Strategic Human Resource for Lean Management involving Quality and Operational Performance

1M. Alias, 2A. Wan Ab Aziz, 3S.B. Mohamed, 4Z. Ibrahim, 5M.S. Muda, 6A.N.M. Rose

1Faculty of Manufacturing Engineering Technology, TATI University College, 24000Terengganu, MALAYSIA
2Faculty of Business Management, Universiti Teknologi MARA Terengganu, Malaysia
3Faculty of Design and Engineering Technology, Universiti Sultan Zainal Abidin, Malaysia
4Faculty of Management and Economics, Universiti Malaysia Terengganu, Malaysia
5Faculty of Mechanical Engineering, Universiti Malaysia Pahang

ABSTRACT

The purpose of this study was to investigate the association of strategic human resources for lean management (LM) involving product quality performance and operational performance in Malaysian small and medium size manufacturing industry (SMI). By inference, relationships between strategic human resources management practice, product quality performance and operational performance and associations are analyzed using Pearson’s correlation, cluster analysis and multiple regression analysis. The findings suggest that strategic human resources practice and implementations has significant associations with product quality performance and operational performance. The results of the study will be of particular interest to practicing production managers or top level managers by learning about the factors stimulating the adoption of strategic human resource for LM.

INTRODUCTION

Over the last decades, Malaysian small and medium size manufacturing industry (SMI) companies have embraced a wide variety of management programs to improve product value and enhance business performance. In addition, the increase in competition, globalization and business challenges had caused many Malaysian SMI manufacturing companies to integrate diverse competitive strategies into their operational systems. Due to intense business competition in the global arena, manufacturing companies need to increase their strategic competitiveness. These manufacturing companies can no longer be satisfied with only one traditional competitive advantage which they could have relied on previously. At present they have to create multiple possible niches to become more competitive and productive. An area that the manufacturing companies can focus on is the enhancement of their operational systems to optimize their returns. Interestingly, several researchers have suggested that the understanding and practicing of Lean management (LM) is an essential prerequisite for staying competitive in the era of globalization and enhancing profitability (Liker, 2004; Srinivasan, 2004; Shah and Ward, 2007; Rose, A.N.M. et al., 2013), citing an increasing number of publications on operational management literatures, are now focused on how companies should integrate their activities with customers and suppliers, and how LM practices should be included in company strategy. Many organizations have begun to recognize that LM is the key to building a sustainable competitive edge for their products and services in an increasingly competitive modern marketplace (Berry et al., 2003). Lean Management (LM) is one of the most popular management processes to impact upon business and operational concepts during the 1990s. The problems relevant to the concept of LM include (1) the lack of research on what it means to practice LM, (2) how to implement a LM system program, and (3) how to measure the performance of a lean management.

The strategic of human resource management identifies optimum practices that can ease lean manufacturing process alignment and integration. Several researchers suggest that effective LM practice has a direct impact on the overall operational performance of an organization (Berry et al., 2003). In fact, LM practice is expected to increase and improve the overall competitive position (Horacio and Forrester, 2002; Kilpatrick, 2003; Cua et al., 2001; Rose, A.N.M. et al. 2013) and points to the ability to attain a high level of performance; companies need to integrate their bundle of management practices into their operations. Yet very few studies have examined empirically the role of human resource management within the LM manufacturing process, as well as the linkage to a firm’s performance.
This paper will review the literature on lean management as well as human resource factors. A model will then be determined for analyzing these two key variables and their linkage to a firm’s product quality and operational performance.

**Literature Review:**

Lean management is a thought process and a philosophy, not a tool, used to look at a business whether it is engaged in manufacturing, a service or any other activity, involving a supplier and a customer relationship, with the aim of eliminating non-value added tasks (Womack et al., 1990). The principles of lean production include teamwork, communication, efficient use of resources and continuous improvement (Kaizen). The conceptual application in reality originated outside of the manufacturing environments. The objective of lean production is for organising and managing product development, operations, suppliers, and customer relations that requires less human effort, less space, less capital, less material and less time to make products with fewer defects to precise customer desires, compared with the previous system of mass production (Marchwinski and Shook, 2004; Slack et al., 2001). Ohno (1988) and Womack and Jones (2003) both searched for ways to reduce lead time by eliminating waste where “Lean” is synonymous with the term “Toyota Production System”.

Lean management is not restricted to the actions that take place in the manufacturing function of a company, rather it relates to activities range from product development, procurement and manufacturing to product distribution. Together these areas combine to create the lean enterprise. The ultimate goal of implementing lean production involves a customer-centric organization in order to improve productivity, enhance quality, shorten lead times, reduce costs and so on. These are factors representing the performance of a lean production system. The determinants of a lean production system are the actions taken, the principles implemented and the changes made to the organization to achieve the desired performance (Karlsson and Ahlstrom, 1996).

There are multiple ways to combine the individual practices to represent the multi-dimensional nature of lean manufacturing. In combining these practices, the researcher has to address both the technique and the execution of improving the manufacturing process. The dominant method in operational management literature has been to use exploratory or confirmatory factor analysis to combine individual practices in a multiplicative function to form orthogonal and unidimensional factors (Flynn et al., 1995; Cua et al., 2001; Shah and Goldstein, 2006). A review of research from organization theory, and labour and human resource management, shows less reliance on factor analysis and offers multiple ways for combining individual practices and creating an index. One such method is the additive index used by Osterman (1994) and MacDuffie (1995) in developing “bundles” of interrelated human-resource management practices.

Many researchers argue that a lean management system is an integrated manufacturing system requiring implementation of a diverse set of manufacturing practices (McLachlin 1997; Shah and Ward (2003); Swink et al., 2005). Additionally, they also suggest that synchronized application of these various practices should result in higher operational performance because the practices, although assorted, are corresponding and inter-related to each other. Therefore, the problem solving capabilities that arise as a result of empowered work teams can help make better performance by identifying root causes of quality problems, by helping to improve workflow, and by improving equipment efficiency. Hence, we hypothesize that simultaneous application of multiple aspects of lean manufacturing will have a significant positive impact on operational performance.

The ideal objective with the continuous improvement work is to achieve perfection, which means that every product, part or process should not be defective at any point in time (Karlsson and Ahlstrom, 1996). The employees must understand that it is their responsibility to improve the quality (Forza, 1996), because they are often the ones that know the process best (Fullerton and Wempe, 2009). The shopfloor workers are also the ones that should correct the products when a defect occurs. If they do that they are the ones that know what went wrong and can come up with a solution (Karlsson and Ahlstrom, 1996).

Every gain that the continuous improvement work accomplishes should be visualized in some way (Wallace, 2004). The manager should structure an overall measuring system that measure parameters like; suggestions per employee, number of employees that have adopted quality and control work, and clearly establish any cost-savings and/or benefits derived from suggestions and so on (Sanchez and Perez, 2001; Karlsson and Ahlstrom, 1996).

Businesses of all sorts adopt some form of human resource management. However, the adoptions of specific human resource practices vary among firms. As a good business practice, human resource management incorporates those activities that supply and coordinate the human resources of an organisation. According to Dunn (1985), human resource management is a comprehensive approach to management of people at work and it seeks to achieve integration and coordination with overall planning and other managerial functions. Past conceptual and empirical works generally agreed on the importance of certain human resource practices in the determination of employee and organizational performance irrespective of size, sector and external environment (Harel and Tzafir, 1999).

Drawing on the universalistic or “best practices” approach, past researchers posited that some human resource practices are always better than others and at the same time, recommended that all organizations should adopt these best practices. The proponents of the universalistic perspective believed that greater use of the best
human resource practices will help organizations to increase their performances. The studies by Shah and Goldstein (2006) and Cua et al., (2001) suggested that good strategic human resource practices have significant impact on the business performance of organizations. According to the findings of these studies, the organizations that focused on human resource practices such as Committed leadership, Strategic Planning, Cross-Functional Training, Employee Involvement and Information and feedback practices produced not only the highest level of productivity but also enhanced their business performance.

Employee involvement is a process for empowering members of an organization to make decisions and to solve problems appropriate to their levels in the organization (Cua et al., 2001). This can be achieved by making the employee part of the organization, which is essential to the success of the organization. Employees who believe they are important will be motivated to ensure that their efforts are consistent to the organizational goals.

Training and education provide the necessary skills and knowledge- the ability to make it happen (Shah and Goldstein, 2006). It is an investment that must be made. According to Dahlgaard et al. (1998), Japan, Estonia and India are reported to allocate between 65 and 80 hours per year in training and education activities for every employee. They believe that worker’s satisfaction, motivation and ability to act as a constructive part in the process of continuous improvement depend very much on education and training.

In the lean environment, everyone is required to gain additional capabilities to improve the process. Hence, a comprehensive training programme is necessary and must be institutionalized within the entire organization. Training in lean philosophy, guiding principles and tools and techniques is never ending. Personal and team interaction skills must be continually refined. This training should be given, only as it is needed, to the people who will use it immediately. It should start with specific training for management. Once management has the skills to lead the lean process, the rest of the organization should be trained to ensure a systematic, integrated, consistent organization-wide effort (Biazzo and Panizzolo, 2000; MacDuffie, J.P., (1995).

Specific job skills training must be provided and constantly updated to reflect the improved processes. All too often management exhorts employees to do things right the first time, to be actively involved in improvement teams, and to participate in the never-ending search for excellence. Yet, at the same time, management fails to provide the necessary training, knowledge, quality tools, and empowerment for effective self-management. Hence, all training should be geared to specific, clearly defined objectives, must be performed as close as possible to the time it is required and is reinforced to ensure the desired results.

Model Formulation:

This study explores relationships among the strategic of human resource factors (HR) in lean management (LM), product quality performance and operational performance within the context of the Malaysian small and medium size manufacturing industry. The proposed model, as depicted in figure 1, is based on three main constructs (i) Strategic human resources factors on LM; (ii) product quality performance (PQP); and (iii) Operational performance (OP). Essentially, human resource factor in LM represents a manager’s assessment of the overall level of human resource practices in lean management (Cua et al., 2001; Samson and Terziovski, 1999; Biazzo and Panizzolo, 2000). In addition to improving levels of performance (Sanchez and Perez, 2001; Wallace, 2004), human resource in LM has also been shown to provide benefits in terms of products quality performance, cost, flexibility, delivery. The model proposed here uses human resources dimensions derived from studies and documented references. Five dimensions of human resources in LM identified from several sources (Saraph et al., 1989; Flynn et al., 1994; Powell, 1995; Ahire et al., 1996; Black and Porter, 1996; Samson and Terziovski, 1999, MacDuffie, 1995) were considered to relate to distinctive features of human resource factors in LM and are, therefore, incorporated in the present conceptual model. These human resource dimensions include: Committed leadership, Strategic Planning, Cross-Functional Training, Employee Involvement and Information and feedback.

Meanwhile, product quality performance are based on four pertinent product quality dimensions namely product conformance (conform), product performance (perform), product reliability (reliable) and product durability (durability) (Kotler, 1994; McGaughey, 1991; Pascucci, 1998). Lastly operational performances in this study are derived from three important operational performance measurements consisting of cost, delivery and flexibility.

Methodology:

This section describes the instrumentation, model formulation and sampling method utilized in this study. Validity and reliability of the constructs are also discussed.

Sampling Method:

In this study, a small and medium-sized enterprise (SME) was defined as a firm with an annual turnover of less than RM25 million and as one which is actively managed by its owner/s. Based on this criteria, 500 SMIs were selected from the listing obtained from the Federation of Malaysian Manufacturers Directory (FMM). The samples (companies) were chosen from the small and medium size manufacturing (SMI) companies in Malaysia.
The sampling frame was based on the Federation of Malaysian Manufacturers Directory 2008 (FMM). The manufacturing sector was chosen for the study because this industry has emerged as one of the leading sectors in Malaysia in terms of adopting new manufacturing programs and human resource factors in LM. Moreover, these efforts are driven primarily by competitive rather than regulatory forces. Three hundred and sixty two responses were received and were analyzed using the SPSS package version 17.0.

Using a structured survey questionnaire, the data were collected through personal survey interviews with the quality and production managers of the 362 selected firms (72.4.9%), out of 500 SMIs identified. The primary purpose of the research was to measure quality managers’ or production managers’ perception of Human resource factor in LM and to gain insight into the benefits of implementing and sustainability lean management practices system in the small and medium manufacturing industry. The aim is to understand and identify determinants of Human resource factors in LM that can enhance product quality performance and operational performance result (flexibility, delivery and cost). Face to face interviews with production managers were carried out to cross check the information collected, to validate the outcome of analysis and developed an understanding of the practical aspects of human resource factors and adoption, given the scarcity of LM studies in Malaysia that have specifically assessed associations between human resource factors and performance.

Validity and Reliability of the Constructs:

The instrument used in this study was a structured survey questionnaire. The questionnaire consisted of two main parts. The first part comprised several constructs measuring human resource factors. To enable respondents to indicate their answers, a five-point Likert interval scales was used for measuring the Human resource factors determinants. The human resource factor determinants in this study were adopted from prominent studies (Shah & Goldstein, 2006; Cua et al., 2001; Saraph et al., 1989; Flynn et al., 1994; Powell, 1995; Ahire et al., 1996; Black and Porter, 1996; Samson and Terziovski, 1999, MacDuffie, 1995). The strategic human resource factors construct was implemented based upon five different kinds of activities that manufacturers commonly use to integrate their operations with human resources namely 1) Committed leadership, 2) Strategic Planning, 3) Cross-Functional Training, 4) Employee Involvement and 5) Information and feedback. In the initial data analysis, the five human resource factor determinants were subjected to validity and reliability tests. By creating the final scales, the data was verified for normality and outliers.

The second part of the questionnaire comprised several performance measurements. Several studies have identified performance improvement constructs that are commonly associated with human resource factors in LM (Sanchez and Perez, 2001; Shah and Goldstein, 2006; Shah and Ward, 2007) and classify performance measures into four groups: quality, cost, delivery and flexibility. This study divided the firm’s performance into two types: 1) Product Quality Performance and 2) Operational Performance. Similarly, the dependent variables namely product quality performance and operational performance also used a five-point interval scale, representing a range of agreement on statements whether over the past three years these performances are high relative to competitors after implementing human resource factors in LM practices.

Validity and reliability tests were conducted to select and assess the final items of the independent constructs that would be used for statistical testing (Refer to Table 1). Content validity represents the sufficiency with which a specific domain of content (construct) was sampled (Nunnally, 1978; Ahire, Golhar and Waller, 1996).
Substance validity is subjective and judgmental but is often based on two standards put further by Nunnally; that the instrument includes a representative set of measures, and whether reasonable methods of scale creation were used (Flynn et al., 1990).

### Hypotheses of the Study:

The researchers believe that human resource determinants have positive influences on the bottom line by improving product quality performance and operational performance. A model is used in this study to analyze the direct relationship effect of strategic human resource factors in LM on performance results. This study intends to investigate whether human resource factors in LM have a significant impact on product quality performance. Therefore, the first hypothesis proposes that implementing effective human resource factors in LM improves operational performance. The second hypothesis states that a human resource factor in LM has a positive relationship effect on operational performance. This study not only tries to investigate whether human resource factors can lead to higher product quality performance but also in turn would result in higher operational performance. Hence, this study tests (third hypothesis) whether there is a direct effect of product quality performance on operational performance. In short, the following hypotheses are postulated:

- **H1**: Human resource factor in LM has a positive relationship effect on product quality performance.
- **H2**: Human resource factor in LM has a positive relationship effect on operational performance.
- **H3**: Product quality performance has a positive relationship effect on operational performance.

In investigating the relationship effect of resource management factors in LM on overall results such as product quality performance and operational performance, it is also pertinent to determine the correlation of each human resource determinant. Additionally, this study also attempts to test the following hypotheses:

- **H1A**: Committed leadership has a positive relationship on human resource management in implementing LM.
- **H1B**: Strategic planning has a positive relationship on human resource management in implementing LM.
- **H1C**: Cross-Functional training has a positive relationship on human resource management in implementing LM.
- **H1D**: Employee involvement has a positive relationship on human resource management in implementing LM.
- **H1E**: Information and feedback has a positive relationship on human resource management in implementing LM.

### RESULTS AND DISCUSSION

The empirical findings are obtained by carrying out parametric data analysis. The parametric analyses include (a) Pearson’s correlations between Human Resource factor (HR) determinants and performance, (b) cluster analysis and Friedman test, and (c) multiple regression analysis.

### Table 1: The finding of the reliability test on strategic of human resource, product quality performance and operational performance scales.

<table>
<thead>
<tr>
<th>Constructs</th>
<th>No. Of Items</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategic of Human Resources</td>
<td>28</td>
<td>3.729</td>
<td>2.933</td>
<td>0.891</td>
</tr>
<tr>
<td>Product Quality Performance</td>
<td>4</td>
<td>3.977</td>
<td>2.969</td>
<td>0.925</td>
</tr>
<tr>
<td>Operational Performance</td>
<td>10</td>
<td>3.756</td>
<td>1.773</td>
<td>0.778</td>
</tr>
</tbody>
</table>

The critical variables of lean management in this study had content validity because an extensive review of the literature was conducted in selecting the measurement items. Divergent or discriminant validity was tested by analyzing bivariate correlations between each of the human resource scales and other variables such as demographic variables and company size. The reliability analysis was conducted by calculating the Cronbach’s alpha for the main construct.

The items that did not significantly contribute to the reliability were eliminated for prudence purpose. The result shows that the Cronbach’s alpha measures for the three constructs exceed the threshold point of 0.70 suggested by Nunnally (1978) and Fornell and Larcker’s (1981). The alpha coefficients for the strategic of human resource determinants, product quality performance and operational performance measures ranges between 0.778 and 0.925 after the alpha maximization process were carried out (table 1). As a result, 42 items were retained for the three constructs.

| Note. **Significant at 1 percent (all t-tests are one-tailed) |

### Table 2: Pearson’s correlation between strategic of human resource factors on LM, product quality performance and operational performance

<table>
<thead>
<tr>
<th>Strategic of Human Resource Factors</th>
<th>Product Quality Performance</th>
<th>Operational Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Committed leadership</td>
<td>0.338**</td>
<td>0.448**</td>
</tr>
<tr>
<td>2 Strategic planning</td>
<td>0.356**</td>
<td>0.422**</td>
</tr>
<tr>
<td>3 Cross-functional training</td>
<td>0.507**</td>
<td>0.587**</td>
</tr>
<tr>
<td>4 Employee involvement</td>
<td>0.517**</td>
<td>0.501**</td>
</tr>
<tr>
<td>5 Information and feedback</td>
<td>0.427**</td>
<td>0.486**</td>
</tr>
</tbody>
</table>

Product quality performance 0.743**
Correlation and Cluster Analysis:

Table 2 reveals Pearson’s correlations between human resource factors in LM practices and product quality performance as well as operational performance. Product quality performance indicator has high correlations with Employee involvement \((r = 0.517)\), Cross-functional training \((r = 0.507)\), Information and feedback \((r = 0.427)\) and followed by Strategic planning \((r = 0.356)\), and Committed leadership \((r = 0.338)\). Operational performance indicator has high correlations with Cross-functional training \((r = 0.587)\), Employee involvement \((r = 0.501)\) and Information and feedback \((r = 0.486)\) and followed by Committed leadership \((r = 0.448)\), and Strategic planning \((r = 0.422)\). For operational performance indicator has high correlation with product quality performance \((r = 0.743)\).

These findings are consistent with several previous studies that proclaimed better organizational transformations as a result of strategic human resource factors in LM initiatives (Cua et al., 2001; Sanchez and Perez, 2001). However the \(r\) values are considered moderate. Therefore, more effort should be carried out by small and medium manufacturing companies in Malaysia to adopt the strategic of human resource in order to improve product quality performance and business performance.

To further explore on the segmentation of SMI manufacturing companies in this study, a cluster analysis was carried out. Since operational performance is a very importance bottom-line outcome, therefore the classification is based on average operational performance clustering. The result (table 3) from cluster analysis statistically segmented the manufacturing companies into two clusters based on operational performance namely “High Operational performance companies” and “Low operational performance companies”.

### Table 3: Rankings of strategic human resource determinants based on operational performance clustering using Friedman’s Rank Test.

<table>
<thead>
<tr>
<th>Strategic Human resource</th>
<th>Friedman’s Test</th>
<th>Rank</th>
<th>Mean</th>
<th>Friedman’s Test</th>
<th>Rank</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Committed leadership</td>
<td>4.23</td>
<td>1</td>
<td>3.897</td>
<td>4.16</td>
<td>1</td>
<td>4.359</td>
</tr>
<tr>
<td>Strategic planning</td>
<td>3.40</td>
<td>2</td>
<td>3.753</td>
<td>4.00</td>
<td>2</td>
<td>4.380</td>
</tr>
<tr>
<td>Cross-functional training</td>
<td>2.56</td>
<td>4</td>
<td>3.482</td>
<td>2.10</td>
<td>5</td>
<td>3.688</td>
</tr>
<tr>
<td>Employee involvement</td>
<td>2.75</td>
<td>3</td>
<td>3.534</td>
<td>2.13</td>
<td>4</td>
<td>3.786</td>
</tr>
<tr>
<td>Information and feedback</td>
<td>2.08</td>
<td>5</td>
<td>3.181</td>
<td>2.61</td>
<td>3</td>
<td>3.851</td>
</tr>
</tbody>
</table>

Note. ***Significant at 1 percent

The first cluster (‘High operational performance companies’) comprise of medium-scaled companies with average employees of more than 50 people. Meanwhile, the second cluster (‘Low operational performance companies’) consists of smaller companies with average employee less than 50. It can be inferred from the findings of the Friedman rank test that higher level of strategic human resource management is more realized in ‘High operational performance companies’ than ‘Low operational performance companies’. This first cluster places high priority on committed leadership, strategic planning, employee involvement, cross-functional training and information and feedback. This result indicates the importance for manufacturing companies not only to develop good strategic planning but also need enhance committed leadership among of all major departments towards encouraging lean management.

Finding of the multiple regression:

The association between human resource factors and performance was further investigated using multiple regression analysis. A model can be view as simultaneous linkages that allow a researcher to determine the relative strength of relationships between variables. Relationship between human resource factors, product quality performance and operational performance are depicted in the multiple regression modelling. Hence, the following hypotheses are postulated:

\(H_0: \) The five independent variables in human resource will significantly explain the variance in product quality performance.

\(H_0: \) The five independent variables in human resource will significantly explain the variance in operational performance.

### Table 4: Result of the multiple regression analysis the five independent variable against product quality performance and operational performance.

<table>
<thead>
<tr>
<th>Predictors</th>
<th>Product quality performance</th>
<th>Operational performance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Beta</td>
<td>F</td>
</tr>
<tr>
<td>Committed leadership</td>
<td>0.227</td>
<td>2.745</td>
</tr>
<tr>
<td>Strategic planning</td>
<td>0.028</td>
<td>0.440</td>
</tr>
<tr>
<td>Cross-functional training</td>
<td>0.130</td>
<td>2.183</td>
</tr>
<tr>
<td>Employee involvement</td>
<td>0.366</td>
<td>5.572</td>
</tr>
<tr>
<td>Information and feedback</td>
<td>0.185</td>
<td>4.591*</td>
</tr>
</tbody>
</table>

\(\text{R}^2 = 0.341\) \(\text{R}^2 = 0.380\)

\(F = 36.78^*\) \(F = 43.595^*\)

\(DF = 5, 356\) \(DF = 5, 356\)

\(P < 0.001\)
As summary of the regression result in table 4, the five variables together significantly explained 34 percent of the variance in product quality performance ($R^2 = 0.341; F = 36.78; p = 0.0001$). The beta values of both employee involvement and information feedback were significant. The five predictor variable together also significantly explained 38 percent of variation in operational performance. This $R^2 = 0.380$ was statistically highly significant, with $F = 43.595$ and $p < 0.0001$. The beta values of both cross-functional training and information feedback were significant. The hypothesis $H_2$ and $H_3$ that the five predictors would significantly explain the variance in product quality performance and operational performance were substantiated. Thus, the general expression in the form of regression equation can be stated as follows:

Product quality performance $= 2.29 + 0.23(\text{Committed leadership}) + 0.03(\text{Strategic planning}) + 0.15(\text{Cross-functional training}) + 0.37(\text{Employee involvement}) + 0.18(\text{Information and feedback})$

Operational performance $= 1.77 + 0.01(\text{Committed leadership}) + 0.02(\text{Strategic planning}) + 0.31(\text{Cross-functional training}) + 0.12(\text{Employee involvement}) + 0.16(\text{Information and feedback})$

The findings demonstrate the importance of human resource factors especially 1) Committed leadership, 2) Strategic planning, 3) Cross-functional training, 4) Employee involvement and 5) Information and feedback, in improving product quality and operational performance in Malaysian small and medium manufacturing industry. Therefore, we have enough evidence to accept the proposition that human resource factors in LM has positive and significant relationship on product quality performance. In addition, product quality performance has a positive and significant relationship on operational performance. The results of regression suggest that human resource factors in LM are able to enhance product quality performance and ultimately improve operational performance.

We can obviously suggest that strategic of human resource can help SMI manufacturing companies improve their product quality performance and in the long run, it is safe to state that human resource factors within LM can ultimately enhance operational performance of the small and medium size manufacturing industry in Malaysia.

Conclusions:
1. The organizational factor; human resource practices was examined to determine their relationships with the business performance of the 362 small and medium-sized industries (SMIs). The correlation analyses of the data gathered by the study indicate some statistically significant relationships between human resource practices and product quality performance and operation performance of the 362 firms interviewed.
2. The positive relationships between human resource practices and product quality and operational performance suggest that to be effective, SMIs should strive to adopt those practices that are positively associated with business performance.
3. The results indicate that SMIs should emphasize better attention to the continuous improvement of the human resource factors within the LM process, as well as management support in sustainability of Lean Management programs.

REFERENCES


Marchwinski, C., J. Shook. 2003. Lean lexicon – a graphical glossary for lean Thinkers, Version 1.0, Brookline, Massachusetts, USA.


