendors in the automotive components and parts industry is the production and supply of the automotive components are controlled by the automotive manufacturer. Most of the foreign car makers are located in Thailand and thus majority of international automotive components companies are located in Thailand. The physical characteristics of automotive components are bulky and heavy, it is more economical if the automotive vendors locate their business of operation near to the automotive manufacturer. The extensive network of international automotive manufacturers present in the country directly contributed to the competitiveness of the country's automotive parts industry (Sultana, Muneer, and Ibrahim, 2015). Consequently, Thailand has become the top exporter of automotive components in the ASEAN region.

Figure 1.2 also shows that in 2015, only two countries did not face a trade deficit situation in automotive components business which are Thailand and Philippines. This has pondered another situation why these countries did not encounter the situation. It could be the export volumes of the parts are really high because of these countries have been chosen by the automotive manufacturer to produce a high value component.

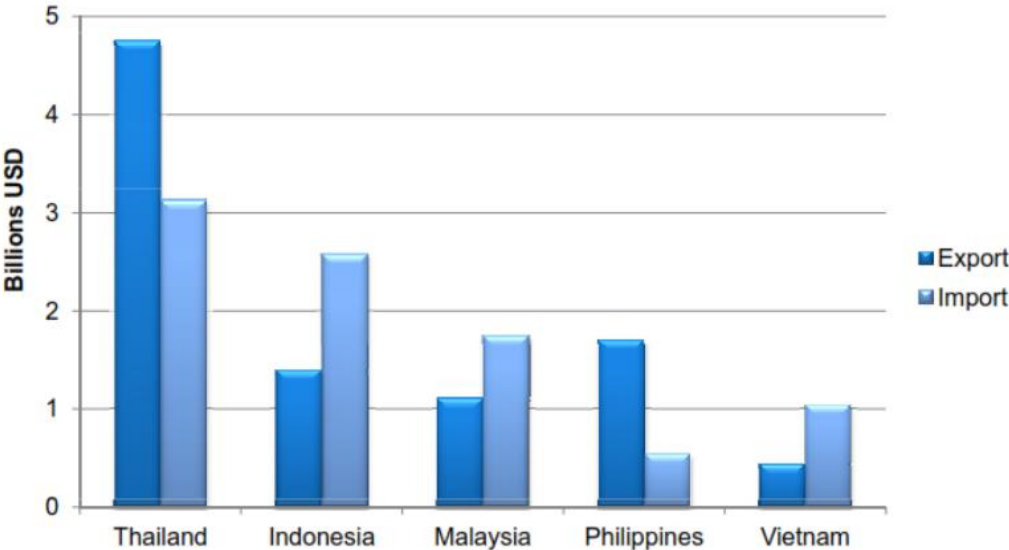


Figure 1.2 Automotive parts trade among major ASEAN countries (HIS Global Insight Automotive, 2015)

ASEAN Investment Report (2013) indicated Malaysia are among the countries in ASEAN produces lower value components because of the control of the foreign automotive manufacturer to this automotive components and parts industry.

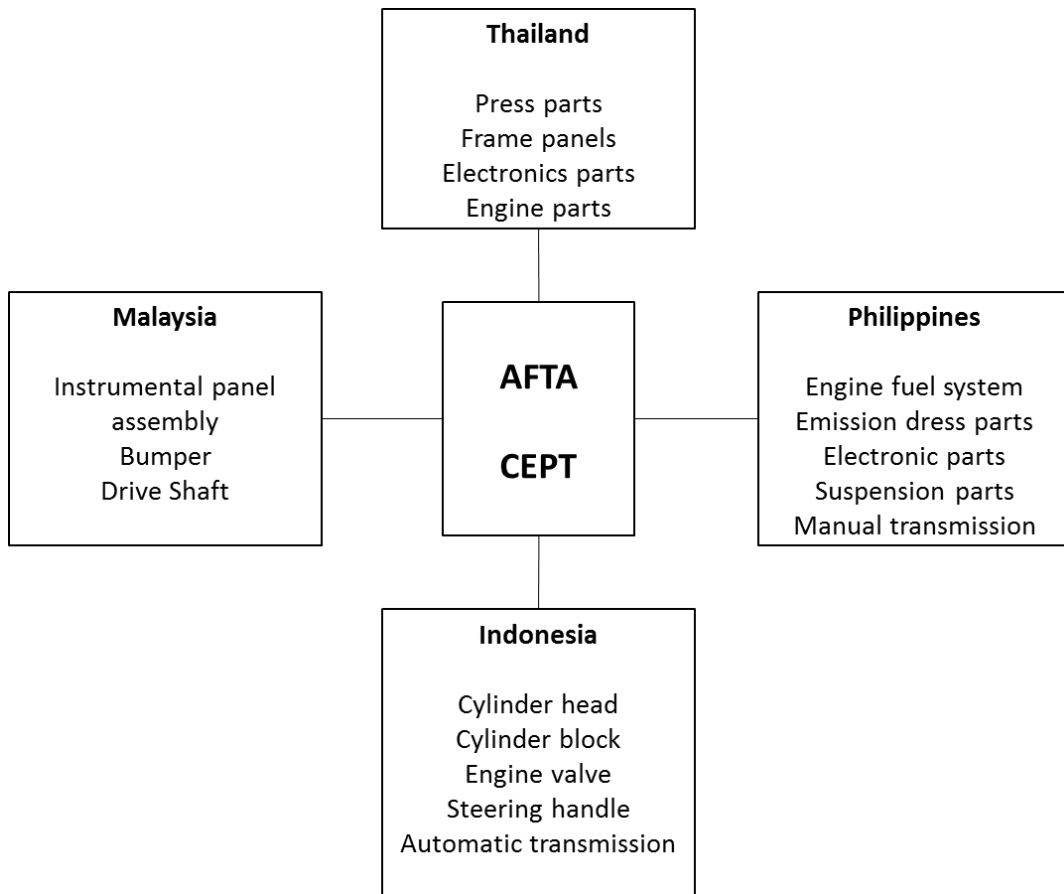


Figure 1.3 Production Network of Automotive Components in ASEAN (ASEAN Investment Report FDI Development and Regional Value Chains, 2013)

Figure 1.3 shows Thailand and Philippines are segmented as the manufacturer for electronic parts thus giving opportunity for these countries to have higher values of export components and parts. This shows the need for the intervention of GOM in this industry and made the study on NAP still important in order to develop the local vendors to be innovative and globally competitive.

1.3 Problem Statement

Malaysia automotive industry has recorded a steady growth over the last thirty years. The growth has been guided by various government policies implemented to

enhance the competitiveness of the automotive industry. The government policies which evolved from the initial Import Substitution Policy (ISI) in 1967 into the recent Industry 4WRD: National Policy on Industry 4.0 in 2018 are all with the same objectives aimed to improve industry competitiveness for effective economic growth; and society restructuring through income and wealth redistribution. These policies have led to the creation of many enterprises such as the automotive vendors created.

Previous studies mentioned that the national intervention policy might not help all the time in developing automotive industry. The government policy in developing the automotive industry can also be differentiated in term of the strategies approached by the government. Wan-Ping, Tai and Samuel (2013) made a comparison study between Malaysia and Thailand automotive policy. According to this study, Malaysia has opted to be as 'independent' country not to depend on foreign automotive car maker to develop its automotive components and parts industry. In other word, the GOM launched Proton with the aim to develop its automotive industry as well as the vendors. Thus, by having a national car company in Malaysia, the government hopes it will help the local vendors industry to participate in the business.

Different with Thailand 'dependent strategy', the country does not own any national car company like Malaysia and henceforth did not control its automotive industry by allowing many international foreign car makers in the country. The automotive policy of Thailand chose the dependence mode with collaboration with US and Japanese car makers, whilst Malaysia chose the independency strategy with the aim to develop its national car program (Wan-Ping, Tai and Samuel, 2013).

One of the reason contributed to the deficit situation was that Malaysia automotive components and parts industry is reported to be too fragmented since majority of the products cater for domestic market and were unable to compete with the foreign suppliers (Sakura, Abidin, and Muslimen, 2012). Reason being is that most of the foreign automotive makers prefer to set up manufacturing plants in Thailand due to the dependency strategy. The trends in automotive components and parts industry include these foreign OEMs vendors which mostly will follow the automotive

makers due to the nature of the automotive supply chain or global value chain (Jiajun Wang 2014).

Therefore, it is necessary to seek why the Malaysian automotive industry has not become a globally competitive industry despite with the full support and assistance from the GOM. It may due to the policy implementation, mismatch incentives to the right target group that do not suite the current requirement of the industry. Hence, every policy should undergo further investigation before the exact problem can be identified. Based on the present scenarios in this industry, the challenges faced by the automotive vendors in Malaysia the problems can be summarised as follows;

- i. The trade deficit in the automotive components and parts in this business requires assistance and attention from the GOM.
- ii. The nature of regionalized supply chain and segmented production of automotive components has hindered the growth of this industry in Malaysia.

1.4 Research Objectives

Based on the problem statement of the study, this research attempts to study the role of NAP in the innovation and vendor performance relations. The objectives of the study are as follows;

1. To evaluate the effectiveness of NAP strategies and directions in enhancing the vendor's performance.
2. To investigate the direct effect and the indirect effect of NAP in the innovation and vendor performance relationship.

3. To classify which innovation types, have significant effect in NAP and vendor performance relationship.
4. To determine which NAP directions and strategies are significant in the innovation and vendor performance relationship.
5. To recommend NAP roles and strategies in the innovation and vendor performance relationship.

Based on the research objectives, the research is expected to give contributions to few stakeholders such as the policy makers, vendor association and automotive manufacturers. Policy maker in this context of this study would be the Ministry of International Trade (MITI) which designed and implemented the NAP in 2006 which the results of the study hopefully can give better understanding on which policy strategies is the most important to the local automotive vendors. Different policies may have different effects on the vendors performance and it is important if future research could differentiate the effect from different policy measures (Okamoto and Sjöholm, 2000).

1.5 Research Questions

Previous researches in the national automotive industry focused on the performance of Proton as the main automotive industry in Malaysia. Researches on vendors capability was also conducted by many researchers in this field. However researches on evaluation of NAP to the automotive vendors in Malaysia was still lacking. This study seeks to address the gap by understanding the role of NAP between innovation and vendors' performance. Henceforth, the following research questions were developed which are as follows;

Research Question 1: Which type of innovation influenced the vendor performance in Malaysia?

- a) Product innovation will influence vendor's performance.
- b) Process innovation will influence vendor's performance.
- c) Marketing innovation will influence vendor's performance.
- d) Organizational innovation will influence vendor's performance.

Research Question 2: How are the innovation and vendor's performance relationship mediated by NAP strategies?

- a) Innovation and vendor's performance will be mediated by investment strategy.
- b) Innovation and vendor's performance will be mediated by technology strategy.
- c) Innovation and vendor's performance will be mediated by market expansion strategy.
- d) Innovation and vendor's performance will be mediated by human capital development strategy.
- e) Innovation and vendor's performance will be mediated by supply chain strategy.
- f) Innovation and vendor's performance will be mediated by safety, security and environment strategy.

1.6 Significance of the study

Based on the research objectives, the research is expected to give policy makers a better understanding on which policy strategies is the most important to the local automotive vendors. Different policies may have different effects on the vendors

performance and it is important if future research could differentiate the effect from different policy measures (Okamoto and Sjöholm 2000). Furthermore, the study on the role of automotive policy in Malaysia improving innovation and vendor's performance are still underexplored in using primary data research (Rosli and Kari, 2008).

This study is expected to give important empirical contributions to the local automotive components parts industry. By identifying the important strategies of the automotive policy, it is hoped that it can help to produce more competitive SMEs and hence contributing to economic development of the country. Furthermore, automotive components and parts is categorized as high technology and value goods which is important because at the present situation, the industry transacts at a deficit situation (Biggart and Guillen, 2008).

Most of the automotive vendors are considered to be in Small and Medium Entrepreneurship (SME) level. Study on government policy is important because SMEs are seen as a potential engine of economic growth in line with the government's objective to create equal wealth distribution under the New Economic Policy (NEP) (Rosli, 2010). Furthermore, most of these SMEs are local vendors which faced difficulties in competing in international market and requires government intervention. According to Sang and Bekhet (2015), GOM need to provide appropriate intervention and policy to encourage the development of electric vehicles as part of the NAP strategy towards low carbon society.

Existing literature in automotive studies mostly focused on the performance of overall automotive industry in Malaysia. Lack of study comparing the performance of automotive vendor with the automotive policy provided by the government (M. Zhang et al. 2019). Furthermore, most study in evaluating government policy used secondary data and lack of empirical study was found in studying the government intervention. Thus, the use of PLS-SEM analysis technique in this study would give a significance of the study in term from different methodology perspectives. This would give a significance of study from the methodology perspectives. Wang (2018) mentioned although there is ample studies on the role of government, but empirical

studies testing the relationship between the local government intervention and innovation performance are still scarce. This was also supported by Thun (2018) which mentioned study to track the performance of automotive components firms are still scarce. Furthermore, the study on innovation in East Asian automotive industry still relevant and continue to need for further exploration on the important challenges and opportunities in this industry (Technovation, 2018).

1.7 Scope of the Study

The study limits to the analysis of effectiveness of NAP implementation towards local automotive vendors. Local automotive vendors in this included main Proton vendors as well as other vendors in Malaysia which are Perodua, Naza and Toyota.

This research intended to look at the impact of NAP directions and strategies to the automotive vendors particularly in the automotive components and parts industry. NAP was launched basically with six objectives, however for the scope of the research only looked into objective (iii) to enhance value added and local capabilities in the automotive sector and objective (iv) to promote export-oriented Malaysian manufacturers as well as component and parts vendors.

The scope of the study also limits to the evaluation of NAP strategies and incentives which offers to all automotive vendors operated in Malaysia. The period of evaluation of NAP is within 2016 to 2018.

1.8 Definition of terms

Automotive industry – is defined as the industry that comprise of automotive manufacturer and automotive components parts manufacturer. It is also known as

“industry of the industries” because automotive industry has create many supporting industries such as in automotive components parts industry (Wad, Peter, Chandran Govindaraju 2011).

Automotive components and parts - Automotive components belong to the group HS 8708 under the Harmonized Trading Code. ‘Components’ is defined as a smaller self-contained part of larger entity. The larger entity is also known as part of a larger device (Sugiarto, Dewayana, and Hetharia 2015).

Automotive vendors - Automotive vendor by definition is entity that supply their products, mainly to automotive makers or automotive-assemblers operating in Malaysia (Rosli, 2010).

EEV – EEV is defined as vehicles that meet a set of specification in terms of carbon emission level (CO₂/km) and fuel consumption (L/km). EEV includes fuel-efficient internal combustion engine (ICE) vehicles for example a ‘D’ segment large family car should consume 7.0L/100km and not releasing above than 120g CO₂/km (MITI, 2014)

EV – Electric vehicles are defined as vehicles not ICE power train but run on a “Hybrid Electric Vehicle” (HEV), “Plug-in Hybrid Electric Vehicle” (PHEV), “Battery Electric Vehicle” (BEV), and fuel cell electric vehicle (FCEV). (MITI, 2014).

Government policy – Government policy in the automotive components industry refers to exclusive manufacturing right to indigenous automotive components such controlling of manufacturing license, the application of protective rates such as import tariff on imported parts (Ranawat and Tiwari 2009).

Institutional support – Institutional support can be defined as government departments provide support for firms in order to reduce the adverse effects inadequate institutional infrastructure. The tangible and intangible resources obtained from government -adequate institutional infrastructure. The tangible and intangible resources obtained from governments and their agencies, such as beneficial policies and programs can affect a company's decisions on innovation (M. Zhang et al. 2019).

Industrial policy – Government efforts to change the production structure of an economy in order to accelerate economic development compared to macro policy (Wade, 2014). Government attempts to push firms in desired direction by various supportive policies. On demand side government may use tariffs, taxes, subsidies, product standards and government procurement to boost or restrict demand. On supply side, government may use entry restrictions, state ownership, technology transfer policy, R&D credits and subsidies to steer firm in desired direction (Thun, 2018).

Innovation - Innovation as a term is not only related to products and processes, but is also related to marketing and organization. Schumpeter (1934) described different types of innovation: new products, new methods of production, new sources of supply, the exploitation of new markets and new ways to organize business. Innovation in this study are measured from four factors according to Oslo Manual (2005) which are product innovation, process innovation, marketing innovation and organizational innovation.

Innovation policy – Innovation policy is the interface between R&D policy and industrial policy that aims to create a conducive framework for bringing ideas to market (OECD, 2005). Innovation policy consists range of different policies that have been introduced at various points of time, with different motivations and using a variety of labels. For example, much of what is called innovation policy today may previously have gone under labels such as industrial policy, science policy, research policy, or technology policy (Edler and Fagerberg 2017).

Performance - Performance is defined as the ability of a firm to deliver outcomes in a priori determined defined as the ability of a firm to deliver outcomes in a priori determined dimensions in relation to a set of targets as required by its owners and stakeholders (Rosli, 2008). Performance in this study are measured in term of product performance, financial performance, market performance and innovative performance taken all the importance dimensions from the previous literature review.

1.9 Organization of the Thesis

The research consists of five chapters. Chapter 1 of this thesis elaborates and explains on research background, problem statement, research objectives, research questions, research hypothesis, conceptual framework, research significance and research scope and limitations.

Chapter 2 reviews literatures on government policy in automotive industry, current scenario of automotive industry in Malaysia in terms of the performance of vendors, the competitiveness of the industry and the effect market liberalization to automotive industry in Malaysia. Secondly, Chapter 2 also reviews on the innovation literatures particularly in the field of innovation economics and innovation policy.

Chapter 3 discusses the research design, theoretical framework and research hypothesis. Chapter 4 discusses the research methods used to study the effectiveness of NAP to automotive vendors, research population and proposed method in data collection and findings. Among the research methods deployed were SEM-PLS techniques and descriptive analysis technique.

Chapter 5 discusses the data findings and analysis performed with Smart PLS. The findings discussed on the result from measurement model test, structural model and mediation analysis. Lastly, the overall conclusion about the research and the future recommendation on the research are presented.

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Journal with Impact Factor

1. Relationship between National Automotive Policy (NAP), innovation and automotive vendors' performance in Malaysia. Aini Suzana Ariffin, Mohd Lutfi Iskandar Sahid, Management and Science Letter, ISSN 1923-9335 May 2019

Indexed Journal

1. Competitiveness Analysis of ASEAN Automotive Industry: A Comparison between Malaysia and Thailand Policy. Aini Suzana Ariffin, Mohd Lutfi Iskandar Sahid, Journal of Science, Technology and Innovation Policy, UTM Vol. 3 No. 2 (Dec. 2017).
2. Factors Potentially Enhancing National Automotive Policy Goals and Industry Innovation. Aini Suzana Ariffina, Mohd Lutfi Iskandar Sahid, Mathew Maavak. Journal of Science, Technology and Innovation Policy, UTM, Volume 2 Number 1 (June 2016).

LIST OF APPENDICES

Appendix A – Survey Questionnaire

Section A : NAP						
	<p>On the following scale from 1 = strongly disagree to 5 = strongly agree, please state whether the incentives offered in NAP is <u>significant to your organization and is important</u> in improving the competitiveness of automotive vendor in Malaysia.</p>					
Question number		Strongly disagree	Disagree	Neither agree / disagree	Agree	Strongly agree
	<u>Investment Strategy</u>					
IVS1	Issuance of new Manufacturing License for motor vehicles in the category of EEV.	1	2	3	4	5
IVS2	Provision of customized incentives to attract investment in the EEV category.	1	2	3	4	5
IVS3	Exemption of import tax and excise duty for assembly of Completely Knocked Down (CKD) hybrid and electric vehicles.	1	2	3	4	5

	<u>Technology and Engineering Strategy</u>					
TEC1	Provision of soft loan to develop EV infrastructure such as Plug-In-Hybrid-Vehicle charging station.	1	2	3	4	5
TEC1	Provision of soft loans for pre commercialization activities EV/EEV to adopt and adapt to new technologies.	1	2	3	4	5
TEC1	Establishment of Industry Centre of Excellent (ICOE) as a platform to develop new technologies in vehicle sub system.	1	2	3	4	5
	<u>Market Expansion Strategy</u>					
MEX1	Organizing Automotive Parts & Components For Market Expansion (APCIMEX) to drive export sales.	1	2	3	4	5
MEX2	Establishment of Distribution Infrastructure Network (DIN) which serves as coordinating centre in marketing,	1	2	3	4	5

	warehousing, repackaging, logistics, inventory control and etc.					
MEX3	Enhancement of the existing economic and technical cooperation programmes with trade partners under the various bilateral and regional agreements.	1	2	3	4	5
	<u>Supply Chain Development Strategy</u>					
SCM1	Provision of soft loans to develop new tooling for Tool, Dies and Mould manufacturers.	1	2	3	4	5
SCM3	Provision of soft loans for component manufacturers under activities such as automation, consolidation, joint venture and technical cooperation.	1	2	3	4	5
SCM3	Provision of soft loans for component manufacturers under activities such as pre-commercialization, product and process design.	1	2	3	4	5

	<u>Safety, Security and Environment Strategy</u>					
SSE1	Introduction of Malaysian Standards for safety related new and used components with gradual implementation beginning early 2015	1	2	3	4	5
SSE2	Introduction of voluntary vehicle inspection programme (VVIP) to ensure roadworthiness of vehicle.	1	2	3	4	5
SSE3	Adoption of global 3R (Reduce, Reuse, Recycle) standard as Malaysian Standards in the automotive components.	1	2	3	4	5
	<u>Human Capital Development Strategy</u>					
HCD1	MAI (Malaysia Automotive Institute) to develop the apprenticeship program to accelerate the assimilation of graduates into the domestic automotive industry	1	2	3	4	5
HCD2	Provision of fund amounting to RM100	1	2	3	4	5

	million for human capital development programme in Lean Production System, QC, Leadership and etc.					
HCD3	Dispatchment of foreign automotive experts to components parts manufacturers such as MAJAICO.	1	2	3	4	5

Section B : Innovation						
	<p>To what extent the below innovation activities has been implemented in your organization after the launch of NAP (2014). Your period of evaluations should between 2015 to 2017.</p> <p>Please rate 1 = ‘not implemented’, 2 = ‘imitated from national market’, 3 = ‘imitated from international’, 4 = ‘current products were improved’, 5 = ‘original product/process/marketing/organization innovation were implemented’.</p>					
Question number	<u>Product Innovation</u>					
PDI1	Increasing manufacturing quality in automotive components and materials.	1	2	3	4	5

PDI2	Decreasing manufacturing cost in components and materials of current products.	1	2	3	4	5
PDI3	Developing newness for current products leading to improved ease of use.	1	2	3	4	5
	<u>Process Innovation</u>					
PCI1	Determining and eliminating non-value adding activities in production process.	1	2	3	4	5
PCI2	Decreasing variable cost per components in the manufacturing process.	1	2	3	4	5
PCI3	Increasing output quality in manufacturing process and techniques.	1	2	3	4	5
PCI4	Increasing delivery speed in delivery related logistic process.	1	2	3	4	5
	<u>Marketing Innovation</u>					
MKI1	Renewing the design of the current and/or new products through changes in appearance, packaging and shape.	1	2	3	4	5

MKI2	Renewing the distribution channels of the current and/or new products.	1	2	3	4	5
MKI3	Renewing the product promotion techniques employed for the promotion of the current and/or new products.	1	2	3	4	5
MKI4	Renewing the product pricing techniques for the current and/or new products.	1	2	3	4	5
	<u>Organizational Innovation</u>					
ORI1	Renewing the routines, procedures and process employed to execute firm activities in innovative manner.	1	2	3	4	5
ORI2	Renewing the supply chain management system in the manufacturing process.	1	2	3	4	5
ORI3	Renewing the production and quality management system.	1	2	3	4	5

Section C : Performance						
	<p>This section is to evaluate your firm performance between the periods of 2015 to 2017. How do you rate the following performance in your organization in the last three years compared before the implementation of NAP in 2014. Please rate in five point scales ranging from 1 = very unsuccessful to 5 = very successful.</p>					
Question number	<u>Innovative Performance</u>					
INP1	Ability to introduce new products to market before competitors.	1	2	3	4	5
INP2	Innovations introduced for work processes and methods.	1	2	3	4	5
INP3	Number of innovations under intellectual property protection.	1	2	3	4	5
INP4	Development of new products follows international standard.	1	2	3	4	5
	<u>Production Performance</u>					
PDP1	Improving in quality of new/existing products (Conformance quality)	1	2	3	4	5
PDP1	Improving in overall production cost	1	2	3	4	5
PDP1	Improving in the production volume.	1	2	3	4	5
	<u>Market Performance</u>					

MKP1	Improvement in customer satisfaction.	1	2	3	4	5
MKP1	Improvement in export sales.	1	2	3	4	5
MKP3	Improving in sales in REM (Replacement Equipment Market).	1	2	3	4	5
MKP4	Improving in sales as OEM manufacturers to Proton & Perodua.	1	2	3	4	5
	<u>Financial Performance</u>					
FP1	Return on sales (profit/total sales)	1	2	3	4	5
FP2	Return on assets (profit/total assets)	1	2	3	4	5
FP3	Improvement in general profitability of the firm.	1	2	3	4	5

Section D: Firm's Information

Please write your answer in questions 1 and 2. For questions 3 to 6, please tick in the following box provided.

1. Please state your company's name.
2. Please state your position.
3. Please state the firm ownership structure. *(Please tick one)*
 - Bumiputra company
 - Non Bumiputra company
 - Multi National Company (MNC)
 - Foreign owned company. Origin: _____

4. Which tier is your company operating in the industry? *(Please tick which is applicable)*

- Tier-1 vendor
- Tier-2 vendor
- Tier-3 vendor

5. Which business module your company involved? *(Please tick)*


- | | |
|-------------------------------------|-------------------------------------|
| <input type="checkbox"/> Body | <input type="checkbox"/> Equipment |
| <input type="checkbox"/> Chasis | <input type="checkbox"/> Powertrain |
| <input type="checkbox"/> Electrical | <input type="checkbox"/> Others : |
-

6. Which Automotive System that your company supply for? *(Please tick all that applies to you)*

- | | |
|----------------------------------------------------|--------------------------------------------|
| <input type="checkbox"/> Transmission system | <input type="checkbox"/> Electronic system |
| <input type="checkbox"/> Steering system
system | <input type="checkbox"/> Air-conditioned |
| <input type="checkbox"/> Brake system | |
| <input type="checkbox"/> Suspension system | <input type="checkbox"/> others: _____ |

7. What is your perspective on NAP and any recommendation for future improvement on NAP?

Appendix B – Letters sent for expert validity.

 UTM UNIVERSITI TEKNOLOGI MALAYSIA	Sekolah Perdana Polisi Sains, Teknologi dan Inovasi (UTM Perdana School)	(UTM Perdana School) Universiti Teknologi Malaysia <i>International Campus</i> Jalan Semarak 54100 Kuala Lumpur, Malaysia
-------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------

Tel: +(6)03-26154587 Faks: +(6)03-26937916 <http://www.perdanaschool.utm.my> Emel: perdanaschool@ic.utm.my

RUJUKAN KAMI: Rujukan Kami: UTM.K.39.01/12.23/1 Jld. 2 (4)
RUJUKAN TUAN: Tarikh: 1 Disember 2016

Tuan Haji Azalan Omar
Presiden
Proton Vendors Association
Proton Holdings Berhad
HICOM Industrial State, Batu 3,
40000 Sham Alam
Selangor Darul Ehsan

Assalamualaikum,

Tuan,

**MEMOHON KERJASAMA UNTUK MENELITI KESAHIHAN SOAL-SELIDIK KAJIAN
MENGENAI POLISI NASIONAL AUTOMOTIF DI MALAYSIA YANG AKAN DIGUNAPAKAI
UNTUK PROGRAM IJAZAH DOKTOR FALSAFAH (PhD)**




Dengan segala hormatnya, merujuk kepada perkara di atas dan butiran maklumat diri pelajar seperti berikut:

NAMA	: MOHD LUTFI ISKANDAR BIN SAHID
NO. K/P	: 781014145759
NO. MATRIK	: PF123014
PROGRAM PENGAJIAN	: DOKTOR FALSAFAH (PENGAJIAN POLISI)
FAKULTI	: UTM PERDANA SCHOOL
TAJUK KAJIAN	: "A SURVEY ON THE EFFECTIVENESS OF NATIONAL AUTOMOTIVE POLICY (NAP) AND ITS IMPACT ON VENDORS PERFORMANCE AND INNOVATION IN MALAYSIA"

2. Adalah dimaklumkan bahawa Jawatankuasa Penyeliaan Tesis Pelajar tersebut telah bersetuju melantik tuan sebagai pakar penilai kepada kandungan borang soal-selidik yang telah dibangunkan untuk tujuan kajian di atas. Bersama-sama ini disertakan Borang Soal-selidik dan Borang Penilaian Pakar untuk tindakan selanjutnya.

3. Kerjasama tuan adalah dipohon untuk melengkapkan borang penilaian tersebut dalam tempoh dua minggu dari tarikh penerimaan surat ini. Komen dan pandangan dari pihak tuan amatlah diharapkan bagi mempertingkatkan lagi kualiti penyelidikan ini.

4. Bagi pihak Jawatankuasa Penyeliaan Tesis Pelajar ini, kami yakin tuan dapat membantu pelajar ini demi melaksanakan penyelidikan beliau.

ANUGERAH MERDEKA 2009
Perayaan 50th Abadi dan
Kemerdekaan, Sains & Inovasi

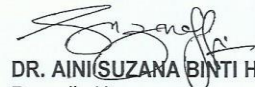
ANUGERAH BERSEKUTUAN
SANG DIPERKATA

5. Kesudian tuan untuk memberi kerjasama di dalam penilaian ini amatlah dihargai dan didahului dengan ucapan ribuan terima kasih.

Salam hormat.

"BERKHIDMAT UNTUK NEGARA"

Yang benar,



DR. AINI SUZANA BINTI HAJI ARIFFIN

Penyelia Utama

Sekolah Perdana Polisi Sains, Teknologi dan Inovasi
(UTM Perdana School)

UTM Kuala Lumpur

☎03-2180 5175

☎03-2180 5340

✉suzana.kl@utm.my



UTM
UNIVERSITI TEKNOLOGI MALAYSIA

Sekolah Perdana Polisi
Sains, Teknologi
dan Inovasi
(UTM Perdana School)

Sekolah Perdana Polisi Sains, Teknologi dan Inovasi
(UTM Perdana School)
Universiti Teknologi Malaysia *International Campus*
Jalan Semarak
54100 Kuala Lumpur, Malaysia

Tel: +(6)03-26154587 Faks: +(6)03-26937916 <http://www.perdanaschool.utm.my> Emel: perdanaschool@ic.utm.my

RUJUKAN KAMI:
RUJUKAN TUAN:

Rujukan Kami: UTM.K.39.01/12.23/1 Jld. 2 (17)
Tarikh: 1 Disember 2016

En. Peter Lim Yoke Cheong
Presiden
Malaysia Automotive Component Manufacturers (MACPMA)
Federation of Malaysian Manufacturers
Wisma FMM, No.3, Persiaran Dagang, PJU 9,
Bandar Sri Damansara,
52200 Kuala Lumpur

Salam Sejahtera,

Saudara,

**MEMOHON KERJASAMA UNTUK MENELITI KESAHIHAN SOAL-SELIDIK KAJIAN
MENGENAI POLISI NASIONAL AUTOMOTIF DI MALAYSIA YANG AKAN DIGUNAPAKAI
UNTUK PROGRAM IJAZAH DOKTOR FALSAFAH (PhD)**

Dengan segala hormatnya, merujuk kepada perkara di atas dan butiran maklumat diri pelajar seperti berikut:

NAMA : MOHD LUTFI ISKANDAR BIN SAHID
NO. K/P : 781014145759
NO. MATRIK : PF123014
PROGRAM PENGAJIAN : DOKTOR FALSAFAH (PENGAJIAN POLISI)
FAKULTI : UTM PERDANA SCHOOL
**TAJUK KAJIAN : "A SURVEY ON THE EFFECTIVENESS OF NATIONAL
AUTOMOTIVE POLICY (NAP) AND ITS IMPACT ON
VENDORS PERFORMANCE AND INNOVATION IN
MALAYSIA"**

- Adalah dimaklumkan bahawa Jawatankuasa Penyelesaian Tesis Pelajar tersebut telah bersetuju melantik saudara sebagai pakar penilai kepada kandungan borang soal-selidik yang telah dibangunkan untuk tujuan kajian di atas. Bersama-sama ini disertakan Borang Soal-selidik dan Borang Penilaian Pakar untuk tindakan selanjutnya.
- Kerjasama saudara adalah dipohon untuk melengkapkan borang penilaian tersebut dalam tempoh dua minggu dari tarikh penerimaan surat ini. Komen dan pandangan dari pihak tuan amatlah diharapkan bagi mempertingkatkan lagi kualiti penyelidikan ini.
- Bagi pihak Jawatankuasa Penyelesaian Tesis Pelajar ini, kami yakin saudara dapat membantu pelajar ini demi melaksanakan penyelidikan beliau.



ANUGERAH TARIFA
INTELEK NEGARA 2010
Kementerian Perdagangan



ANUGERAH MERDEKA 2009
Pencapaian Uluang Akademik dan
Prestasi Sains & Teknologi



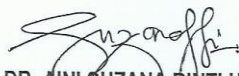
ANUGERAH IJNAMA
TRANS-DISCIPLINARY

5. Kesudian saudara untuk memberi kerjasama di dalam penilaian ini amatlah dihargai dan didahului dengan ucapan ribuan terima kasih.

Salam hormat.

"BERKHIDMAT UNTUK NEGARA"

Yang benar,



DR. AINI SUZANA BINTI HAJI ARIFFIN

Penyelia Utama

Sekolah Perdana Polisi Sains, Teknologi dan Inovasi

(UTM Perdana School)

UTM Kuala Lumpur

☎03-2180 5175

☎03-2180 5340

✉suzana.kl@utm.my

Appendix C – Replies from vendor’s associations

5/27/2019 Yahoo Mail - FW: Seek a full cooperation from top management member of Proton Holdings Berhad on conducting A Survey regarding P...

FW: Seek a full cooperation from top management member of Proton Holdings Berhad on conducting A Survey regarding Proton's Vendors Performance in implementing National Automotive Policy.

From: Nuraizura binti Abu Bakar (Nuraizura@proton.com)
To: aini.suzana@yahoo.com; lutfiskandar@yahoo.com
Cc: Radzaif@proton.com; Hamizan@proton.com; ANUARMU@proton.com; ZAINIA@proton.com
Date: Friday, January 6, 2017, 12:23 PM GMT+8

Dear Dr Aini & En Lutfi,

Our procurement department has circulated the survey to Proton Vendors Association Exco and gave them deadline to submit by next Tuesday (10 January 2017). The PIC for this is En Khalrul Anuar Muhammad (Senior Manager, Chief Procurement Officer's Office). He can be contacted at anuarmu@proton.com or 0123656028 for any questions.

Thank you.

Warm regards,

Nuraizura Abu Bakar
Deputy Chief Executive Officer's Office
PERUSAHAAN OTOMOBIL NASIONAL SDN BHD
NICOM Industrial Estate, Batu 3, P.O. Box 7100,
40918 Shah Alam, Selangor Darul Ehsan, MALAYSIA
T: +603-5102 6362 | F: +603-5191 9548 |
Email : nuraizura@proton.com Website : www.proton.com

From: suzana ariffin <aini.suzana@yahoo.com>

Subject: Fw: Seek a full cooperation from top management member of Proton Holdings Berhad on conducting A Survey regarding Proton's Vendors Performance In implementing National Automotive Policy.

Date: 6 January 2017 at 9:29:38 AM MYT

To: Dato' Md Radzaif bin Mohamed <Radzaif@proton.com>

Reply-To: suzana ariffin <aini.suzana@yahoo.com>

1/4

NAP Survey

From: Sharina Ahmad Shukri (sharina@FMM.ORG.MY)

To: lutfiskandar@yahoo.com

Date: Thursday, May 19, 2016, 11:18 AM GMT+8

Dear En Lutfi

Refer to our conversation this morning, below are few member companies that you can approach. You can find more MACPMA members in the attached directory. Hope this will help. Thank you.

Advance Autoelectronics Industries Sdn Bhd

Contact Person:

Mr Yang Chor Beng

Product Manufactured:

Automotive Electrical, Electronic Products and Audio Assembly

Tel: 03 5161 8111

Fax: 03 5161 1762

Email: yangcs@aalgroup.com.my / yang.com764@gmail.com

APM Auto Electric Sdn Bhd

Contact Person:

Mr Chye Mun Heng

Product Manufactured:

Alternator, Starter Motor, Wiper Motor, Windshield Washer, Distributor, Radiator fan motor, Wiper system, Throttle body, Horn Power window, Relay Assy

Contact: Automotive industries

From: Izhah Zakaria (izham@shrdc.org.my)

To: lutfiskandar@yahoo.com

Date: Thursday, May 19, 2016, 11:57 AM GMT+8

Sim wbt.

En. Lutfi,

Berikut adalah 3 kenalan saya di MACPMA.

teresa.chan@smls.com.my

HR Manager – SMIS

yuenmun.lou@esyap.com.my

HR Manager – CSYap

mshahrul@newhoongfatt.com.my

HR Executive – New Hoong Fatt

<http://www.aslaep.com/ass/member.htm>
ajelah)

MACPMA member list (mungkin tuan dah jumpa di website ni, saya letak

Secara amnya saya anticipate low response rate dari MACPMA. Kalau sekiranya betul tekaan saya, saya cadangkan tuan melawat Suria Component Manufacturing & jumpa COO dia Tn Hj Rosli untuk dapatkan link kepada persatuan vendor Proton / Perodua.

nurul@suria-grp.com

HR Manager Suria Component Manufacturing

rosli@suria-grp.com

COO Suria Component Manufacturing

NO 10 & 12, JALAN ZUHAL U5/178, KAWASAN PERINDUSTRIAN SUBANG KRISTAL 40150 SHAH ALAM, SELANGOR

Shah Alam

03-7832 6474

<http://www.suria-grp.com>

Another option, boleh visit En. Asmady Kabisa, HR Training Manager di UMW Toyota. Dia ni orang lama, patut dia pun ada link dengan automotive industries ni especially dengan Toyota vendors.

asmady.kabisa@umw.com.my

Appendix D – Fornell-Lacker Criterion Result

	FP	HCD	INP	IVS	MEX	MKI	MKP	ORI	PCI	PDI	PDP	SCM	SSE	TEC
FP	0.799													
HCD	0.248	0.852												
INP	0.576	0.364	0.787											
IVS	0.303	0.457	0.321	0.869										
MEX	0.291	0.554	0.304	0.467	0.863									
MKI	0.698	0.310	0.511	0.312	0.333	0.788								
MKP	0.698	0.310	0.511	0.312	0.333	0.693	0.788							
ORI	0.693	0.248	0.576	0.303	0.291	0.698	0.698	0.799						
PCI	0.693	0.356	0.767	0.394	0.318	0.693	0.693	0.810	0.744					
PDI	0.472	0.340	0.693	0.255	0.255	0.445	0.445	0.472	0.624	0.825				
PDP	0.804	0.334	0.648	0.362	0.282	0.703	0.703	0.804	0.693	0.563	0.748			
SCM	0.271	0.497	0.240	0.538	0.552	0.282	0.282	0.271	0.323	0.161	0.281	0.860		
SSE	0.201	0.449	0.351	0.444	0.471	0.336	0.336	0.201	0.293	0.322	0.247	0.512	0.853	
TEC	0.010	0.432	0.116	0.382	0.508	0.104	0.104	0.010	0.124	0.081	0.095	0.563	0.500	0.789

Appendix E – HTMT Result

	FP	HCD	INP	IVS	MEX	MKI	MKP	ORI	PCI	PDI	PDP	SCM	SSE	TEC
FP														
HCD	0.311													
INP	0.683	0.440												
IVS	0.376	0.556	0.350											
MEX	0.346	0.675	0.344	0.553										
MKI	0.870	0.378	0.605	0.382	0.404									
MKP	0.870	0.378	0.605	0.382	0.404	1.253								
ORI	0.409	0.311	0.683	0.376	0.346	0.870	0.870							
PCI	0.580	0.468	0.846	0.512	0.401	0.875	0.875	1.058						
PDI	0.556	0.414	0.320	0.275	0.291	0.530	0.530	0.556	0.784					
PDP	0.360	0.490	0.894	0.525	0.394	0.963	0.863	0.360	0.460	0.781				
SCM	0.335	0.619	0.266	0.646	0.668	0.344	0.344	0.335	0.417	0.183	0.409			
SSE	0.222	0.511	0.391	0.527	0.541	0.355	0.355	0.222	0.355	0.361	0.339	0.629		
TEC	0.063	0.613	0.209	0.525	0.736	0.183	0.183	0.063	0.201	0.188	0.190	0.750	0.677	

Appendix F – Cross Loadings Result

	FP	HCD	INP	IVS	MEX	MKI	MKP	ORI	PCI	PDI	PDP	SCM	SSE	TEC
FP1	0.866	0.233	0.463	0.279	0.269	0.544	0.545	0.866	0.691	0.388	0.710	0.258	0.223	-0.019
FP2	0.914	0.226	0.581	0.285	0.292	0.740	0.741	0.914	0.798	0.481	0.791	0.250	0.143	0.004
FP3	0.574	0.114	0.281	0.129	0.086	0.293	0.293	0.575	0.364	0.205	0.325	0.110	0.116	0.063
HCD1	0.231	0.876	0.321	0.371	0.485	0.318	0.318	0.231	0.318	0.296	0.296	0.414	0.440	0.374
HCD2	0.148	0.832	0.295	0.396	0.471	0.232	0.232	0.148	0.265	0.295	0.257	0.419	0.409	0.380
HCD3	0.246	0.847	0.312	0.405	0.460	0.235	0.235	0.246	0.322	0.279	0.298	0.439	0.298	0.353
INP1	0.189	0.181	0.629	0.033	0.137	0.233	0.233	0.189	0.278	0.722	0.246	-0.018	0.183	-0.099
INP2	0.554	0.322	0.871	0.335	0.288	0.493	0.493	0.554	0.643	0.904	0.603	0.230	0.328	0.094
INP3	0.334	0.308	0.823	0.181	0.173	0.316	0.316	0.334	0.539	0.839	0.460	0.118	0.256	0.147
INP4	0.609	0.305	0.804	0.354	0.309	0.489	0.490	0.609	0.819	0.582	0.623	0.321	0.306	0.152
IVS1	0.244	0.403	0.252	0.851	0.408	0.278	0.277	0.244	0.279	0.212	0.255	0.471	0.323	0.342
IVS2	0.266	0.394	0.335	0.881	0.394	0.227	0.227	0.266	0.398	0.272	0.365	0.477	0.398	0.369
IVS3	0.278	0.394	0.245	0.873	0.416	0.311	0.311	0.278	0.342	0.178	0.316	0.457	0.431	0.285
MEX1	0.294	0.464	0.322	0.436	0.844	0.288	0.287	0.294	0.340	0.270	0.301	0.488	0.488	0.421
MEX2	0.226	0.479	0.244	0.396	0.871	0.307	0.307	0.226	0.221	0.227	0.200	0.457	0.359	0.456

	FP	HCD	INP	IVS	MEX	MKI	MKP	ORI	PCI	PDI	PDP	SCM	SSE	TEC
MEX3	0.220	0.492	0.200	0.362	0.873	0.264	0.264	0.220	0.245	0.145	0.213	0.478	0.347	0.440
MKI1	0.656	0.294	0.463	0.270	0.323	0.784	0.785	0.656	0.679	0.420	0.723	0.242	0.336	0.074
MKI2	0.430	0.266	0.398	0.282	0.277	0.791	0.790	0.430	0.422	0.362	0.401	0.285	0.352	0.218
MKI3	0.568	0.175	0.359	0.156	0.200	0.771	0.771	0.568	0.514	0.294	0.513	0.166	0.155	-0.017
MKI4	0.520	0.235	0.380	0.274	0.242	0.808	0.698	0.520	0.538	0.316	0.541	0.198	0.211	0.063
MKP1	0.656	0.294	0.463	0.270	0.323	0.784	0.808	0.656	0.679	0.420	0.723	0.242	0.336	0.074
MKP2	0.430	0.266	0.398	0.282	0.277	0.791	0.790	0.430	0.422	0.362	0.401	0.285	0.352	0.218
MKP3	0.568	0.175	0.359	0.156	0.200	0.771	0.771	0.568	0.514	0.294	0.513	0.166	0.155	-0.017
MKP4	0.520	0.235	0.380	0.274	0.242	0.808	0.808	0.520	0.538	0.316	0.541	0.198	0.211	0.063
ORI1	0.866	0.233	0.463	0.279	0.269	0.544	0.545	0.866	0.691	0.388	0.710	0.258	0.223	-0.019
ORI2	0.914	0.226	0.581	0.285	0.292	0.740	0.741	0.914	0.693	0.481	0.693	0.250	0.143	0.004
ORI3	0.574	0.114	0.281	0.129	0.086	0.293	0.293	0.575	0.364	0.205	0.325	0.110	0.116	0.063
PCI1	0.609	0.305	0.804	0.354	0.309	0.489	0.490	0.609	0.819	0.582	0.623	0.321	0.306	0.152
PCI2	0.353	0.348	0.581	0.310	0.188	0.468	0.468	0.353	0.650	0.537	0.638	0.205	0.293	0.117
PCI3	0.573	0.192	0.356	0.287	0.230	0.351	0.351	0.573	0.798	0.283	0.711	0.227	0.164	0.135
PCI4	0.817	0.229	0.520	0.241	0.222	0.702	0.703	0.817	0.826	0.447	0.876	0.211	0.130	-0.003
PDI1	0.189	0.181	0.629	0.033	0.137	0.233	0.233	0.189	0.278	0.722	0.246	-0.018	0.183	-0.099

	FP	HCD	INP	IVS	MEX	MKI	MKP	ORI	PCI	PDI	PDP	SCM	SSE	TEC
PDI2	0.554	0.322	0.871	0.335	0.288	0.493	0.493	0.554	0.643	0.904	0.603	0.230	0.328	0.094
PDI3	0.334	0.308	0.823	0.181	0.173	0.316	0.316	0.334	0.539	0.839	0.460	0.118	0.256	0.147
PDP1	0.353	0.348	0.581	0.310	0.188	0.468	0.468	0.353	0.650	0.537	0.791	0.205	0.293	0.117
PDP2	0.573	0.192	0.356	0.287	0.230	0.351	0.351	0.573	0.663	0.283	0.711	0.227	0.164	0.135
PDP3	0.817	0.229	0.520	0.241	0.222	0.702	0.703	0.817	0.826	0.447	0.876	0.211	0.130	-0.003
SCM1	0.186	0.465	0.152	0.397	0.462	0.180	0.180	0.186	0.230	0.108	0.220	0.760	0.422	0.496
SCM2	0.263	0.423	0.242	0.502	0.503	0.265	0.265	0.263	0.295	0.168	0.247	0.913	0.465	0.481
SCM3	0.243	0.414	0.214	0.482	0.465	0.272	0.272	0.243	0.301	0.135	0.259	0.899	0.437	0.489
SSE1	0.257	0.468	0.365	0.401	0.439	0.406	0.406	0.257	0.320	0.332	0.276	0.424	0.900	0.345
SSE2	0.109	0.325	0.245	0.342	0.383	0.207	0.206	0.109	0.207	0.221	0.174	0.486	0.862	0.512
SSE3	0.072	0.291	0.244	0.400	0.369	0.142	0.142	0.072	0.162	0.233	0.126	0.431	0.793	0.529
TEC1	0.012	0.339	0.087	0.366	0.406	0.034	0.034	0.012	0.123	0.031	0.084	0.557	0.345	0.857
TEC2	0.009	0.362	0.128	0.313	0.389	0.113	0.113	0.009	0.120	0.106	0.097	0.504	0.527	0.937
TEC3	0.000	0.355	0.033	0.240	0.490	0.092	0.092	0.000	0.033	0.025	0.025	0.234	0.238	0.504

Appendix G – Descriptive Analysis Result

a) Perception of NAP strategies among tier-1, tier-2 and tier-3 vendors.

Tier-1	IVS	TEC	MEX	HCD	SCM	SSE
Strongly Disagree	4.4%	15.0%	0.9%	10.1%	0.9%	3.1%
Disagree	5.3%	11.0%	11.5%	33.5%	10.1%	6.6%
Neither	44.9%	35.2%	40.1%	35.2%	38.8%	46.3%
Agree	44.9%	38.3%	46.7%	19.8%	43.2%	38.8%
Strongly Agree	0.4%	0.4%	0.9%	1.3%	7.0%	5.3%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Tier-2	IVS	TEC	MEX	HCD	SCM	SSE
Strongly Disagree	6.0%	12.0%	0.0%	0.0%	0.0%	4.0%
Disagree	28.0%	32.0%	28.0%	44.0%	0.0%	2.0%
Neither	42.0%	22.0%	24.0%	6.0%	44.0%	46.0%
Agree	24.0%	30.0%	30.0%	26.0%	34.0%	38.0%
Strongly Agree	0.0%	4.0%	18.0%	24.0%	22.0%	10.0%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Tier-3	IVS	TEC	MEX	HCD	SCM	SSE
Strongly Disagree	43.5%	21.7%	8.7%	8.7%	13.0%	8.7%
Disagree	8.7%	17.4%	8.7%	43.5%	0.0%	8.7%
Neither	39.1%	17.4%	21.7%	13.0%	39.1%	47.8%
Agree	8.7%	43.5%	39.1%	17.4%	43.5%	34.8%
Strongly Agree	0.0%	0.0%	21.7%	17.4%	4.3%	0.0%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

b) Implementation level of innovation by implemented tier-1, tier-2 and tier-3 vendors.

Tier-1	PDI	PCI	MKI	ORI
Full Innovation Implemented	8.4%	2.2%	0.9%	2.2%
Imitated International	42.3%	51.1%	34.8%	44.9%
Imitated National	4.8%	5.3%	34.4%	7.5%
Product Improvement	44.5%	41.4%	30.0%	45.4%
Total	100%	100%	100%	100%

Tier-2	PDI	PCI	MKI	ORI
Full Innovation Implemented	8.0%	0.0%	0.0%	0.0%
Imitated International	32.0%	36.0%	42.0%	42.0%
Imitated National	10.0%	10.0%	38.0%	8.0%
Product Improvement	50.0%	54.0%	20.0%	50.0%
Total	100%	100%	100%	100%

Tier-3	PDI	PCI	MKI	ORI
Full Innovation Implemented	13.0%	4.3%	0.0%	4.3%
Imitated International	30.4%	52.2%	39.1%	47.8%
Imitated National	13.0%	8.7%	39.1%	4.3%
Product Improvement	43.5%	34.8%	21.7%	43.5%
Total	100%	100%	100%	100%

c) Vendors' Market Performance for tier-1, tier-2 and tier-3 vendors.

Tier 1 Vendor	Improved Export Sales	Improved in REM Sales	Improved in OEM Sales	Improved Customer Service
Very unsuccessful	4.4%	2.2%	3.1%	0.0%
Unsuccessful	20.7%	6.2%	18.5%	0.4%
Neither	29.1%	31.3%	33.5%	34.4%
Successful	35.7%	49.3%	35.2%	52.9%
Very unsuccessful	10.1%	11.0%	9.7%	12.3%
Total	100.0%	100.0%	100.0%	100.0%

Tier 2 Vendor	Improved Export Sales	Improved in REM Sales	Improved in OEM Sales	Improved Customer Service
Very unsuccessful	10.0%	2.0%	2.0%	0.0%
Unsuccessful	18.0%	6.0%	16.0%	2.0%
Neither	20.0%	24.0%	28.0%	26.0%
Successful	46.0%	50.0%	48.0%	62.0%
Very unsuccessful	6.0%	18.0%	6.0%	10.0%
Total	100.0%	100.0%	100.0%	100.0%

Tier 3 Vendor	Improved Export Sales	Improved in REM Sales	Improved in OEM Sales	Improved Customer Service
Very unsuccessful	8.7%	4.3%	8.7%	0.0%
Unsuccessful	21.7%	17.4%	17.4%	4.3%
Neither	34.8%	17.4%	34.8%	43.5%
Successful	30.4%	43.5%	34.8%	43.5%
Very unsuccessful	4.3%	17.4%	4.3%	8.7%
Total	100.0%	100.0%	100.0%	100.0%

d) Vendors' Financial Performance for tier-1, tier-2 and tier-3 vendors.

Tier 1 Vendor	Improved in ROS	Improved in ROA	Improved overall profit
Very unsuccessful	3.5%	2.2%	3.5%
Unsuccessful	10.1%	15.0%	15.9%
Neither	29.5%	53.3%	21.6%
Successful	47.1%	28.2%	50.2%
Very unsuccessful	9.7%	1.3%	8.8%
Total	100.0%	100.0%	100.0%

Tier 2 Vendor	Improved in ROS	Improved in ROA	Improved overall profit
Very unsuccessful	6.0%	10.0%	10.0%
Unsuccessful	16.0%	16.0%	16.0%
Neither	50.0%	48.0%	52.0%
Successful	28.0%	26.0%	18.0%
Very unsuccessful	0.0%	0.0%	4.0%
Total	100.0%	100.0%	100.0%

Tier 3 Vendor	Improved in ROS	Improved in ROA	Improved overall profit
Very unsuccessful	0.0%	0.0%	0.0%
Unsuccessful	17.4%	21.7%	17.4%
Neither	21.7%	21.7%	26.1%
Successful	47.8%	43.5%	43.5%
Very unsuccessful	13.0%	13.0%	13.0%
Total	100.0%	100.0%	100.0%