

Green Lean TQM Human Resource Management Practices in Malaysian Automotive Companies

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Abstract—Green Lean Total Quality Management (LTQM) Human Resource Management (HRM) System is a system comprises of HRM in Environmental Management System (EMS) practices which is integrated to TQM with Lean Manufacturing (LM) principles. HRM is essential especially in dealing with low motivation and less productive employees. The ultimate goal of this system is to focus on achieving total human resource development that is motivated and capable to optimize their creativity to be a part of Green and Lean TQM organization. A survey questionnaire was developed and distributed to 30 highly active automotive vendors in Malaysia and analyzed by Minitab v16 and SPSS v17. It was found out companies that are practicing Green LTQM HRM practices have generated more revenue and have RND capability. However, years of company establishment do not affect the openness of the company to adapt new initiatives that can help to improve the effectiveness of the operations. It was also found out the importance of training, communication and rewards for employees. The Green LTQM HRM practices framework model established in this study hopefully will give preliminary insight especially to companies that are still looking for system that can improve their productivity from managing human resource. This is preliminary study that combined 4 awards practices, ISO/TS16949, Toyota Production System SAEJ4000, MAJAICO Lean Production System and EMS focusing on highly active companies that have been involved in MAJAICO Program and Proton Vendor Development Program. Future study can be conducted to know the status at other industry as well as case study pertaining to this system.

Keywords—Automotive Industry, Lean Manufacturing, Operational Engineering Management, Total Quality Management, Environmental Management System.

I. INTRODUCTION

HUMAN is the greatest asset to a company [1]. It is important to nurture and develop human which in this case are employees in order to optimize their potential values. These have started even as early as Middle Ages in Europe through the craftsmanship training and knowledge transfer between the master and the young workers [2]. Employees with high motivation and discipline will not just excel in their life and have job satisfaction but also will have better commitment to the organization, high productivity and quality products under the implementation of Total Quality Management, Lean Manufacturing and other quality

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management initiatives [3]. The success of an employee in managing their daily task will determine the success of a company. In the study on Green Human Resource Management (GHRM), it is found out that EM organization that are not using full range of GHRM will have potential limitation in the effectiveness of total environmental improvement [4].

In Malaysia, the importance of human resource development has been identified especially in automotive industry. Malaysia Automotive Institute has been established in not only revising National Automotive Policy but also managing the National Automotive Agendas [5]. One of the agenda is in developing a skillful and highly income workforce that can cater the needs of highly technology automotive environment industry through their Human Capital Development Program. This program not only develop automotive industry workforce from Industry Led Professional Certificate Program but at the same time started from university level through the Automotive Apprenticeship Programme [6]. These collaboration programs between the government, industry and academic side have objectives to produce employable and well trained automotive workforce graduates.

Besides that, HRM has been integrated in a Lean TQM Factory Model System that has been established in 2011 from a study on highly performance automotive companies in Malaysia [7]. This paper has included EMS HRM Practices in order to help companies in operations improvements by eliminating wastes and obtaining sustainable environment from environment care in the organizations.

The Green Lean TQM HRM practices that is established in this study is specifically for Malaysian automotive industry based on adaptation of Malaysian Prime Minister Award Model, Malcolm Baldrige National Quality Award, European Quality Foundation Award, Toyota Production System, ISO16949, SAEJ4001 and MAJAICO Lean Production System. The framework established will give a preliminary guide on practices that have potential in increasing productivity and motivation of employees and hopefully will impact positively on performance of the company.

This paper will start with the research methodology comprises of the design and development of the questionnaire survey and then followed with the findings of the Green Lean TQM HRM practices.

II. METHODOLOGY – DESIGN AND DEVELOPMENT OF QUESTIONNAIRE

In this study, the main tool used to collect descriptive data is through questionnaires developed based on ISO14001:2004 Environmental Management System, four awards which are

Malaysia Quality Award, Deming Prize Award, Malcolm Baldrige National Quality Award, European Award, ISO/TS16949, MAJAICO Lean Production System, Toyota Production System and SAEJ4001: Implementation of Lean Operation User Manual which has been issued in November 1999 by The Engineering Society for Advancing Mobility Land, Sea, Air and Space. The questionnaire has been reviewed by six academicians and four practitioners. The reliability of the questionnaires are then analysed by Social Sciences Package v.17 Software or known as SPSS. The results showed that the entire variable are reliable as the overall Cronbach Alpha is 0.909 Previous studies have indicated reliability coefficient Cronbach Alpha of more than "0.60" as sufficient to signify the validity of the variables used in the questionnaires [8].

The population of the study consists of 30 highly performance and active vendors for automotive components. The vendors are evaluated as highly committed and high performance vendors and are listed to be used as the benchmark companies for others vendors. The respondents of the survey are personnel's from Quality, Factory, Operations, Production Engineers, Executives, Managers, Top Management divisions and Environment Officers. The questionnaire is directed to them in order to ensure that the terms and structures used are meaningful and understood by them.

III. RESULTS AND DISCUSSION

A. Current Status of TQM, LM and EMS in HRM for Malaysian Automotive Industry

The response rate obtained is "100%" for 30 vendors or "12.3%" for a car manufacturer vendor in Malaysia. The response rate percentage is acceptable and reasonable as previous studies conducted in Malaysia have response rate from "11.5 – 12.6 %" [9], [10] and [11]. Thus, the response rate achieved in this study is common for Malaysian industry.

This study has been able to find out that from 30 practitioners of Lean Manufacturing and TQM in Malaysian automotive companies, 16 of the companies have implemented Green HRM as one of the key practices in their organization. It was found out that in this study Green HRM is commonly practiced compared to Lean TQM HRM. This study has discovered that high revenues companies implementing Lean TQM then continued with EMS in managing their human resources. This shows that Green Lean TQM HRM has contributed to high revenue to the companies. However, years of establishment in the automotive industry does not guarantee that the companies become more ready to implement new initiatives. This is because, despite of having companies established since 1960s up to 2000s, this study has found out that only companies established in 1980s and 1990s are highly active in practicing Lean TQM as well as being certified as EMS companies. This happen because of the possibility that these companies is established in the same year as Malaysian national car manufacturers which was established which is PROTON Berhad in 1983 and

PERODUA in 1994. During these years, there were many companies that are established to support the Malaysian automotive industry. Due to these factors, these companies are more open and dare to change in adapting any initiative that can boost their company's performance and help to survive in the fierce automotive industry.

In this study, it was found out that majority of high income revenue companies were from 100% local ownership. These companies have been implementing Lean TQM and EMS compared to other companies with foreign ownership. This is a good indicator to Malaysian government whereby one of the National Automotive Policy is to develop local vendors. Thus, the local vendors have not only succeeded to obtain more revenue but at the same time they are striving to become one of the world class manufacturer's practices.

High income revenue companies with Research and Development (RND) capabilities are not only implementing Lean TQM but are also commonly practiced EMS than the Non-RND companies. This is a good sign to Malaysian automotive industry especially as the government have been promoting for more design capability in local vendor. Having RND capabilities will open opportunity for more business as the companies can produce more new design products to penetrate not only domestic but export market. However, this study found out that for Green Lean TQM companies, not all of the products are designed in-house. 60% of the companies have some product designed in-house and only 3% can designed their entire product. Besides that, 50% companies are exporting <10% of their products despite of more RND companies. This shows that the high Lean and TQM and EMS practitioners companies are producing products for domestic market rather than export eventhough with RND capabilities. The reason because for some companies, their products are OEM dependants and their parents company has plant that caters for each of the foreign country.

In terms of categorizing the human resource or employees, in this study, it was found out that most companies has difficulty to categorize their employee based on direct labor, indirect labor, technical and nontechnical labor. The reason can be because of no clear guideline on types of labor market in Malaysia. Guideline is only available for total number of employees in categorizing the type of enterprises either micro, small, medium or large enterprise. In this study, guideline from SME Corporation Malaysia is used whereby small enterprise has employees between 5 and 50, medium enterprise has employee of 51 and 250 while large enterprise has employees of more than 150 [12]. The European guideline has different terminology on large enterprise whereby large enterprise is categorized for more than 250 employees. From this study, 73.3% are from large enterprise with employees from 157 to 12000. This data shows that it is crucial to have well motivated, skillful and knowledgeable employees as they can determine the success of a company especially for a large enterprise with large number of employees. The importance of managing people are mentioned and practiced by the success manufacturer like Toyota [1] which has mentioned that valuable employees are

more important than high technology facilities and any system.

B. Integrated TQM with LM and EMS HRM Practices in Malaysia Automotive Companies

This study has integrates the HRM practices in terms of LM, TQM and EMS based on the adaptation from several world class awards companies, models and system. There are 10 practices studied in Lean TQM System HRM while 13 practices for Green HRM. In order to come out with a framework model, this study has categorized the practices into several categories. The highest implementation practiced from above 90% of implementation is categorized as Foundation Level. . The foundation practices are those practices that need to be initially implemented if a company has the interest in implementing the integrated practices. Other practices are described in Level I for 85% to 89% implementation percentage, Level II for 80% to 84%, Level III for 70% to 79% and Level IV for less than 70% implementation. The foundation practices are determined based on the “90.5 – 96.5%” implementation response from the surveys conducted. It was found out that all the vendors have agreed and most of them have been actively implementing these practices compared to other practices. Thus, these practices are considered the key practices in the integrated Green Lean TQM System. After successfully implementing the foundation practices, a company can proceed with practices from Level I, II, III and lastly Level IV.

There are three practices in Green HRM and none practices in Lean TQM that falls in the foundation level. All the levels from foundation, level 1, 2 and 3 of Green HRM has implementation percentage from 77% to 94.8% for Green HRM while 69% to 88.2% for Lean TQM HRM practices. The foundation practices for Green HRM are more on the EMR clear roles and responsibility and the important of procedure available for everyone to be aware of conformance to policy, procedures and requirements of EMS. This shows that a person in-charge is needed in managing the overall environmental management system in the companies. It was found out that 14 high revenue companies are implementing these foundation with response scale from agree to strongly agree. The remaining two EMS Certified companies come from medium revenue industry. Besides that, companies that have been established in 1980s with 11 companies are commonly implementing foundation practices with scale 5 to 6. For Level 1, the focus of the companies are more on procedures which focuses on everyone in the companies awareness of their roles and responsibilities in conformance with EMS requirements, significant environmental aspect/impact and benefits of improvements. The next important practices are clearly defined and communicated to everyone on their roles, responsibilities and authorities. This shows that a clear job scope can help manpower to focus and committed on their job. After understanding their roles and responsibilities, in Level 2 for implementation percentage from 80.2% to 83.3%, training needs for all staff are needed especially for certified EMS companies on environmental

aspects and the records that must be documented. Besides that, the company has sufficient human resources and specialized skills to establish, implement and maintain the EMS. For Level 3 practices, the implementation percentage is from 77% to 78.2%. In level 3, HRM also focuses not only on the people management but also on the availability and adequacy of infrastructures and technology to establish, implement and maintain the EMS. Availability of infrastructures and technology is not sufficient without the capability and competency of the people handling the technologies. In Green HRM practices, the effectiveness of people competencies is evaluated based on their education, training or experience. Table I explains in details of the Green HRM Practices with its implementation percentage.

TABLE I
 THE GREEN HRM PRACTICES FRAMEWORK GUIDELINE MODEL IN HIGHLY ACTIVE LM AND TQM AUTOMOTIVE COMPANIES IN MALAYSIA

Green HRM Practices	Average Implementation Percentage
Foundation Level	
1) The Environmental Management Representative report to top management for review and improvement	94.9%
2) There is an environmental management representative that has clear roles, responsibility and authority for effective EMS	92.7%
3) Procedure is available for everyone to be aware of conformance to policy, procedures and requirements of EMS	90.7%
Level 1	
1) Procedure available for everyone to be aware of their roles and responsibilities in conformance with EMS requirements.	89.7%
2) Procedure is available for everyone to be aware of significant environmental aspect/impact and benefits of improvements.	88.5%
3) Roles, responsibilities and authorities are defined, in written and communicated to all people that involved in the organization .	86.5%
Level 2	
1) Training needs of environmental aspects and EMS are recorded.	83.3%
2) The company has sufficient human resources and specialized skills to establish , implement and maintain the EMS.	80.2%
Level 3	
1) The company has adequate resources of infrastructures and technology to establish, implement and maintain the EMS.	78.2%
2) All people performing activities are competent for environmental technologies on certain level of education, training or experience and are recorded and review for its effectiveness.	77.0%

In Lean TQM HRM practices, for Level 1 that has percentage implementation from 86.3% to 88.2%, the highest practices that are implemented in Malaysian automotive companies are on the emphasis of keeping records for trainings, education and skills. This is because records are important as it will become the tool to assess the level and needs of employees. The second highest percentage is the important of having training budget in each company. All training even if conducted in-house requires training budget allocation.

In level 1 of Lean TQM HRM, the implementation percentage is from 80.3% to 84%. All the training can be used as a gauge to measure the employee morale indicator. Usually, highly motivated are people who enjoy their work as they know their job. This will show in the quality of their work, the discipline even the health condition of the employee. In this study, training should also involve not only low level staff but also for top management. Knowledge is for everyone and the difference will be the level of the knowledge and skills given are based on the capabilities of each employee. Besides training, in managing people, communication is also very important. In this study, the effectiveness of top-down and bottom-up communication is achieved by always keeping in touch with its people through transmitting information to its people either through regular two way meetings, briefings and others. The importance of communication is recognized by Malaysian government especially as they are now looking to foster the importance of communication skills in the university students through Apprenticeship Program managed by Malaysia Automotive Institute. This program not only focuses on automotive engineering knowledge but also provide soft skills knowledge in effective communication and critical thinking [13]. Communication can also help to identify employee needs. In this study, the employee needs are identified as owning authority empowerment in doing continuous improvement activities, continuous performance target review, objectives of individuals and teams are negotiated, appraised fairly and rewarded with sufficient incentives and financial packages. Besides that, company must also provides health, safety, morale and spiritual needs of employees-physical and recreational facilities and other activities such as counseling, self improvement programs etc in order to produce employees that are motivated as well as be innovative, creative and perform improvements.

In level 2, it was found out that the two least practices are in availability of a career plan or development path for employees with implementation percentage of 76.2%. This shows that in Lean TQM HRM, career plan or development path are least consideration in managing employees. This could be due to the large pools of workers that are available in the market. Thus, the company does not feel the needs to identify the necessary training and knowledge needed for employee development. This is different from Toyota company whereby they really belief in developing the internal employee rather than recruiting a new employee especially when considering for employee promotion. [1]. No career plan and development path can also be one of the reasons of high

staff turn over in a company. Table 2 lists down the Lean TQM HRM Practices for every level with the implementation percentage.

TABLE II
 THE LEAN TQM HRM PRACTICES FRAMEWORK GUIDELINE MODEL IN
 HIGHLY ACTIVE LM AND TQM AUTOMOTIVE COMPANIES IN MALAYSIA

Lean TQM HRM Practices	Average Implementation Percentage
Foundation Level	
1) All trainings, education, skills and experience information are recorded.	88.2%
2) Training budget is allocated.	86.3%
Level 2	
1) Employee Morale Indicator.	84.0%
2) All staff have appropriate education, training, skills and experience.	82.7%
3) All trainings from top management to low level staff are planned, reviewed and monitored its effectiveness.	82.7%
4) The effectiveness of top-down and bottom-up communication is achieved by always keeping in touch with its people through transmitting information to its people (regular two way briefing meetings, briefings etc).	82.7%
5) All continuous improvement teams are empowered with authority and it is written, understood and followed.	82.2%
6) All staff and team agree on target and continuously review performance.	81.5%
7) Objectives of individuals and teams are negotiated, people are appraised fairly and are rewarded with sufficient incentives and financial packages.	81.5%
8) Employees are empowered, motivated to be innovative, creative and do continuous improvements.	81%
9) Company provides health, safety, morale and spiritual needs of employees-physical and recreational facilities and other activities such as counseling, self improvement programs etc.	80.3%
Level 2	
1) Career plan or development path for employees are available.	76.2%
2) Complete training in LMS for all staff.	69%

IV. CONCLUSION

EMS HRM practices have been commonly practiced compared to LM and TQM HRM practices for a company that has the three initiatives. This is a good indicator on current automotive manufacturers whereby they are now moving towards developing human resource while at the same time sustaining the environment instead of just focusing on financial profit. However, in this study, it was found out those local companies that implementing the three initiatives have generated more revenues and have RND capability. However, it was found out that the number of years of company

establishment do not affect the openness of the company to adapt new initiatives that can help to improve the effectiveness of the operations. It was also found out the importance of training, communication with employees and rewards of priority in order to have productive employees that are willing to grow together with a company. It is a good sign to Malaysian companies as the government has been supporting human capital development through Malaysia Automotive Institute not only for the industries but also in preparing future workers at the university level that have the knowledge and education as well as communication skills require for engineering operational environment. The Green LTQM HRM practices framework model established in this study hopefully will give preliminary insight especially to companies that are still looking for system that can improve their productivity from managing human resource. Future study can also adapt this model in order to measure the relevancy of the LTQM HRM framework in other industry.

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REFERENCES

- [1] J.Liker (2004).*The Toyota Way*, (1st Ed.), McGraw-Hill.
- [2] Malaysia Automotive Institute Apprenticeship Programme, "Malaysia Automotive Institute," [online]2012. <http://www.mai.org.my> – apprenticeship programme (Accessed: 30 May 2012).
- [3] L.M.D.Menezes "Job satisfaction and quality management: an empirical analysis," International Journal of Operations & Production Management, vol. 32, Issue 3, pp.308 – 328, 2012.
- [4] D.W.S.Renwick, T.Redman and S.Maguire " Green Human Resource Management: A review and Research Agenda," International Journal of Management Reviews, 2012
- [5] National Automotive Policy, "Malaysia Automotive Institute," [online]2012. <http://www.mai.org.my> – national automotive policy (Accessed: 5 May 2012).
- [6] Human Capital Development, "Malaysia Automotive Institute," [online]2012. <http://www.mai.org.my> – human capital development (Accessed: 30 May 2012).
- [7] N.A.M.Salleh, S.Kasolang and A.Jaffar "Lean TQM Automotive Factory Model System," World Academy of Science, Engineering and Technology, vol. 79, pp 627-633, 2011.
- [8] D.M. Johnson, J. Sun, M.A. Johnson, "Integrating multiple manufacturing initiative: challenge for automotive suppliers," Measuring Business Excellence, vol.11, pp 41-56, 3, 2007.
- [9] S.F.Lim, "Empirical study on the perception of lean manufacturing practices in Penang manufacturing companies," MBA dissertation, Universiti Sains Malaysia, Malaysia, 2000, unpublished.
- [10] Y.C. Wong, K.Y. Wong, A. Ali, "A study on lean manufacturing implementation in the Malaysian electrical and electronics industry.," European Journal of Scientific Research, vol. . 38, pp. 521 – 535, 4 2009.
- [11] R. Jusoh, D. N. Ibrahim, and Y. Zainuddin, "The performance consequence of multiple performance measures usage: evidence from the Malaysian manufacturers," International Journal of Productivity and Performance Management, vol. 57, pp. 119-136, 2008.
- [12] Definition of SMEs, "SME Corporation Malaysia," [online] 2012. <http://www.smecorp.gov.my> – Definition of SMEs (Accessed: 30 May 2012).
- [13] MAI-UTEM Set Off Its' Automotive Apprenticeship Programme, "MAI HCD News," [online] 2012. <http://www.mai.org.my> – Human Capital Development (Accessed:30 May 2012).