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Lean TQM Automotive Factory Model System

Noor Azlina Mohd Salleh, Salmiah Kasolang and Ahmed Jaffar

***Abstract*—**Integrated Total Quality Management (TQM) with Lean Manufacturing (LM) is a system comprises of TQM with LM principles and is associated with financial and nonfinancial performance measurement indicators. The ultimate goal of this system is to focus on achieving total customer satisfaction by removing eight wastes available in any process in an organization. A survey questionnaire was developed and distributed to 30 highly active automotive vendors in Malaysia and analyzed by PASW Statistics 18. It was found out that these vendors have been practicing and measuring the effectiveness TQM and LM implementation. More involvement of all Malaysian automotive vendors will represent the exact status of current Malaysian automotive industry in implementing TQM and LM and can determine whether the industry is ready for integrated TQM and LM system. This is the first study that combined 4 awards practices, ISO/TS16949, Toyota Production System and SAEJ4000.

***Keywords*—**Automotive Industry, Lean Manufacturing, Operational Engineering Management, Total Quality Management

I. Introduction

GLOBALLY, manufacturers around the world are facing stiff competition with demanding customer seeking quality of goods and services with low cost price. In order to do that, manufacturers need to be able to produce products or services in the most economical, cost effectiveness manufacturing environment and at the same time capable to produce new products or services with low lead times [1] as world class manufacturers [2].With all of the above requirements by customers and the revelation of benefits of Lean Manufacturing System to all industry are published in a book "The Machine that Changed the World"[3] and the effectiveness of Toyota Production System in conquering world automotive industry , thus there is a need to establish a framework model. This Integrated Total Quality Management and Lean Manufacturing framework will be helpful for automotive industry in Malaysia that will aid companies to improve operations and remain competitive. The benefits of TQM and LM are really useful for Malaysia automotive industry which has started in 1983 and has 6 car companies and 3 motorcycle companies. It is a vital industry as it provides 58,327 employments in 2008 [4]. Despite of more than 25 years experience in industry, Malaysia Automotive Industry is still far behind the largest car manufacturing which is Japan based from International Organization of Motor Vehicle Manufacturers [5] despite supports that have been given by Malaysian government. The supports are through Industrial Master Plan (IMP3), National Automotive Policy (NAP), Yearly Industry Excellence Award and establishment of Malaysia Automotive Institute with gearing ministry and organization like Ministry of International Trade and Industry (MITI), Malaysia Industrial Development Authority (MIDA), Standards and Industrial Research Institute of Malaysia (SIRIM) and Malaysia Productivity Corporation (MPC). However, solely depending on government support is insufficient for surviving in the fierce market. `Survivors manufacturers are those implementing world class practices.

One of the ways of becoming a world class manufacturer is by implementing TQM and LM. As of January 2010, in Malaysian context, there are 26 studies available in TQM, four studies in LM and four studies in Integrated Manufacturing System [6] – [10]. To the author knowledge, no studies that implement Integrated TQM and LM system is available especially for automotive industry and the status of Malaysian automotive industry was last reported by Kasolang in 2001 [11]. The study was mainly focused on the implementation of TQM among automotive vendors. The integrated model 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 and SAEJ4001: Lean Implementation. The framework established is initially for Malaysia Automotive Industry will allow the company not only improve its competitiveness but will open opportunity for global recognition awards. This paper will not only find the status of TQM and LM practices but also the key performance indicators that are used in Malaysian Automotive Industry.

This paper will start with the research methodology comprises of the design and development of the questionnaire survey and followed with the findings of the six practices and five performance measurement indicators. The six practices are leadership, supplier, organization and

N.A.Mohd.Salleh was with the Quality Management Section Hicom-Honda Manufacturing Sdn.Bhd and Research and Development Department PROTON Berhad. She is now a Ph.D student in Faculty of Mechanical Engineering Universiti Teknologi MARA Malaysia. (phone: 603-55105090; fax: 603-55435160; e-mail: azlina_salleh@ yahoo.com).

S.Kasolang is now an Associate Professor and Deputy Dean (Research and Industrial Linkage) of Faculty of Mechanical Engineering Universiti Teknologi MARA Malaysia. (e-mail: salmiahk@salam.uitm.edu.my).

A.Jaffar is now a Professor and Dean of Faculty of Mechanical Engineering Universiti Teknologi MARA Malaysia. (e-mail: ahmedjaffar@salam.uitm.edu.my).

customers management practices, product management, information management, human resource management and lastly process management practices. The five performance measurement are customer involvement and satisfaction level, leadership effectiveness level, human resource management effectiveness level, process and system approach effectiveness and quality measurement level. These five performance measurement are categorized as financial and nonfinancial performance measurement. The detail framework model will be given in Table I after references. Discussion on Table I is included in Section II (B).

II. Methodology – Design and Development of Questionnaire

In this study, the main tool used to collect descriptive data is through questionnaires developed based on four awards which are Malaysia Quality Award, Deming Prize Award, Malcolm Baldridge National Quality Award, European Award, ISO/TS16949, 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 reviewed by three academician and three practitioners. The reliability of the questionnaires are then analysed by Social Sciences Package v.18 Software or formerly known as SPSS. The results showed that all the independent and dependent variable are reliable as the Cronbach Alpha results obtained are in the range of "0.828 to 0.978". 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 [12].

The population of the study consists of 30 highly performance and active vendors for automotive components to a common master company. The vendors are evaluated by the car company 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 from Quality, Factory, Operations, Production Managers and Top Management divisions. The questionnaire is directed to them in order to ensure that the terms and structures used are meaningful and understood by them. In order to ensure understanding of the questionnaire, all the vendors were visited to attend any queries by the respondents.

III. Results and Discussion

A. Survey Background

A questionnaire survey is conducted in order to obtain the current scenario of integrated TQM with LM in Malaysian Automotive Industry. From 244 PROTON Berhad vendors obtained from Vendor Management Group PROTON Berhad vendors contact list, this study will focus on a group of automotive vendors in Malaysia comprises of highly performance and active companies in Selangor and Negeri Sembilan covering performance for year 2008 to 2010 as evaluated by Vendor Management Group PROTON Berhad. This study will then zoom in details for 30 vendors. 13 vendors are actively involved in implementing Lean Manufacturing System under the consultation of MAJAICO program which will be described in the following section as MAJAICO Vendors and 17 vendors that does not involve in the MAJAICO program due to their limitation of involvement in the weekly monitoring by MAJAICO. However these 17 vendors are highly active in the Vendor Development Program initiated by Vendor Management Group PROTON Berhad especially in implementing 5S. These next 17 vendors will be described later as PROTON Developed Vendors. All the 30 vendors will be later used as the benchmark model company for PROTON Berhad through Vendor Management Group and Malaysian Automotive Industry specifically for other vendors that are interested to implement a system that can boost their company's performance.

*Response Rate;*A total of 30 questionnaires are distributed to the highly active and high performance automotive vendors around Selangor and Negeri Sembilan as proposed by Vendor Management Group PROTON Berhad. From 30 active vendors, 13 vendors are MAJAICO improvement vendors which have been implementing lean manufacturing system developed by MAJAICO while 17 are highly active vendors that participate in the vendor improvement programs conducted by Vendor Management Group PROTON Berhad. These population samples are chosen because these companies are recognized as highly committed and are used as the benchmark companies by Vendor Management Group PROTON Berhad for other PROTON Berhad vendors. The medium of sending the questionnaires are as requested by the vendors. Some of the questionnaires are sent and pick-up directly while there is some of the vendors that requested for online survey forms and softcopy survey forms. Respondents for this survey are from the Lean Manufacturing Champion for the MAJAICO improvement vendors, Quality Managers and Engineers, Operations Manager and Engineers. A list of related contact person for Lean Manufacturing Champion is given by Vendor Management Group PROTON Berhad. There are cases that Marketing Executive and Manager is the contact person from Vendor Management Group list. For this case, the Marketing personnel have been the window contact person and are accountable to ensure related respondents for this survey. In order to increase the response rate, below are the actions taken:

- A presentation on the study is presented to the CEO of PROTON Berhad during PROTON's visit to UiTM Shah Alam on the event of signing a

collaboration agreement between PROTON Berhad and UiTM. The CEO is aware on the study and recommended the Vendor Management Group PROTON Berhad to assist and involve in this study.

- A recommendation letter is obtained from the dean of Faculty of Mechanical Engineering UiTM Shah Alam and from the manager of Vendor Management Group PROTON Berhad. The letter is attached together with the survey forms. These letters are very essential as they showed the importance of this study not only academically but also to the vendors' customer which in this case is PROTON Berhad.
- All the respondents are called prior to sending the questionnaires. These are done in order to obtain commitment and explain on the importance of this study. Besides that, the calls are made so as to know the types of survey forms that they preferred.
- Three types of survey forms are prepared. There are the hardcopy form, softcopy form and online forms. The forms are prepared in such a way to allow the respondents to choose the best form format that is convenience for them.
- A follow-up calls, emails and sms are sent to the respondents with the aims of acquiring the status of the survey and obtaining any enquiries regarding the survey questions.
- Pilot test study and review of the survey questionnaires is conducted to two vendors, three academicians and one professional that allow for improvement of the questionnaires.

The response rate for this survey is 93.3% which is 28 out of 30 vendors replied the survey in one month time representing. All the 13 MAJAICO vendors participate in the case study while the remaining is 15 out of 17 PROTON Developed Vendors. From 244 PROTON Berhad vendors, this study is able to gain 28 vendors which represent 11.5% of total vendors but represent 93.3% of highly active and high performance vendors. The response rate percentage is acceptable and reasonable as previous studies conducted in Malaysia have response rate from 11.5 – 12. 6 %. Wong, Wong and Ali (2009) in their study on Lean Manufacturing in Malaysian electronic industry obtained 12.6% response rate. According to their study, Jusoh, Ibrahim, Zainuddin (2008), obtained a response rate of 12.3% and Ahmed and Hassan (2003) in their study in Malaysia SMIs have 11.5% Thus, the response rate for this study is considered to be common in Malaysian study. In this study, 92.9% or 26 vendors are highly interested in the outcome of the research and request for summary report of this study while 75% or 21 vendors eager to participate in the case study. Table 4.2 listed down all the comments related to this study. The response rate obtained is "93.3%" in one month time for 28 vendors or "11.5%" 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 %" [13] – [15]. Thus, the response rate achieved in this study is common for Malaysian industry.In this study, "92.9%" vendors have positive comments and are highly interested in the outcome of the research and requested for summary report of this study while "75%" vendors eager to participate in the case study. The data also showed that TQM and LM have been practiced by the high performance vendors but with implementation percentage which if s "35.7%" for TQM and "67.9%" for LM. Eventhough the term TQM and LM have been established in the same year which is 1985, but the data shows LM is accepted more and is the latest trend of initiative implementation in Malaysian Automotive Industry. Besides that, LM which is originated from a successful automotive company in the world has proven their businesses success through their unique Toyota Production System. Majority vendors voluntarily want to implement TQM and LM while some of them implement it due to customer requirement. The implementation of TQM has started since 1996 that is 11 years after TQM was introduced in the Western world in 1985 while LM implementation has started in 2001.Majority of the companies are from plastic industry, privately owned and are from Medium and Large Enterprise.

B. Integrated TQM with LM Practices with Performance Measurement in Malaysia Automotive Industry

Descriptive analysis is used in discussing TQM and LM Practices which is classified as Independent Variables and its Performance Measurement which is classified as Dependent Variables in the Highly Active and High Performance Malaysian Automotive Vendors. All six Independent Variables are the six practices of an integrated TQM with LM comprises of leadership practices, human resource management practices, information management practices, supplier - organization - customers management practices, product management practices and process management practices. The five Dependent Variables are Customer Involvement and Satisfaction Level, Quality Measurement Effectiveness Level, Leadership Effectiveness Level, Human Resource Management Effectiveness Level and Process and System Approach Effectiveness Management Level.The findings from the survey indicates that all the Independent and Dependent Variables have mean values of more than "4" that indicate moderately strong practices of the companies on TQM and LM practices as well as measuring the performance. Leadership has been highly practiced with mean values of "5.25" which mean "87.5%" implementation value. The entire respondent realized that leadership is the most important practice in an effective and profitable organization. This study indicates majority companies belief in a strong open-minded leadership with implementation percentage of "87.54%" which is followed with the focus on managing suppliers, entire organization and customers with "82.99%"

implementation. After that, the highly active and high performance vendors focus on managing the internal management system which are managing the product "81.55%", information system "81.43%", human resource management system "81.41%" and lastly process management system with "80.60%" for production side. In order to measure the effectiveness of the implemented practices, performance measurements of the practices are being measured in this study. Some of the performance measurement indicators that have been used by previous studies are evaluated to investigate whether they are being implemented in the Malaysian Automotive Industry. In this study, there are five categories of performance measurements that are being evaluated in the Malaysian Automotive Industry for the highly active and high performance vendors. The five categories are then classified into financial and non-financial performance measurement. The nonfinancial aspects are the performance measurement indicators for Customer Involvement and Satisfaction Level, Process and System Approach Effectiveness, Quality Measurement Effectiveness Level and Human Resource Management Effectiveness Level. Leadership Effectiveness Level is classified as the financial aspect of the performance measurement indicator. Nonfinancial performance measurement has a higher mean with "4.95" or "82.5%" performance measurement implementation compared to financial performance measurement with "4.88"or 81.3% performance measurement. The higher mean for nonfinancial performance measurement points out that the vendors are not just looking on the financial aspect of the companies but are now putting nonfinancial aspect even higher than the financial aspects. They are now aware that simply considering only financial aspects are no longer guaranteed survival in the industry. Table 1 illustrates foundation practices and the three steps required for their implementation in automotive companies. 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 Step I, II and III. The effectiveness of the practices can be measured by performance indicators as described in the performance measurement indicators row.The foundation practices are determined based on the "90.5 – 96.5%" implementation response from the surveys conducted. It is found out that all the vendors have agreed and most of them have been highly implementing the practices compared to other practices. Thus, these practices are considered as the key practices in the integrated Lean TQM System. After successfully implementing the foundation practices, a company can proceed with practices from Step I, II and lastly Step III which are in the range of "85 – 89.9%, 80 – 84.9% and 70 – 79.9%" respectively.

For Performance Measurement Indicators, the highest mean obtained from the survey data is coming from Customer Involvement and Satisfaction Level which is "84.3%" measurement implementation percentage. This can be considered as moderately strong implementation of measurement performance indicators. This is a good sign of the industry as the vendors are looking to satisfy the customers by involving the customers as much as possible in the process of producing the products that will be satisfied the customers. After focusing on evaluating the customer satisfaction level, the respondents have been practicing measuring the performance of Process and System Approach Effectiveness Level "83.3%", Quality Measurement Effectiveness Level "82.9%", Leadership Effectiveness Level "82.2%" and Human Resource Management Effectiveness Level "79.3%". Malaysian Automotive Industry needs to focus on developing human and at the same time developing the technology. A satisfied, healthy and motivated employee will produce higher productivity which will finally benefit the organization.

In order to measure whether TQM and LM practices will have effect on performance measurement, Independent Samples Mann-Whitney Test from Social Sciences Package v.18 Software is used to analyze the relationship between Integrated TQM and LM with financial and nonfinancial performance measurement. The Mann-Whitney Test is used due to the small sample size and nonlinear or nonuniform result. The significance level tested for the relationship is "0.05%". The analysis shows that all the Integrated TQM and LM practices and all the financial and nonfinancial performance measurement have significant level more than "0.05%" with the highest "0.982%" and lowest "0.146%". This means that there is a relationship between Integrated TQM and LM Practices with financial and nonfinancial performance measurement for MAJAICO and PROTON Developed Vendors. Any changes in the practices of the Integrated TQM and LM Practices will affect the performance of the companies financially and nonfinancially.

IV. CONCLUSION

Financial and nonfinancial performances are now needed for giving a more comprehensive organizational performance assessment. Solely depending on financial indicators are no longer sufficient to remain competitive in the fierce market. This is a good sign for Malaysian Automotive Industry since the vendors are looking and focusing more on the nonfinancial performance which is the bridge to the higher financial performance. Automotive industry is a fierce market. This study has investigated the financial and nonfinancial performance of a group of automotive vendors in Malaysian Automotive Industry. This group of vendors serves a common master company. From the results of the conducted survey, it indicates that strong leadership efficient practices will not only considered financial profit but will also include non financial profit of managing human assets in a productive and harmonious working environment. This will put an organization far ahead and at the world class status. From this study, a

common framework model with Integrated TQM and LM practices has been proposed which will allow a systematic quality implementation for all vendors. This will facilitate control and monitoring of quality initiatives among vendors in the effort to meet higher customer satisfaction. Future work on measuring the overall effectiveness and workability of the framework can be studied and refined on a larger scale of automotive vendors.

REFERENCES

[1] S.Taj, "Lean manufacturing performance in China: assessment of 65 manufacturing plants," Journal of Manufacturing Technology Management, vol.19, pp 217-234, 2, 2008.
[2] 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.
[3] J.P. Womack, D.T. Jones and D. Ross, The machine that changed the world: The story of lean production. New York: Rawson Associates, 1990.
[4] H.Hashim, "Briefing to Ministry of Trade Malaysia," Automotive Institute of Malaysia, Kuala Lumpur, Malaysia, 2009 , unpublished.
[5] World Motor Vehicle Production: World Ranking of Manufacturers 2008, "Organisation Internationale des Constructeurs d'Automobiles," [online] 2009, http://oica.net/wp-content/uploads/world-ranking-2008.pdf (Accessed: 21 October 2009).
[6] Lean,"MalaysianThesisOnline,"[online]2009.http://eresources.perpun.net.my/myto/resindex1.php?df1=title&rt=lean&ph1=%25&df3=title&std=ASC&Search=Search – lean (Accessed:20 October 2009).
[7] Total Quality Management,"Malaysian Thesis Online,"[online]2009. http://portal.perpun.net.my/myto/resindex1.php?df1=title&rt=total%20quality%20management&ph1=%&cmp1=&df2=&ra=&ph2=&cmp2=&ri=&rp=&rf=&ry1=&ry2=&df3=pubyear&std=ASC&page=0&limit=50 (Accessed: 20 October 2009).
[8] TQM in Malaysia Automotive,"Scopus," [online] 2010. http://www.scopus.com (Accessed: 10 July 2010].
[9] Integrated System in Malaysia Automotive, "Scopus," [online] 2010. http://www.scopus.com (Accessed: 10 July 2010).
[10] Lean manufacturing in Malaysia, "Scopus," [online] 2010. http://www.scopus.com (Accessed: 10 July 2010].
[11] S. Kasolang, "Implementation of TQM in the Malaysian Automotive Vendors," M.S.thesis, University Putra Malaysia, Malaysia, 2001, unpublished.
[12] S.F.Lim, "Empirical study on the perception of lean manufacturing practices in Penang manufacturing companies," MBA dissertation, Universiti SainsMalaysia,Malaysia,2000,unpublished.
[13] 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.
[14] 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.
[15] S. Ahmed, and M. Hassan, "Survey and case investigation on application of quality management tools and techniques in SMIs," International Journal of Quality and Reliability Management, vol. 20, pp. 795-826, 2003.

TABLE I
FRAMEWORK MODEL GUIDELINE ON INTEGRATED TQM WITH LM PRACTICES STEPS AND PERFORMANCE MEASUREMENT INDICATORS PROPOSED FOR AN AUTOMOTIVE COMPANY

PERFORMANCE MEASUREMENT	FINANCIAL INDICATORS	NON-FINANCIAL INDICATOR				
	LEADERSHIP EFFECTIVENESS LEVEL	**CUSTOMER INVOLVEMENT AND SATISFACTION LEVEL**	**QUALITY MEASUREMENT LEVEL**		**HUMAN RESOURCE MANAGEMENT EFFECTIVENESS LEVEL**	**PROCESS AND SYSTEM APPROACH EFFECTIVENESS MANAGEMENT LEVEL**
	Implementation Percentage: "72.7 – 85.7%" *Profit Margin. *Return On Investment. *Sales Growth. *Shareholder Return. *Divident Payment. *Liquidity. *Overtime.	*Implementation Percentage: "76.8 – 88.7%"* *Respond To Customer Complaint or Request. *On Time Delivery. * Customer Satisfaction Index. * Customer Involvement. * Awards or Recognition Received. *Customer Complaint.	*Implementation Percentage: "80.3 – 86.3%"* * Inprocess Defect Rate. * Scrap or Reject Rate. * Rework Rate. * Warranty Claims. * Supplier Reject Rate. * Customer Return Rate. * Quality Audit.		*Implementation Percentage: "75– 84.5%"* *Employee Training and Retraining Programs. *Employee Productivity. *Employee Involvement in Problem Solving. *Employee Satisfaction Index. *Employee Reward or Recognition Program. *Absenteeism and Sickness Rate. * Staff Turnover. *Employee Suggestion.	*Implementation Percentage:" 75– 87.5 %"* * Set-upTime. * Cycle Time. *5S Audit. *Inventory Turnover Time. *Lead Time. *Overall Equipment Efficiency. *Operating Consumables. *Supplier On-Time Delivery *Time to Break Even on New Development. *Autonomous Maintenance Practice. * Value Stream Mapping. *Manufacturing Flexibility. * Teamwork Groups. * Suggestion Made To Supplier.
STEP III		*Implementation Percentage: "75.7 – 78%"* Financial Benefits. Supplier Improvements Programs.		*Implementation Percentage: "78 – 78.5%"* Open Access Information, Knowledge, Operating and Financial Data.	*Implementation Percentage: "76.2%"* Employees Career Plan.	*Implementation Percentage: "75 – 79.8%"* Integrated Logistics Statistical Tool Usage. Jidoka – In- Station Quality. Andon - Visible/Audible Indicators. Problem solving in Preventive Maintenance activities.
STEP II	*Implementation Percentage: "80.3 – 84%"* Non- blaming performance oriented Total Invlvement of Everyone. Reviewed – environmental noncompliance.	*Implementation Percentage:" 81.5 – 84.5%"* Follow-up on customer requirements and customer satisfaction and communicated to all employees. Customers is no.1 priority to all support department.		*Implementation Percentage: "82.2 – 82.7%"* Extensive Application of Data analysis.	*Implementation Percentage:" 80.3 – 84%"* Employee Morale Indicators Appropriate education, skill, training and experience for all staff. Complete training in Lean Manufacturing System to all staff. Reviewed & monitored all training effectiveness. Effective top down communication Employees Authority. Performance Evaluation Merit. Rewarding Employees High Achievement. Company provides health, safety, morale and spiritual needs of employees-physical and recreational facilities and other activities such as counseling, self improvement programs etc.	*Implementation Percentage: "80.3 – 84.5%"* Bills of Materials are accurately catalogued and standard operations are accurately routed, timed and have been value engineered. Process Ownership. All the nonconformance findings from Preventive Maintenance activities are recorded and documented. Effective Material Management. Error-proofing device (poka-yoke). Effective Planned Preventive Maintenance System Changeover Times, Histories and Lot Size.

STEP I	*Implementation Percentage: "85.2 – 89.9%"* Value Stream Mapping (VSM) Activities Financial Cash Flow and Balance Sheet. Reviewed and monitored safety and health issues, lean team progress from VSM activities and improvement recommendation. Customer Representative, Management Representative and Lean Kaizen Leader.	*Implementation Percentage: "86.3 - 89.3%"* Promptly feedback on customer feedback and complaint. Involvement at the earliest stage in development and reviews. Properly represented.	*Implementation Percentage: "81 – 84%"* Mutual Agreement by Stakeholders Employee's Product and Process Knowledge. Robust product and process design. Product Lead Times.	*Implementation Percentage: "85.7%"* Operating data are recorded, collected and used by person in charge.	*Implementation Percentage: "86.3 – 88.2%"* Recorded information on trainings, education and experience. Allocated Training Budget	*Implementation Percentage: "85.2 – 87.5%"* Continuously Process Improvement. 5 Why Analysis . Product Segregation . 5S Practices. Updated Factory Layout Person Machine Separation. Standardized Task. Load-Smoothed to customer pull (pull system). Takt Time Rate Process Flow One Piece Flow.
PRACTICES	**LEADERSHIP** *"87.54%"*	**SUPPLIER, ORGANIZATION AND CUSTOMER** *"82.99%"*	**PRODUCT** *"81.5%"*	**INFORMATION** *"81.43%"*	**HUMAN RESOURCE** *"81.41%"*	**PROCESS** *"80.60%"*

FOUNDATION PRACTICES

Implementation Percentage: "90.5 – 96.5%"

- Set S-M-A-R-T policies and objectives for Quality, Environment and Lean.
- Set vision and mission statement.
- Owned commitment to customer, statutory, regulatory, environment and safety.
- Review company performance status from customer feedback, cost of quality and audit results.
- Everyone in the company must have mind setting that these practices are for gaining LONG TERM BENEFITS.