



# Journal of Environmental Science, Computer Science and Engineering & Technology

An International Peer Review E-3 Journal of Sciences and Technology

Available online at [www.jecet.org](http://www.jecet.org)

Environmental Science

Research Article

## ISO 14001 Performance Efforts and Environmental Performance in Malaysian Automotive Industry

Siti Norhafizan Hibadullah<sup>1</sup>, Nurul Fadly Habidin<sup>2\*</sup>, Nursyazwani Mohd Fuzi<sup>3</sup>, Auni Fatin  
Nadia Chiek Desa<sup>4</sup> and Farah Izzaida Mohd Zamri<sup>5</sup>

<sup>1, 3, 4, 5</sup> Department of Accounting and Finance, Universiti Pendidikan Sultan Idris,  
Tanjung Malim, Perak, Malaysia

<sup>\*2</sup> Department of Management and Leadership, Universiti Pendidikan Sultan Idris,  
Tanjung Malim Malaysia

**Received:** 18 January 2013; **Revised:** 4 February 2013; **Accepted:** 6 February 2013

**Abstract:** In the globalization era, ISO 14001 and Environmental performance (EP) are increasingly implemented in the automotive industry. The implementation of Environmental Management System (EMS) specified by this International Standard. It specifies the requirements for an EMS, which provides a framework for an organization to control and monitor their environmental impact of company activities, products and services for improving environmental performance continually. The purpose of this study is to proposed structural relationship ISO 14001 and environmental performance model for Malaysia automotive industries. The conceptual model using Structural Equation Modeling (SEM) has been proposed. Base on the proposed conceptual model and reviewed, research hypotheses are being develop, the paper culminates with suggested future research.

**Keywords:** ISO 14001, Environmental Management System, Environmental performance, Performance measurement, Structural Equation Modeling

## INTRODUCTION

The Asean Trade Area (AFTA) is an important agreement for its member nations and its trading partners throughout the world. Although sometimes, it seems as though it does so little, it is the begin of something bigger, greater liberalization of trade, and increased globalization. Therefore, Zakuan *et al.*<sup>1</sup>, pointed out that globalization and intense world-wide competition along with the technological advancements have created an entirely new business environment for the automotive industry. However, according to Nordin *et al.*<sup>2</sup>, that heightening challenges in today's global competition have prompted many manufacturing firms to adopt new manufacturing management strategies in order to improve the firm's efficiency and competitiveness.

The International Organization for Standards is a worldwide federation of standards bodies and is the world's largest developer of standards. The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. According to Nishitani<sup>3</sup> that in 1996, the International Organization for Standardization published standard 14001 Environmental Management Systems (EMS)-Requirements with guidance for use. ISO 14001 was first published in September 1996 and amended in November 2004. It was created and amended by Technical Committee ISO/TC207, Environmental Management, Subcommittee SC1 Environmental Management Systems.

In this era of globalization, the demand for the environmental management system (EMS) ISO 14001 registration is required, as many car manufacturers require that their supplier obtain it. ISO 14001 registration requires the existence of proper quality plans, programs, documentation, and procedures. Despite being demanding, there is still considerable confusion surrounding the effect of ISO 14001 registration effort on lean practices and quality performance. Besides that, Conding *et al.*<sup>4</sup>, pointed out that providing empirical evidence to encourage companies to implement ISO 14001 in order to improve their environmental performance and to enhance their competitive advantage in the global market.

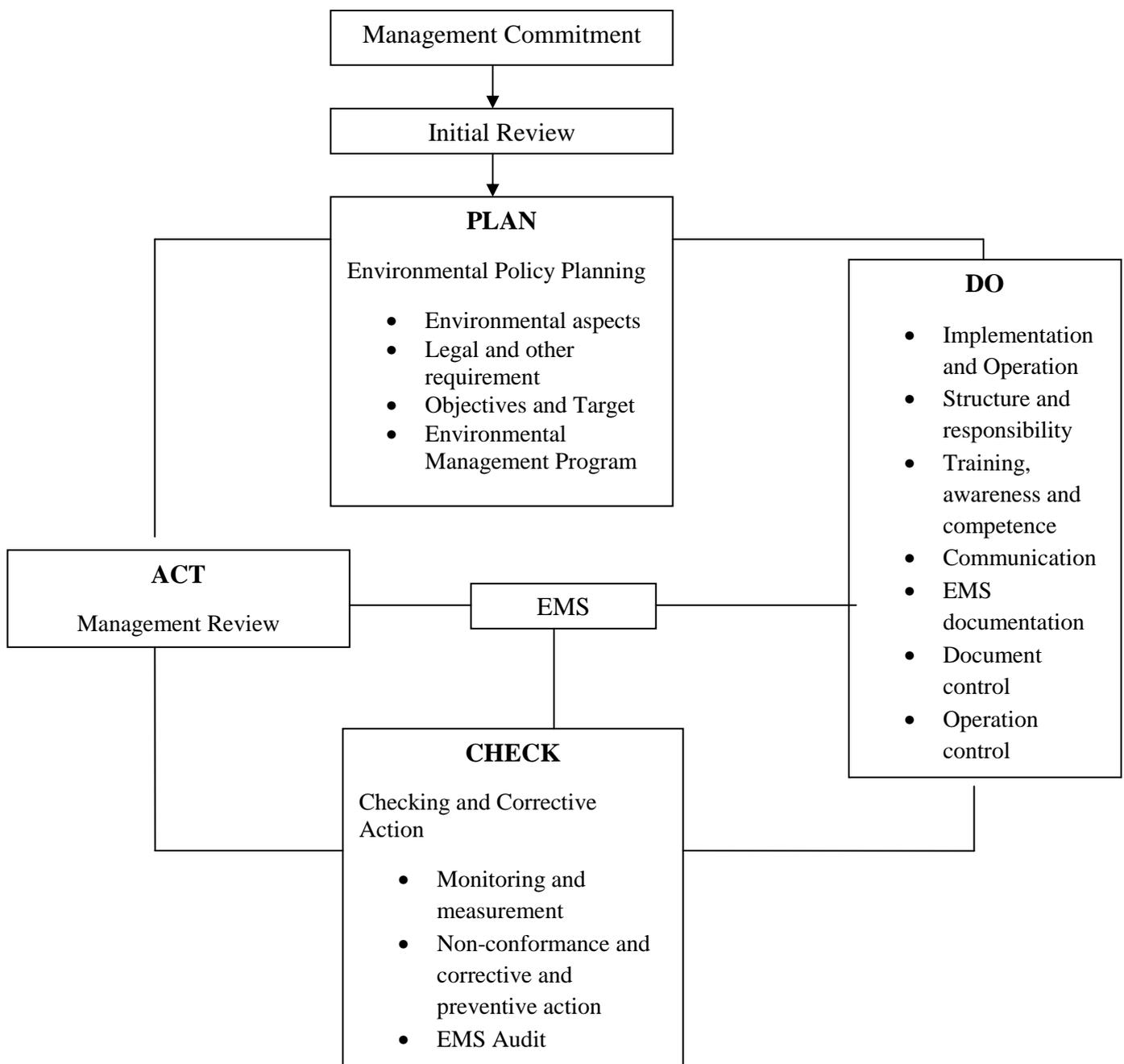
In the automotive industry which is rapidly increasing, the ISO 14000 elements provide diverse organizations a framework for managing and continually improving their environmental programs. Many companies currently monitor pollution prevention, or toxic use reduction programs. By using ISO 14001, companies can now merge environmental programs into one coherent system to efficiently manage all environmental activities. In addition to that, improving the environmental performance of companies is one way of limiting environmental damage. An EMS, such as ISO 14001, provides a framework for organizations that wish to effectively manage their environmental affairs. Thus, implementing an EMS that a company can successfully implement the ISO Standard, or it can seek the certification because of trading issues or marketing purposes, where may help businesses integrate environmental values into their operations<sup>5</sup>. In short, ISO 14001 provides organizations with a competitive advantage, by informing their customers that their environmental processes and impact is effectively managed, continually improving, and part of the corporate management system.

## LITERATURE REVIEW

**ISO 14001:** According to Gavronski *et al.*<sup>6</sup>, (2008), the International Organization for Standardization defines environmental management systems, and the role played by ISO 14001: An EMS is a structured approach to addressing the environmental bottom line. ISO 14001 is the world's most recognized EMS framework that assists organizations both to manage better the impact of their activities on the environment and to demonstrate sound environmental management. Exploring and validating different models that might explain the meaning of ISO 14001 for managers and its connection with practices expected to improve environmental performance also shed light on several problems related to certification<sup>7</sup>. The study by Arimura *et al.*<sup>8</sup>, EMS generally consists of internal policies, assessments, plans, and implementation actions that affect facilities and their effects on the environment.

An EMS is a systemic approach to handling environmental issues within an organization. For ISO 14001 adoption, a firm needs to meet the requirements for four main elements based on the principles of continuous improvement (Plan, Do, Check, and Act): environmental policy, planning, implementation and operation, checking and corrective action, and management review<sup>8-10</sup>. The Plan cycle deals with the beginning stages of an organization becoming ISO 14001 compliant. The Do cycle is the implementation and operation of the ISO 14001 standard within an organization. The Check cycle deals with checking and correcting errors. The Act cycles is a review of the entire process by the organization's top management and improve that never ends as an organization continually finds ways to improve their EMS<sup>3</sup>.

**Figure 1.** shows the EMS cycle which is an abstract description of the different components. The design and implementation of an EMS requires a considerable time and effort therefore requiring the commitment of management of the organization. Management needs to communicate their support to the system and emphasize that they aim to improve their environmental performance<sup>12</sup>.



According to Pun and Hui<sup>13</sup> the factors such as management commitment, documentation control, training, education, communication, and community relations may determine the success of EMS adoption and implementation. The success of the implementation of ISO 14001 depends upon the proper monitoring mechanism in place. Table 1. Shows the measurement items for ISO 14001 efforts.

**Table- 1: ISO 14001 and Their Measurement Items**

ISO 14001	Items	Reference/ Authors
Management approach	Top management commitment and support Environmental policies and objectives Management reviews	<sup>14</sup> Sambasivan & Fei, 2008; <sup>15</sup> Cassells <i>et al.</i> , 2012; <sup>8</sup> Arimura <i>et al.</i> , 2011; <sup>16</sup> Balzarova and Castka, 2008; <sup>9</sup> Inno, 2005
Organizational change	Training and awareness Documentation and control Emergency response and preparedness Communication	<sup>14</sup> Sambasivan & Fei, 2008; <sup>17</sup> Babakri <i>et al.</i> , 2003; <sup>16</sup> Balzarova and Castka, 2008; <sup>9</sup> Inno, 2005
External and social aspects	Market pressure Government policies and legislation Customer requirements Employee relations	<sup>18</sup> Kitazawa and Sarkis, 2000; <sup>14</sup> Sambasivan & Fei, 2008; <sup>16</sup> Balzarova and Castka, 2008; <sup>9</sup> Inno, 2005
Technical aspects	Production process enhancement Monitoring and measuring equipment Environmental specialist assistance	<sup>14</sup> Sambasivan & Fei, 2008; <sup>16</sup> Balzarova and Castka, 2008; <sup>9</sup> Inno, 2005

The findings of empirical study by Sambasivan and Fei<sup>14</sup> indicate that external factors an organization should consider for successful implementation of ISO 14001. The drive to the whole process comes from the top management and the entire organization has to be committed towards this effort. All employees must be given proper training and general awareness level must be high. Processes, structure, and attitude of the organization towards the environment have to be geared to reap maximum benefits from the implementation. In addition, proper equipment to monitor the systems and technical expertise must be available within an organization to ensure continuous improvement in the management of environment.

Based on Babakri<sup>17</sup> the ISO standard's elements which required the greatest effort and time to implement were identifying environmental aspect, EMS documentation, objectives and targets, EMS audits, operational control, environmental management program, training, and document control. The company seeking ISO 14001 certification should note these time consuming elements and allocate sufficient resources to them. According to these authors also, the study provides information on what a firm can expect to encounter during implementing ISO 14001 in terms of the time needed for obtaining the certificate and the most critical ISO 14001 elements such as time and effort. This information could be useful to companies that are in the process of adopting the standard where they do not have clear pictures of the critical factors for successful implementation of ISO 14001.

Besides that, Morrow and Rondinelli<sup>19</sup> pointed out that EMS seem to be instrumental in bringing about a variety of impacts. EMS implementation and certification assist companies to integrate their environmental, health and safety management systems and in some cases their environmental and quality management systems. Perhaps because EMS certification requires strong staff participation and environmental training programs, many firms report increased employee awareness of the environmental aspects of their jobs and of their responsibilities for reducing negative impacts. ISO 14001 certified companies also report environmental performance improvements, especially in the areas of waste recycling, air and waste emissions reductions, materials reuse, energy and water conservation, and environmental and safety incidence reduction.

In addition, Nee<sup>20</sup> found that recognition, reward and organizational culture have a significant relationship with ISO 14001 EMS implementation. This assist to advance managers understanding of the importance and values of these groups of resources on ISO 14001 EMS implementation. The motivation to obtain the ISO 14001 certification comprises the antecedents that influenced the decision makers to seek the EMS certification. Besides that, the benefits scale is related to the capabilities enhanced or created by the certification process. The benefits may also include performance improvements obtained from those capabilities. A summary of ISO 14001 benefits can be found in **Table 2**.

**Table 2: A summary of ISO 14001 benefits**

Authors	Benefit of ISO implementation
<sup>7</sup> Boiral and Henri, 2012	Improved quality; Customer satisfaction; and Production management.
<sup>21</sup> Vries <i>et al.</i> , 2012	Strong internal motivation; Top management commitment; Communication with interest groups; Stakeholder involvement; Responsibilities for environmental management; and Training and educational programs.
<sup>11</sup> Rodriguez <i>et al.</i> , 2011	Adapting to environmental legislation; Improving the public image of their firm; Improving environmental performance; and Increasing environmental awareness of employees.
<sup>22</sup> Homens, 2011	Risk reduction such as insurance costs; Identification of improvement opportunities; Adoption of innovative practices; Enhanced operational efficiency, internal cost savings, compliance assurance; Improved relationship with regulators; Improved documentation and data management; and Increased environmental awareness.
<sup>23</sup> Turk, 2009	Improvement of environmental awareness; Improvement of standardisation in environmental management; Minimization of the adverse impacts on the environment; and Establishing a system for sustainable environmental development.
<sup>14</sup> Sambasivan and Fei, 2008	Improved company reputation and image; Increased staff morale and motivation; Improved profit, performance, and opportunity; and Improved customer loyalty and trust.
<sup>10</sup> Brouwer and Koppen, 2008	Reduction of environmental costs; Better relationship with stakeholders; Firmer grip on environmental policy; Reduction of environmental risks; Reduction of environmental impacts;and Improvement of company image.

Authors	Benefit of ISO implementation
<sup>24</sup> Gonzalez <i>et al.</i> , 2008	Improvements in productivity; Competitiveness; Business profitability; and Green image.
<sup>25</sup> Yusoff, 2008	Cost savings; Reduced risk; Increased operational efficiency; Positive external relations and public image; Improved communication; Greater employee stewardship; Shared environmental solutions; and Improved public relations.
<sup>26</sup> Tan, 2005	Increased market share; Improved customer satisfaction; Improved efficiency of operations and processes; Cost reduction; Improved image and reputation; and Improved risk management practices.
<sup>27</sup> Chavan, 2005	Minimizing environmental liabilities; Maximizing the efficient use of resources; Reducing waste; Demonstrating a good corporate image; Building awareness of environmental concern among employees; Gaining better understanding of the environmental impacts of business activities; and Increasing profit through more efficient operations.
<sup>28</sup> Barla, 2005, <sup>29</sup> Bellesi <i>et al.</i> , 2005	Improve a firm's corporate image among consumers; investors and the surrounding communities; Reduce liability risks such as insurance costs; Improved input productivity; and Reduced waste disposal and pollution abatement costs.
<sup>9</sup> Inno, 2005	Reducing the burden on natural resources; and Improvement of waste management.
<sup>30</sup> Poksinska <i>et al.</i> , 2003	Improved relations with stakeholders; and Improved organizational control.
<sup>19</sup> Morrow and Rondinelli, 2002	Improving efficiency and reducing the costs; and Increase investor confidence in a company.
<sup>31</sup> Edwards <i>et al.</i> , 1999	Improved environmental awareness; Cooperation among employees; Enhanced regulatory compliance; Increased access to new and international markets; and Improved industry-government relations.

Today, automotive industry are motivated to implement the ISO 14001 EMS as a way of doing the following: adapting to environmental legislation; improving the public image of their firm; improving environmental performance; increasing environmental awareness of employees as well as to meet market demands. However, the principal obstacle that companies generally encounter in becoming more environmentally friendly is the substantial investment required in both material and human resources. Although, the opposite has also been argued for improved environmental performance would induce cost savings and increase sales and thus improve economic performance<sup>11</sup>.

**ISO 14001 and EP:** Evidence of positive effects of ISO 14001 on EP is presented by Bellesi *et al.*<sup>29</sup>. Then study suggested that many countries this has come to include concern for the environment. An EMS, such as ISO 14001, when properly overseen and applied provides a flexible tool that has the potential to improve environmental performance for organizations of varying sizes. Governments have an interest in the widespread adoption of the ISO 14001 standard. However, they need to do a better job convincing industry that it stands to benefit from adoption of an EMS. According to these authors also, the international market still considers cost and quality as the determining factors for selecting suppliers, EMS certification for many firms is an important product feature that is also taken into consideration. However, EMS certification appears to imply a supplier who is managing its business well and is showing ethical responsibility.

Yin and Schmeidler<sup>32</sup> pointed out that ISO 14001 standards are flexible, designed to be applicable to any organization, regardless of size, type and location. The development and implementation of ISO 14001 must have an impact on the linkage between ISO certification and facilities environmental performance. Moreover, facilities that assimilated ISO standards into their daily operations to a larger extent and that included performance elements in their ISO 14001 standards to a larger extent are more likely to report greater environmental performance improvement and more likely to report that ISO certification contributed to the improvement to a greater extent. Besides that, Wilcox<sup>33</sup> pointed out that ISO 14001 is required to craft a public statement of their overall environmental impact. In fact that implementing ISO 14001 is a commitment to incremental improvement, firms are likely to be reluctant to disclose accurate levels of pollution habits or environmental risks within their facilities. In addition, ISO certification could be an effective tool for promoting EMSs and therefore improving facilities environmental performance. Therefore, government agencies, environmental groups and the general public should consider special treatment for ISO certified facilities.

Morrow and Rondinelli<sup>19</sup> indicates that several factors motivate companies to implement and certify EMS. Among multinational and large corporations in the United States, the desire to integrate environmental, health and safety management with total quality management systems, the requirement of parent corporations to improve environmental performance, the preference for getting beyond regulatory compliance, and finding costcutting opportunities are frequently mentioned as motivators to adopt EMS. According to Inno,<sup>9</sup> large companies and foreign capital based companies were using standardized EMS. It also seem to be motivated by the desire to extend environmental management standards to their suppliers. Besides that, ISO 14001 or EMS certification is an indicator of environmental responsibility and is often seen as a way of developing competitive advantage.

ISO 14001 standard aims to create sustainable improvements in the practices of participating firms through the implementation and integration of appropriate environmental management tools<sup>34</sup>. Moreover, the adoption and implementation of EMS in a proactive way with the understanding of the firms technological responses to the implementation of environmental management tools and integrating it with other standards by providing better opportunities can create value to the organizations. Furthermore, Fortunski<sup>35</sup> have argued that in the energy sector in Poland provided arguments that the EMS based on the ISO 14001 standard contributes to sustainable development in general such as in particular when standard legal enforcement mechanisms are weak and to sustainable business in particular.

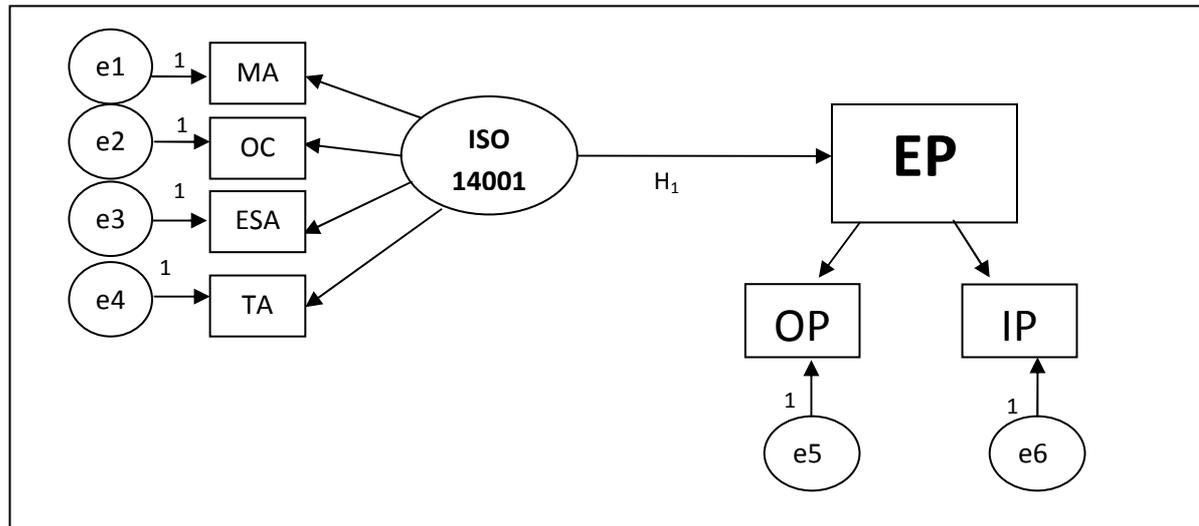
**Hypotheses Development:** To understand the relationship of each ISO 14001 on EP in Malaysian automotive industry, the following hypotheses were set up to be tested. Based on the literature review, these hypotheses will be stated based on a numbering system from H1. This style of hypothesis statement is chosen due to the nature of answering hypotheses using structural equation modeling methods.

H<sub>1</sub>: There is a positive and direct significant relationship between ISO 14001 performance efforts and environmental performance in Malaysian automotive Industry.

## A PROPOSED RESEARCH MODEL

Based on the literature review, many previous studies were explored about ISO 14001 and EP. This research aims analyzing of the relationship between ISO 14001 and EP for Malaysian automotive industries. This model is called proposed research model as presented in **Figure 1**.

**Figure 1: Proposed Model of The study**



\*Note: MA= Management Approach, OC= Organizational Change, ESA= External and Social Aspect, TA= Technical Aspect, EP= Environmental Performance, OP= Operational Performance, IP= Innovation Performance

## METHODOLOGY

In this study, sampling method by using structured questionnaire. A survey is considered as the most economical among methods available for data collection due to its ability in performing efficient data collection<sup>36</sup>. In general, a survey typed questionnaire approach is relatively low cost of money, time saving, and simple approach. Moreover, by using survey methods, it can clarify the question the survey respondents and recording their responses to be used as data for analysis<sup>37</sup>. Therefore it had been used by the authors.

In achieving the objectives of the study, the Malaysian automotive suppliers firms were selected as the population. The data was obtained from PROTON Vendor Association (PVA) and Kelab Vendor PERODUA (KVP). These lists of automotive suppliers consist of electrical, electronic, metal, plastic, rubber, and other automotive part<sup>4</sup>.

To analyze the data, two statistical techniques were adopted. The statistical Package for the Social Sciences (SPSS) version 17 was used to analyze the preliminary data and provide descriptive analyses about thesis sample such as means, standard deviations, and frequencies. SEM using AMOS 6.0 will use to test the measurement model.

Structural Equation Modeling (SEM) techniques was utilize to perform the require statistical analysis of the data from the survey. Exploratory factor analysis, reliability analysis and confirmatory factor analysis

to test for construct validity, reliability, and measurements loading were performed. Having analyzed the measurement model, the structural model was then tested and confirmed.

## CONCLUSION

The implementation of an EMS specified by this ISO 14001 is intended to result in improved environmental performance. Therefore this ISO 14001 is based on the premise that the organization will periodically review and evaluate its EMS to identify opportunities for improvement and their implementation. The most important element of ISO 14001 is that the EMS must continually improve. Where, the rate, extent and timescale of this continual improvement process are determined by the organization in the light of economic and other circumstances. Improvements in its EMS are intended to result in further improvements in environmental performance.

## ACKNOWLEDGEMENT

The researchers would like to acknowledge the Ministry of Higher Education (MOHE) for the financial funding of this research through Fundamental Research Grant Scheme (FRGS), and Research Management Centre (RMC), UPSI for Research University Grant (RUG).

## REFERENCES

1. N.M. Zakuan, S.M. Yusof, A.M. Shaharoun, The Link between Total Quality Management and Organizational Performance in Malaysian Automotive Industry: The Mediating Role of ISO/TS16949 Efforts. *Industrial Engineering and Engineering Management*, 2009.
2. M. Nordin, B.M. Deros, D.A. Wahab, Relationship between organizational change and lean manufacturing implementation in Malaysian automotive industry. *The 11<sup>th</sup> Asia Pacific Industrial Engineering and management Systems Conference. The 14<sup>th</sup> Asia Pacific Regional Meeting of International Foundation for Production Research*, 2010.
3. K. Nishitani, An empirical study of the initial adoption of ISO 14001 in Japanese manufacturing firms. *Ecological Economic*, 2009, **68**, 669-679.
4. J. Conding, A.F.M. Zubir, S. Hashim, N.A.S.L. Jaya, N.F. Habidin, The Structural Analysis of Green Innovation (GI) and Green Performance (GP) in Malaysian Automotive Industry. *Research Journal of Finance and Accounting*, 2012, **3**, 6.
5. A. Ghisellini, D.L. Thurston, Decision traps in ISO 14001 implementation process: case study results from Illinois certified companies. *Journal of Cleaner Production*, 2005, **13**, pp. 763-777.
6. I. Gavronski, G. Ferrer, E.L. Paiva, ISO 14001 certification in Brazil: motivations and benefits. *Journal of Cleaner Production*, 2008, **16**, 87-94.
7. O. Boiral, J.F. Henri, Modelling the impact of ISO 14001 on environmental performance: A comparative approach. *Journal of Environmental Management*, 2012, **99**, 84-97.
8. T.H. Arimura, N. Darnall, H. Katayama, Is ISO 14001 a gateway to more advanced voluntary action? The case of green supply chain management. *Journal of Environmental Economics and Management* 2011, **61**, 170-182.
9. M. Inno, Assessment of the ISO 14001 Implementation Process in Estonian Certified Construction Companies. Department of Civil and Environmental Engineering Water Environment Technology, 2005.
10. M.C.A. Brouwer, K.V. Koppen, The soul of the machine: continual improvement in ISO 14001. *Journal of Cleaner Production*, 2008, **16**, 450-457.
11. G. Rodriguez, F.J. Alegre, G. Martinez, Evaluation of environmental management resources (ISO 14001) at civil engineering construction worksites: A case study of the community of Madrid. *Journal of Environmental Management*, 2011, **92**, 1858-1866.
12. G.R. Chavan, N. Naik, The Study And Implementation Of Environmental Management System. *International Journal of Engineering Research & Technology (IJERT)*, 2012, **1**, 9, 2278-0181.
13. K.F. Pun, I.K. Hui, An analytical hierarchy process assessment of the ISO 14001 environmental management system. *Integrated Manufacturing Systems*, 2001, **12/5**, 333-345.
14. M. Sambasivan, N.F. Fei, Evaluation of critical success factors of implementation of ISO 14001 using analytic hierarchy process (AHP): a case study from Malaysia. *Journal of Cleaner Production*, 2008, **16**, 1424-1433.

15. S. Cassells, K.V. Lewis, A. Findlater, An exploration of ISO 14001 uptake by New Zealand firms, *International Journal of Law and Management*, 2012, **Vol. 54 Iss: 5**, 345-363.
16. M.A. Balzarova, P. Castka, Underlying Mechanisms in the maintenance of ISO 14001 environmental management system, *Journal of Cleaner Production*, 2008, **16**, 1949-1957.
17. K.A. Babakri, R.A. Bennett, M. Franchetti, Critical factors for implementing ISO 14001 standard in United States industrial companies. *Journal of Cleaner Production* 2003, **11**, pp. 749–752.
18. S. Kitazawa, J. Sarkis, The Relationship between ISO 14001 and continuous source reduction programs, *International Journal of Operation Production Management*, 2000, **Vol. 20 Iss: 2**, 225-248.
19. D. Morrow, D. Rondinelli, Adopting Corporate Environmental Management Systems: Motivations and Results of ISO 14001 and EMAS Certification, *European Management Journal*, 2002, **20**, 2, 159–171.
20. G.Y. Nee, Determining Factors for ISO14001 EMS Implementation among SMEs in Malaysia: A Resource Based View. *World Academy of Science, Engineering and Technology*, 2011, **59**.
21. H.J.D. Vries, D.K. Bayramoglu, T.V. Wiele, Business and environmental impact of ISO 14001, *International Journal of Quality & Reliability Management*, 2012, **29**, 4, 425 – 435.
22. J.L.M Homens, Labeling Schemes or Labeling Scams? Auditors' Perspectives on ISO 14001 Certification. Faculty of the Virginia Polytechnic Institute and State University, 2011.
23. A.M Turk, (2009), ISO 14000 environmental management system in construction: an examination of its application in Turkey, *Total Quality Management & Business Excellence*, 2009, **Vol. 20 No. 7**, pp. 713-33.
24. P. Gonzalez, J. Sarkis, B. Adenso-Diaz, Environmental management system certification and its influence on corporate practices: Evidence from the automotive industry, *International Journal of Operations & Production Management*, 2008, **Vol. 28 Iss: 11**, pp. 1021 – 1041.
25. S.A Yusoff, Environmental Management System And Its Impacts On Manufacturing Company's Performance In Malaysia. *Faculty of Mechanical Engineering, Universiti Malaysia Pahang*, 2008.
26. L.P. Tan, (2005). Implementing ISO 14001: is it beneficial for firms in newly industrialized Malaysia?. *Journal of Cleaner Production*, 2005, **13**, pp. 397-404.
27. M. Chavan, An appraisal of environment management systems: a competitive advantage for small businesses, *Management of Environmental Quality: An International Journal*, 2005, **Vol. 16 No. 5**, pp. 444-63.
28. P. Barla, ISO 14001 Certification and Environmental Performance in Quebec's Pulp and Paper Industry. Department d'economie, Universite Laval, 2005.
29. F. Bellessi , D. Lehrer, A. Tal, Comparative Advantage: The Impact of ISO 14001 Environmental Certification on Exports. *Environmental Science Technology*, 2005, **39**, 1943-1953.
30. B. Poksinska, J.J Dahlgaard, J.A.E Eklund, Implementing ISO 14000 in Sweden: motives, benefits and comparisons with ISO 9000, *International Journal of Quality & Reliability Management*, 2003, **20**, 5, 585-606.
31. B. Edwards, J. Gravender, A. Killmer, G. Schenke, M. Willis, The Effectiveness Of Iso 14001, In *The United States Master of Environmental Science & Management*, 1999.
32. H. Yin, P.J. Schmeidler, Does ISO 14001 Certification Enhance Environmental Performance? Conditions under which Environmental Performance Improvement Occurs. *Risk Management and Decision Processes Center The Wharton School, University of Pennsylvania*, 2007.
33. K. Wilcox, ISO 14001: An analysis. *Graduate School Of International Relations And Pacific Studies University Of California, San Diego*, 2007.
34. S.P. Sebhatu, and B. Enquist, ISO 14001 as a driving force for sustainable development and value creation. *The TQM Magazine*, 2007, **19**, 5, 468 – 482.
35. B. Fortunski, Does the environmental management standard ISO 14001 stimulate sustainable development?: An example from the energy sector in Poland. *Management of Environmental Quality: An International Journal*, 2008,**19**, 2, 204 – 212.
36. C.A. Moser, G. Kalton, Survey Methods in Social Investigation. 2<sup>nd</sup> Edition, Heinemann Educational: Landon, 1971.
37. T.L. Chang, Six Sigma: A Framework for Small and Medium Sized Enterprises to Achieve Total Quality. PhD Dissertation, Cleveland State University, 2002.

**\*Correspondence Author: Nurul Fadly Habidin;** Department of Management and Leadership,  
Universiti Pendidikan Sultan Idris, 35900 Tanjung Malim Malaysia