Challenges and Strategies of Malaysian Automotive: A Literature Review 2016-2018

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DOI: https://doi.org/10.30880/jtmb.2019.06.02.005
Received 06 December 2018; Accepted 10 March 2019; Available online 30 June 2019

Abstract: Malaysia automotive industry is facing extraordinary challenges from global competition such as foreign brands through trade liberalization and the changes in customer behavior. Unfortunately, The National Automotive Policy (NAP) still not fully transformed Malaysian automotive industries into a globally competitive and export-oriented sector. Hence, more research needed to find out more strategies to overcome every single challenge. This paper aims to study the latest of Malaysia automotive industry's challenges and strategies comprehensively. Based on the review and analysis of the literature, there are nine main strategies to overcome various challenges in Malaysia such as; Energy Efficient Vehicles (EEV), End-of-Life Vehicle (ELV), sustainability of automotive industry, performance monitoring, collaboration, management of automotive business, New Product Development (NPD), customer engagement and employees continuous improvement. Most of the studies related to “going green” such as the ELV, EEV, and sustainability of the automotive industry, but still lack study about NPD even though it is important for the industry's survival. As a result, further research on NPD specifically for cross-functional team empirically in the future due to the cross-functional team is one of the factors of NPD success. Total 46 the most relevant articles have been chosen from various journals and databases between the year 2016 and 2018 with keywords "Malaysia" and "Automotive" for the most updated review. The challenges and strategies reviewed due to other than as guidance for further research, it can help companies to improve the strategies suitable to the challenges they are facing. From author knowledge, no studies about a comprehensive review on Malaysia automotive industry's challenges and strategies as most of the study focus on a certain topic such as on quality management.

Keywords: Malaysia, automotive, new product development

1. Introduction

The automotive industry forms a main pillar of the global economy (Mohd Fuzi, Habidin, & Ong, 2018) as one of the important economic sectors (Mathivathanan, Kannan, & Haq, 2018; Othman et al., 2016; Habidin et al., 2015) and play a leading role in a country’s industrialization (Abdul Aziz, Jaafar & Suraya, 2014). With the increasing urbanization and the global population growth leads to high demand for mobility (Schüller et al., 2017). Global attention has been received by automobile industries in ASEAN for domestic and overseas competitiveness (Tai, 2016) lead to stiff global competition (Maarof & Mahmud, 2016). Due to strategically located in the center of ASEAN, Malaysia offers vast opportunities for global automotive and component manufacturers to set up manufacturing and distribution operations (Habidin et al., 2016; Kharani et al., 2017; Chian, Aziati, & Yusof, 2017). The presence of Geely Auto in Malaysia hopefully will spur the growth of the automotive industry in Malaysia (Ariffin & Sahid, 2017). Since the establishment of the national car projects Proton in 1985 and Perodua in 1993, the Malaysian automotive industry has developed (Wong, Al-Obaidi & Mahyuddin, 2018) and has grown tremendously (Go et al., 2016). The
activities cover from car manufacturing to dealing auto business with foreign countries (Habidin et al., 2016). The government of Malaysia saw the importance to have own automotive manufacturing industry since automotive is seen as “industry of the industries” (Ariffin & Sahid, 2017).

The annual car sales globally has been forecasted to incline from 75 million in 2010 to 207 million and then 326 million in 2050 and 2100 respectively (Sabbagh et al., 2016) with Malaysia targeted 1.25 million vehicles in 2020 for total production volume (Wong, Al-Obaidi & Mahyuddin, 2018) and the estimation for vehicle registration as much as 31 million in the year 2020 (Ramli et al., 2018). Automotive manufacturing is one of the biggest sectors that contributed to a global economy every year with a huge amount of investment of over $4 trillion globally (Mohammed, Muhammad Hussain & Zain, 2017). Malaysian automotive industry has been identified to boost industrialization process for the manufacturing sector in order to achieve vision 2020 (Ahmad et al., 2017). In Malaysia, half of the automotive suppliers are supplying to Proton with 62.7 percent is SMEs (Hudin et al., 2017). However, Malaysia automotive industry is facing extraordinary challenges which are global competition such as foreign brands (Hanaysha & Hilman, 2015) through trade liberalization and the changes in customer behavior. Compared to before, Malaysia now ranked third in the ASEAN region producing some 650,000 vehicles per year (Mohd Nadzri et al., 2016). Previously, Malaysia used to lead the automotive production and sales in the ASEAN region (Mohd Nadzri et al., 2016). Until now, National Automotive Policy (NAP) still not fully transform Malaysian automotive industries into a globally competitive and export-oriented sector. Hence, more research needed to find out more strategies to overcome the challenges and this study started to make a comprehensive review from various scholars regarding the automotive industry in Malaysia. Due to high relevance to the country's Gross Domestic Product (GDP), the automotive industry in Malaysia was chosen for this study (Taju Rahim & Zainuddin, 2017). This paper makes a comprehensive review relating to the challenges and strategies for the Malaysian automotive industry from various scholars, journals and databases. The next topic, the purpose of the study gives a short description of the reason of study initiated. Then, the next section gives an approach from articles selection till grouping of strategies. Next is the findings on challenges and strategies found from the literature review then discussion provided with practical implications of the review study before suggest for future research and the limitation from this study. Consequently, the final section presents the conclusions of the study.

2. The purpose of the study

Automotive industry is important to economic and social growth, both in the short and long term and continuously proven to be a cornerstone to the development of many countries (Marin & Kaminski, 2018) including Malaysia. Also a generator and exporter of leading management practices and the source of a continuous stream of high and medium technologies due to the car has shaped not only the global economy but how billions of people live (Hernández, Pons & Serrat, 2017). Due to the large demand in emerging economies in Asia, Latin America and Eastern Europe, automotive Original Equipment Manufacturer (OEM)s have been increasing their global activities (Kalogerakis, Fischer & Tiwari, 2017). The pressures have led automotive companies to look for an edge wherever they can find it (Lee & Govindan, 2014) and restructure their business strategy (Habidin et al., 2015) especially with the increasing demand on cars in the automobile market particularly in Malaysia (Lee & Govindan, 2014). In Malaysia, automaker like PROTON needs to update with new automotive business trends (Shatouri et al., 2013) and keep up with the changing needs of consumers (Ali, Gafar & Akbar, 2013).

3. Approach to study

Total 46 the most relevant articles have been chosen from various journals and databases such as Emerald, Science Direct, and etc. also articles from local Malaysian university websites due to reliability sources between the year 2016 until 2018 for current reviews with keywords “Malaysia” and “Automotive” to make sure only relevant articles are chosen for this review study. The challenges and strategies reviewed due to other than as guidance for further research, it can help companies, especially local or other foreign investors to use the strategy as per findings to suit with the current challenges they are facing now as per listed in this study. Then from the analysis of the literature reviews, 35 key strategies in nine groups have been identified from various types of challenges in the automotive industry. Challenges identified from the problems of the researchers’ aim to solve in the articles while strategies are the proposed solutions or best practice for that particular problem. There are 25 groups of strategies have been identified in the first attempt of grouping. The grouping of strategies is based on the words are strongly related to their articles such as article written by Adnan et al., (2017) has been put under EEV group even though not mentioned about EEV. It is due to they mentioned about Electric Vehicle (EV) which is part of EEV. The author had attempted to reduce the grouping numbers by combining related groups. As a result, nine groups of strategies have been identified and explained in the next topic, the findings on challenges and strategies.
4. Findings on challenges and strategies

In this topic, the author explains the details of the challenges and strategies. The summary of the findings for the challenges and strategies can be found in Table 1.

Table 1 - Challenges and strategies for automotive in Malaysia (2016 – 2018)

| CHALLENGES | KEY STRATEGIES | AUTHOR & YEAR |
|-------------|----------------|---------------|
| **GROUP STRATEGY 1: Energy Efficient Vehicle (EEV)** | 1. To reduce environmental pollution | 1. Future EV industry | Adnan et al., 2017 |
| | 2. Reduction 40% greenhouse gas emissions | 2. Urge for EEV | Salehen et al., 2016 |
| | 3. Manufacturers are urged to go green | 3. Use of LPG | Chian et al., 2017 |
| | 4. Resources scarcity and global warming | 4. Resources scarcity and global warming | Shukor et al., 2017 |
| | 5. To reduce emissions | 5. To reduce emissions | Schüller et al., 2017 |
| **GROUP STRATEGY 2: End-of-life Vehicle (ELV)** | 1. Vehicle disposal | 1. Vehicle disposal | Go et al., 2016 |
| | 2. The ELV policy never taken place | 2. The ELV policy never taken place | Mohd Jawi et al., 2017 |
| | 3. ELV not properly managed | 3. ELV not properly managed | Raja Mamat et al., 2016 |
| | 4. To improve ELV recyclability | 4. To improve ELV recyclability | Wong et al., 2018 |
| | 5. To follow the European Union Directive | 5. To follow the European Union Directive | Ali et al., 2017 |
| | 6. Disposal of ELVs creates hazardous | 6. Disposal of ELVs creates hazardous | Mohamad-Ali et al., 2017 |
| **GROUP STRATEGY 3: Sustainability of Automotive Industry** | 1. The concept of sustainability | 1. The concept of sustainability | Govindan et al., 2016 |
| | 2. Resource shortages and pollution | 2. Resource shortages and pollution | Matsumoto et al., 2018 |
| | 3. Vehicle price imbalance | 3. Vehicle price imbalance | Yusop et al., 2016 |
| | 4. Profit margin shrinkage | 4. Profit margin shrinkage | Sabbagha et al., 2016 |
| | 5. To increase the competitive advantage | 5. To increase the competitive advantage | Mohd Fuzi et al., 2017 |
| | 6. Competitors from both local and foreign | 6. Competitors from both local and foreign | Mohd Fuzi et al., 2018 |
| | 7. To make lighter bodies | 7. To make lighter bodies | Ramli et al., 2018 |
| | 8. Unsystematic GSCM deployment practices | 8. Unsystematic GSCM deployment practices | Khairani et al., 2017 |
| | 9. ELV not properly managed in Malaysia | 9. ELV not properly managed in Malaysia | Raja Mamat et al., 2016 |
| | 10. Still uncompetitive even after NAP | 10. Still uncompetitive even after NAP | Ariffin et al., 2016 |
| | 11. World climate change | 11. World climate change | Abu Bakar and Amat Senin, 2016 |
| | 12. Few studies sustainable manufacturing | 12. Few studies sustainable manufacturing | Nordin and Adebambo, 2016 |
| **GROUP STRATEGY 4: Monitoring Performance** | 1. To increase performance evaluation | 1. To increase performance evaluation | Habidin et al., 2016 |
| | 2. Lack of studies on environmental issues | 2. Lack of studies on environmental issues | Habidin et al., 2016 |
| | 3. Few studies supply chain integration | 3. Few studies supply chain integration | Othman et al., 2016 |
| | 4. Green strategy for organizational performance | 4. Green strategy for organizational performance | Hasan and Ali, 2017 |
| | 5. Model dubbed the “global car” | 5. Model dubbed the “global car” | Abu Kassim et al., 2017 |
| **GROUP STRATEGY 5: Collaboration** | 1. Delivery risks | 1. Delivery risks | Hudin et al., 2017 |
| | 2. 45% emission reduction by 2030 | 2. 45% emission reduction by 2030 | Ambrose et al., 2017 |
3. Unable to compete with international brand partnership Ariffin and Sahid, 2017

GROUP STRATEGY 6: Management of Automotive Business

| 1. To survive in the global competition | 22. Quality management | Ahmad et al., 2016 |
| 2. No regulation remanufactured product |  | Mohamed et al., 2018 |
| 3. To minimize waste | 23. Lean management | Ahmad et al., 2017 |
| 4. To solve sudden quality and reliability issues |  | Aikhuele, 2017 |
| 5. Changing market scenario |  | Fok-Yew, 2018 |
| 6. Difficulties to adopt all lean manufacturing |  | Rose et al., 2017 |
| 7. AFTA adversely affected the performance | 24. Supply chain management | Khairani et al., 2017 |
| 8. Environmental problems | 25. Green technology | Fernando et al., 2018 |

GROUP STRATEGY 7: New Product Development (NPD)

| 1. To survive in the global competition | 26. Product development | Ahmad et al., 2016 |
| 2. Increasing demands for customized products |  | Aikhuele, 2017 |
| 3. To strengthen brand equity | 27. Innovation | Mohd Turan et al., 2017 |
| 4. Reducing global CO2 emissions |  | Taju Rahim and Zainuddin, 2017 |
| 5. To reap the pioneer | 28. Early customer expectation | Taju Rahim and Zainuddin, 2017 |
| 6. Late design change insisted by customers | 29. Design | Mohd Turan et al., 2017 |
| 7. The poor product design process | 30. Risk analysis | Mohammad et al., 2017 |
| 8. Fast-growing global market | 31. Public awareness | Alhayali et al., 2017 |
| 9. Minimize uncertainty in supply and demand | 32. Quality service | Hanaysha, 2016 |

GROUP STRATEGY 8: Customer Engagement

| 1. Increase the use of clean technology | 33. Brand | Ahmad Mabkhot et al., 2016 |
| 2. Differentiation issues | 34. Training | Hudin et al., 2017 |
| 3. To gain and sustain brand loyalty | 35. Kaizen | Maarof and Mahmud, 2016 |
| 4. Designing customer journey and experience |  | Mohd Nadzri et al., 2016 |

GROUP STRATEGY 9: Employees Continuous Improvement

| 1. Inadequate employees' skills and training | 34. Training | Hudin et al., 2017 |
| 2. Thailand and Indonesia as a hub | 35. Kaizen | Habidin et al., 2016 |
| 3. Compete with low-cost countries |  | Maarof and Mahmud, 2016 |

4.1 Energy Efficient Vehicles (EEV)

The Energy Efficient Vehicle (EEV) includes fuel-efficient internal combustion engine (ICE) vehicles, hybrid, electric vehicles (EV) and alternative fuelled vehicles powered by Compressed Natural Gas (CNG), Liquefied Petroleum Gas (LPG), Biodiesel, Ethanol, Hydrogen, and Fuel Cell (Shukor et al., 2017). There are five articles related to EEV, which is government promoted in order to reduce the environmental pollution (Adnan, Nordin & Rahman, 2017), to overcome resources scarcity, to overcome global warming (Shukor et al., 2017) and for efficiency as well as to establish Malaysia as a regional hub in a sustainable way (Chian, Aziati, & Yusof, 2017). The government of Malaysia has future plan to install 25,000 electric-vehicle charging stations throughout Malaysia by 2020 (Adnan, Nordin & Rahman, 2017), and to announce National Automobile Policy (NAP) 2014 to urge local automobile manufacturers to produce EEV (Chian, Aziati & Yusof 2017). Malaysia also already committed to reducing 40% greenhouse gas (GHG) emissions by the year 2020 with electric vehicle (EV) future innovation invention (Salehen et al., 2017; Schüller et al., 2017). According to a previous study (Schüller et al., 2017), gas driven vehicle (LPG) achieves the best results due to lower consumption costs.
4.2 End-of-Life Vehicle (ELV)

Nowadays, the automotive industry faces a number of serious challenges in vehicle disposal due to its impact on the environment throughout its entire life cycle (Go et al., 2016) and Malaysian automotive industry required to follow European Union Directive towards ELV which is reused and recovery towards certain percentage (Ali et al., 2017). The promising strategy is to minimize the environmental impact of automotive on environmental sustainability by End-of-life Vehicle (ELV) (Go et al., 2016) which is five articles written about ELV as a strategy. However, according to prior study (Mohd Jawi et al., 2017), the ELV policy has never taken place in Malaysia's automotive ecosystem, even though a proper ELV plan can contribute to a sustainable environmental control as well as in promoting safety in the modern cars. A previous study (Raja Mamat et al., 2016) stated that ELV is not properly managed in Malaysia can endanger the environment and social life in Malaysia. Hence, they proposed a framework in establishing an ELV management system besides the strategies of government for introducing remanufacturing roadmap and the development of automotive authorized treatment facilities (ATFs) framework through National Automotive Policy 2014 (NAP). A new concept of a processing framework to utilize ELV waste from automotive to construction industries has been proposed by Wong, Al-Obaidi & Mahyuddin, (2018) by starting a new trend of circular economy applications to improve ELV recyclability. A previous study (Mohamad-Ali et al., 2017) proposed to incorporate end-of-life design strategies into the vehicle design in order to enhance the effectiveness of the ELV recovery network.

4.3 Sustainability of automotive industry

Very few studies about sustainability in Malaysia which consist of three dimensions; environmental, economic and social with environmental is the lowest practices of Malaysian manufacturing firms (Nordin & Adebambo, 2016). This is supported by (Habidin et al., 2016) stated that environmental issues have been neglected by the company and still lack studies in Malaysia. The sustainable and competitive business environment for the future survival of small medium enterprises (SMEs) can be attained by the adoption of the green business model (Abu Bakar & Amat Senin, 2016). Sustainability has become a prime challenge in today's competitive world and can be improved through remanufacturing (Govindan et al., 2016). Remanufacturing can be considered as a key solution to address global concerns such as resource shortages and environmental pollution by reusing components that are still functioning well and replacing worn-out components (Matsumoto, Chinen & Endo, 2018). Remanufacturing products undergo an extensive process which produces a better result in terms of quality compared to recycling, reconditioning or refurbishing processes (Yusop, Wahab & Saibani, 2016). The government of Malaysia introduced automotive remanufacturing roadmap as inputs to the development of the ELV management system in Malaysia (Raja Mamat et al., 2016). For both the manufacturers and the dealers, after-sales business is becoming a remarkable profit source (Sabbagha et al., 2016). Corporate Social Responsibility (CSR) practices need to be implemented in the automotive suppliers to reflect great success. CSR practices are required to increase the competitive advantage and improve the financial position (Mohd Fuzi, et al., 2017; Mohd Fuzi, Habidin, & Ong, 2018). Previous (Ramli et al., 2018) had studied about the use of fiber reinforced plastic composites to make lighter car bodies as quoted by Henry Ford "The most environmentally friendly thing you can do for a car that burns gasoline is to make lighter bodies". A prior study (Khairani et al., 2017) suggested PDCA-ISO 14001 EMS provides a structured framework for a holistic deployment of green practices and an opportunity for firms to implement green supply chain management in a holistic manner.

4.4 Performance monitoring

Malaysian automotive industry practice green performance measurement to increase the performance evaluation (Habidin et al., 2016). The monitoring process will ensure the effectiveness of green marketing strategies, also the outcome of the organization (Hasan & Ali, 2017). Logistics performance benefited from supply chain integration, just-in-time (JIT) purchasing and JIT manufacturing (Othman et al., 2016). Global New Car Assessment Programme (Global NCAP) was founded in 2011 to overcome cost-cutting issues which a certain car model can be dubbed the "global car" or "global platform" but comes with different safety equipment and structural construction as opposed to its market origin (Abu Kassim, Furas & Mustaffa, 2017). A previous study (Ariffin, Sahid & Maavak, 2016), suggested to set up a national council to evaluate industry performance due to an automotive industry still remain uncompetitive even though after nearly a decade since the implementation of the National Automotive Policy (NAP).

4.5 Collaboration

Malaysia still unable to compete with an international brand, hence the strategic partnership with international car maker such as Geely Auto should be the right direction (Ariffin & Sahid, 2017). For the environment, collaborative
4.6 Management of automotive business

The highest articles for this topic are related to lean management. The other articles are related to quality management, green technology management and green supply chain management. The best possible way to achieve high quality remanufactured components is through continuous quality control (Mohamed et al., 2018). For survival, small and medium-sized enterprises (SMEs) need to incorporate quality management practices in their organization strategy (Ahmad et al., 2016). With the new customer drive, globally competitive and to continue moving up the ladder in the changing market scenario, many manufacturers turned to "Lean" with the goal to reduce waste in order to produce products and service with the lowest cost (Fok-Yew, 2018). However, many Malaysian companies are still on the journey of lean practices and still need guidance to compete with other long-term established companies in order to minimize wastes while maximizing the overall performances in an organization (Ahmad et al., 2017). It is parallel with Rose et al., (2017) previous study which stated that small and medium enterprises facing difficulties to adopt all of the lean manufacturing principles due to lack of knowledge. Hence, they explored the journey of lean manufacturing implementation as a simple guideline, including preliminary in-process and post of lean manufacturing. Previous (Aikhuele, 2017) studied about applying lean thinking practices in new product development for automotive related parts in Pekan Malaysia to solve sudden quality and reliability issues, for faster product development time, reduction in warranty costs, easier and cheaper manufacturing processes and etc. In order to prepare and manage green technology management in the workplace, a transformative process must occur to change from voluntary to enforcement (Fernando et al., 2018). The application of green supply chain management (GSCM) also as part of the strategies to overcome ASEAN Free Trade Area challenges (Khairani, et al., 2017).

4.7 New Product Development (NPD)

NPD increases to become a necessity in today's fast-growing global market not just for competitive advantage due to increasing demands for customized and hybrid products (Aikhuele, 2017). Sustainable product development practices need to be incorporated with quality management practices as part of organizational strategies to survive in the global competition in the automotive industry (Ahmad et al., 2016). Hence, the sustainability assessment model in product development has been proposed by Mohd Turan et al., (2017). Product design has become the main focus in a highly competitive environment and fast-growing global market (Mohd Turan et al., 2017). In order to overcome the late design change insisted by the customers, suppliers must be able to foresee the expectations of customers and incorporated into the design process earlier (Fernando et al., 2018). A prior study by Mohammed, Muhammad Hussain, & Zain (2017) identified five critical factors that make good design process namely technology, customer requirement, process planning, product life cycle and information gathering to overcome poor product design process. NPD can be accelerated through superior technological innovation capabilities. Besides, by technological innovation, firms can reduce global CO2 emissions (Taiju Rahim & Zainuddin, 2017). Automobile manufacturing firms have applied project risk analysis in order to minimize uncertainty in supply and demand (Fernando et al., 2018).

4.8 Customer engagement

Malaysia government supports the green concept in terms of public awareness (Alhayali, et al., 2017). Automotive brands face severe challenges, particularly with differentiation issues. Hence, providing quality services can be a good strategy to build a positive brand image (Hanyssha, 2016). Brand loyalty of Malaysia consumers in local automobile brand industry affected by brand personality and brand satisfaction (Ahmad Mabkhot, Md. Salleh & Shaari, 2016). The brand image and car brand attribute are factors influencing the brand experience of national car owners (Mohd Nadzri et al., 2016). Marketing strategies adopted by Malaysian car brand in Facebook is congruent with the customer engagement motive in social media (Kormin & Baharun, 2016).

4.9 Employees continuous improvement

Malaysia facing challenges such as global automakers like Toyota has decided to make Thailand and Indonesia as their hub for their automotive vehicle products. Hence, to overcome the challenges the Malaysian automotive industry
can implement Kaizen Event practices in the industry that emphasize continuous improvement process (Habidin et al., 2016). Buddy system or on job training still not adequate, more intensive training activities needed (Hudin et al., 2017). A prior study (Maarof & Mahmud, 2016) suggested Kaizen or continuous improvement can overcome challenges such as the effect of globalization from low-cost countries such as China and India.

5.0 Discussion and practical implications of the review study

Recently, Malaysian automotive industry has been a major manufacturer and exporter of vehicle spare parts, components, and accessories in the region (Mohd Fuzi, Habidin & Ong, 2018; Habidin et al., 2016). Latest from the study (Wong, Al-Obaidi & Mahyuddin, 2018), Malaysia has nine motor vehicle assemblers, 343 components/part manufacturers, and four vehicle manufacturers namely Proton, Perodua, Naza and Modenas. Since the introduction of the National Car Project, the development of automotive components and parts manufacturing in Malaysia has been boosted (Go et al., 2016). Malaysia automotive industry even ranked the top 20 in the world in the performance aspect (Habidin et al., 2016). However, to remain competitive in the market the manufacturers need to do something (Maarof & Mahmud, 2016) such as to incorporate sustainable product development practices in organization strategies (Ahmad et al., 2016), to provide quality services (Hanaysha, 2016) and to incorporate customer expectations into design process earlier (Fernando et al., 2018). Government plays a bigger role such as on policy (Ali et al., 2017), collaboration with other countries (Ambrose et al., 2017), public awareness (Alhayali et al., 2017) and roadmap (Raja Mamat et al., 2016). The automotive industry studied in Malaysia has been chosen due to high relevance in the country's Gross Domestic Product (GDP). The challenges and the strategies reviewed in this study because other than guidance for further research, it can help other companies such as SMEs, global investors, and other Malaysian companies implement the strategies to overcome the challenges. This review of the literature had seen comprehensive challenges and strategies to justify the significance, relevance to study further on nine main findings from this study, especially on NPD. Hence, the author may extend the study on NPD particularly due to one of the main findings from this research. This study will become the platform as a basis for further research on the main findings; EEV, ELV, sustainability of automotive industry, performance monitoring, collaboration, management of automotive business, NPD, customer engagement and employees’ continuous improvement. This paper contributed to other researchers who want to find the most recent and growing topic regarding the automotive industry trend, especially in Malaysia. From author's review, still lack study related to NPD, especially in Malaysia as much focus on "go green" topic such as the ELV, EEV or sustainability even though NPD is a source of competitive advantage as supported by Fantazy & Salem (2016).

6.0 Future research and limitation

Compared to articles about green or environment, the study of NPD still lacks especially in Malaysia automotive industry particularly related to the cross-functional team which is one of the success factors in NPD. Other than the cross-functional team, NPD success can be influenced by various factors such as market analysis, top management support, planning, HR management, strategic management and technological improvements (Roy, Modak & Dan, 2017). However, there is still limitation such as this paper written in a descriptive manner instead of critical to meet the purpose of the justification relevancy to further study on the related topic such as in NPD.

7.0 Conclusion

This paper explored the challenges and strategies of the automotive industry in Malaysia suggested by various researchers and found nine main strategies to overcome challenges. One of the strategies is NPD, such as sustainable product development practices need to be incorporated with quality management practices as part of organizational strategies to survive in the global competition for the automotive industry (Ahmad et al., 2016). The novelty of the study is the review is not limited to the certain topics but with a more comprehensive review of the challenges and strategies of the automotive industry in Malaysia from various journals and databases.

Acknowledgment

I would like to thanks to Mybrain scholarship, supervisor and coordinator at the International University of Malaya-Wales for this study.
References

Mohd Fuzi, N., Habidin, N. F., & Yee Ong, S. Y. (2018). Corporate social responsibility practices in Malaysian automotive suppliers: a confirmatory factor analysis. International Journal of Business Excellence, 15(2), 222–238.

Mathivathanan, D., Kannan, D. and Haq, A. N. (2018). Sustainable supply chain management practices in Indian automotive industry: A multi-stakeholder view. Resources, Conservation and Recycling. Elsevier B.V., 128, 284–305.

Othman, A. A., Kaliani Sundram, V. P., Mohamed Sayuti, N., & Shamsul Bahrain, A. (2016). The relationship between supply chain integration, Just-In-Time and logistics performance: A supplier’s perspective on the automotive industry in Malaysia. International Journal of Supply Chain Management, 5(1), 44–51.

Habidin, N. F., Mohd Zubir, A. F., Mohd Fuzi, N., Md Latip, N. A., Azman, M. N. A. (2015). Sustainable performance measures for Malaysian automotive industry. World Applied Sciences Journal, 33(6), 1017–1024.

Abdul Aziz, F., Jaafar, N. N. and Suraya, S. (2014). Critical success factors of new product development and impact on the performance of Malaysian automotive industry. Research Gate, (February), 1–7.

Schüller, M., Tewiele, S., Bruckmann, T., & Schramm, D. (2017). Evaluation of alternative drive systems based on driving patterns comparing Germany, China and Malaysia. International Journal of Automotive and Mechanical Engineering, 14(1), 3985–3997.

Tai, W. (2016). The political economy of the automobile industry in ASEAN: A cross-country comparison. Journal of ASEAN Studies, 4(1), 34–60.

Habidin, N. F., Eyun, M. A., Mohd Zubir, A. F., Mohd Fuzi, N., & Yee Ong, S. Y. (2016). The relationship between sustainable manufacturing practice and environmental performance in Malaysian automotive SMEs. International Journal of Academic Research in Business and Social Sciences, 6(12), 338–352.

Khairani, N. S., Kasim, E. S., Rajamanoharan, I. D., & Misman, F. N. (2017). Green supply chain management in the Malaysian automotive industry: A systems thinking perspective. International Journal of Supply Chain Management, 6(2), 38–48.

Chian, N. S., Aziati, A. H. N., & Yusof, S. M. (2017). Factors affecting the implementation of green manufacturing for Malaysian automobile manufacturers: A literature review from 2010 until 2015. The Social Sciences, 12(7), 1293–1298.

Ariffin, A. S., Sahid, M. L. I., & Maavak, M. (2016). Factors potentially enhancing national automotive policy goals and industry innovation. Journal of Science, Technology and Innovation Policy, 2(1), 10–17.

Ariffin, A. S., & Sahid, M. L. I. (2017). Competitiveness analysis of ASEAN automotive industry: A comparison between Malaysia and Thailand. Journal of Science, Technology and Innovation Policy, 3(2), 23–32.

Wong, Y. C., Al-Obaidi, K. M., & Mahyuddin, N. (2018). Recycling of end-of-life vehicles (ELVs) for building products: Concept of processing framework from automotive to construction industries in Malaysia. Journal of Cleaner Production, 190, 285–302.

Go, T. F., Wahab, D. A., Fadzil, Z. F., Azhari, C. H., & Umeda, Y. (2016). Socio-technical perspective on end-of-life vehicle recovery for a sustainable environment. International Journal of Technology, 5, 889–897.

Habidin, N. F., Hassan, H., Hashim, S., Yee Ong, S. Y., & Mohd Fuzi, N. (2016). The relationship between Kaizen event and operational performance in Malaysian automotive SMEs. International Journal of Academic Research in Business and Social Sciences, 6(12), 504–517.

Sabbagha, O., Ab Rahman, M. N., Ismail, W. R., & Wan Hussain, W. M. H. (2016). Impact of quality management systems and after-sales key performance indicators on automotive industry: A literature review. In 6th International
Research Symposium in Service management, IRSSM-6 2015, 11-15 August 2015, UiTM Sarawak, Kuching, Malaysia, 224, 68–75.

Ramli, N., Mazlan, N., Ando, Y., Leman, Z., Abdan, K., Aziz, A. A., & Sairy, N. A. (2018). Natural fiber for green technology in automotive industry: A brief review. IOP Conference Series: Materials Science and Engineering, 1–7.

Mohammed, A. S., Muhammad Hussain, I., & Zain, Z. (2017). Analysis for determining factors that make good design process in automotive manufacturing organization. IOSR Journal of Mechanical and Civil Engineering, 14(3), 97–104.

Ahmad, M. F., Ting, N. Y., Nor, N. H. M., Wei, C. S., Hassan, M. F., & Abdul Hamid, N. A. (2017). Comparative study of lean practices between Japanese and Malaysia automotive service centres. In 2nd International Conference on Applied Science and Technology 2017 (ICAST’17) AIP, 1891, 1–5.

Hudin, S. N., Abdul Hamid, A. B., Chin, T. A., & Habidin, N. F. (2017). Exploring supply chain risks among Malaysian automotive SMEs. In Proceedings of INTCESS 2017 4th International Conference on Education and Social Sciences 6-8 February 2017-Istanbul, Turkey, 354–362.

Hanaysha, J. and Hilman, H. (2015). The impact of product innovation on relationship quality in automotive industry: Strategic focus on brand satisfaction, brand trust, and brand commitment. Asian Social Science, 11(10), 94–104.

Van der Geer, J., Hanraads, J. A. J., & Lupton, R. A. (2000). The art of writing a scientific article. Journal of Science Communication, 163, 51–59.

Mohd Nadzri, W. N., Musa, R., Muda, M., & Hassan, F. (2016). The antecedents of brand experience within the National Automotive Industry. Procedia Economics and Finance, 37, 317–323.

Taju Rahim, F., & Zainuddin, Y. (2017). Moderating effect of environmental turbulence on firm’s technological innovation capabilities (TIC) and business performance in the automotive industry in Malaysia: A conceptual framework. In MATEC Web of Conferences, 90, 1–11.

Marin, R. O. and Kaminski, P. C. (2018). Analysing open innovation integration to product development processes within the Brazilian automotive industry. International Design Conference, 1915–1924.

Hernández, X. F., Pons, E. T. and Serrat, N. A. (2017). Disruption in the automotive industry: A Cambrian moment. Business Horizons. Kelley School of Business, Indiana University, 60, 855–863.

Kalogerakis, K., Fischer, L. and Tiwari, R. (2017). A comparison of German and Indian innovation pathways in the auto component industry.

Lee, T. W. and Govindan, S. (2014). Emerging issues in car purchasing decision. Academic Research International, 5(5), 169–179

Shatouri, R. M., Omar, R., Igusa, K., & Filho, S. P., Flavio (2013). Embracing green technology innovation through strategic human resource management: A case of an automotive company. American Journal of Economics and Business Administration, 5(2), 65–73.

Ali, N. A. M., Gafar, M. H. A., & Akbar, J. (2013). Enhancing promotional strategies within automotive companies in Malaysia. In International Conference on Economics and Business Research 2013 (ICEBR 2013), 1–7.

Shukor, M. S., Sulaiman, Z., Chin, T. A., Zakuan, N., & Muharam, F. M. (2017). Materialism, altruism, environmental values, learning strategies and sustainable claim on purchase intention of energy efficient vehicle (EEV) – A literature review. IOP Conf. Series: Materials Science and Engineering, 1–11.

Adnan, N., Nordin, S. M., & Rahman, I. (2017). Adoption of PHEV/EV in Malaysia: A critical review on predicting consumer behaviour. Renewable and Sustainable Energy Reviews, 72, 849–862.

Salehen, P. M. W., Su’ait, M. S., Razali, H., & Sopian, K. (2017). Development of battery management systems (BMS) for electric vehicles (EVs) in Malaysia. MATEC Web of Conferences, pp. 1–8.
Ali, N., Ghazilla, R. A. R., Abdul-Rashid, S. H., Sakundarini, N., Ahmad-Yazid, A., & Stephenie, L. (2017). A system dynamics approach to develop a recovery model in the Malaysian automotive industry. IOP Conference Series: Materials Science and Engineering, 210, 1–6.

Mohd Jawi, Z., Md Isa, M. H., Solah, M. S., Ariffin, A. H., Shabadin, A., & Osman, M. R. (2017). The future of end-of-life vehicles (ELV) in Malaysia – A feasibility study among car users in Klang valley. MATEC Web of Conferences, 90, 1–8.

Raja Mamat, T. N. A., Mat Saman, M. Z., Sharif, S., & Simic, V. (2016). Key success factors in establishing end-of-life vehicle management system: A primer for Malaysia. Journal of Cleaner Production, 135, 1289–1297.

Mohamad-Ali, N., Ghazilla, R. A. R., Abdul-Rashid, S. H., Sakundarini, N., Ahmad-Yazid, A., & Stephenie, L. (2017). Development of an end-of-life vehicle recovery model using system dynamics and future research needs. IOP Conf. Series: Materials Science and Engineering, 1–9.

Nordin, N., & Adebambo, H. O. (2016). Descriptive analysis of sustainable manufacturing indicators in Malaysian manufacturing firms. Journal of Mechanical Engineering and Sciences (JMES), 10(2), 2127–2134.

Abu Bakar, K., & Amat Senin, A. (2016). Modelling sustainability of SMEs business in the new economic transition. International Journal of Business. Economics and Law, 11(2), 32–37.

Govindan, K., Seuring, S., Zhu, Q., & Azevedo, S. G. (2016). Accelerating the transition towards sustainability dynamics into supply chain relationship management and governance structures. Journal of Cleaner Production, 112, 1813–1823.

Matsumoto, M., Chinen, K., & Endo, H. (2018). Paving the way for sustainable remanufacturing in Southeast Asia: An analysis of auto parts markets. Journal of Cleaner Production, 205, 1029–1041.

Yusop, N. M., Wahab, D. A., & Saibani, N. (2016). Realising the automotive remanufacturing roadmap in Malaysia: Challenges and the way forward. Journal of Cleaner Production, 112, 1910–1919.

Mohd Fuzi, N., Habidin, N. F., Hibadullah, S. N., & Yee Ong, S. Y. (2017). CSR practices, ISO 26000 and performance among Malaysian automotive suppliers. Social Responsibility Journal, 13(1), 203–220.

Hasan, Z., & Ali, N. A. (2017). Modelling the relationship between green marketing strategies and performance outcomes for business sustainability. In Global Conference on Business and Economics Research (GCBER) 2017 14-15 August 2017, Universiti Putra Malaysia, Malaysia, 20–27.

Fok-Yew, O. (2018). The mediating effect of lean’s soft factors on lean’s hard factors and operational excellence in Malaysia manufacturing companies. International Journal of Business Marketing and Management, 3(1), 26–35.
Rose, A. N. M., Ab Rashid, M. F. F., Nik Mohamed, N. M. Z., & Ahmad, H. (2017). Similarities of lean manufacturing approaches implementation in SMEs towards the success: Case study in the automotive component industry. MATEC Web of Conferences, pp. 1–6.

Aikhuele, D. O. (2017). Systematic model for lean product development implementation in an automotive related company. Management Science Letters, 7, 337–350.

Fernando, Y., Walters, T., Ismail, M. N., Seo, Y. W., & Kaimasu, M. (2018). Managing project success using project risk and green supply chain management: A survey of automotive industry. International Journal of Managing Projects in Business, 11(2), 332–365.

Mohd Turan, F., Johan, K., Muhd Nur, N. H., & Omar, B. (2017). Sustainability Assessment Model in Product Development. IOP Conf. Series: Materials Science and Engineering, 226, 1–9.

Alhayali, Z. A. M., Chew, B. C., Salleh, N., & Abd. Hamid, M. S. R., (2017). Implementation of renewable energy concept in the automotive industry in Malaysia: An exploratory study. Journal of Technology Management and Business, 04(01), 96–115.

Hanaysha, J. (2016). Testing the effect of service quality on brand equity of automotive industry: Empirical insights from Malaysia. Global Business Review, 17(5), 1060–1072.

Ahmad Mabkhot, H., Md, Salleh, S., & Shaari, H. (2016). The mediating effect of brand satisfaction on the relationship between brand personality and brand loyalty: Evidence from Malaysia. Management Science Letters, 6, 87–98.

Kormin, K., & Baharun, R. (2016). Social media and relationship marketing strategies of Malaysian car brands. Indian Journal of Science and Technology, 9(46), 1–8.

Fantazy, K. A. & Salem, M. (2016). The value of strategy and flexibility in new product development: The impact on performance. Journal of Enterprise Information Management, 29(4), 525–548.

Roy, S., Modak, N. & Dan, P. K. (2017). Product quality as factors and measures for new product development success in Indian manufacturing industries. In Materials Today: Proceedings 4, 1385–1393.