

Measuring the Level of Lean Readiness of the Hong Kong's Manufacturing Industry

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ABSTRACT

Increasingly competitive business environments have forced manufacturing organisations to continuously seek improvements in their production processes as an alternative to achieve operational excellence. Lean manufacturing principles and techniques based on the elimination waste have been widely used by manufacturing organisations around the world to drive such improvements. The purpose of this paper is to present an empirical study that evaluates the readiness level of the Hong Kong's manufacturing industry to provide a foundation for the successful implementation and/or sustainment of lean practices. To conduct this study, the paper adapts an assessment framework developed by Al-Najem et al. [16]. Thus, the lean readiness assessment is based on six quality practices (i.e. planning & control; processes; human resources; customer relations; supplier relations; and top management & leadership) related to lean manufacturing. One research question and three hypotheses were formulated and tested using a combination of inferential statistics (i.e. Levene's test and t-test) and descriptive statistics. Data were collected through a survey questionnaire responded by 9 manufacturing organisations with operations in Hong Kong. The findings suggest that the Hong Kong's manufacturing organisations surveyed do not currently have a well-developed foundation to implement or sustain lean manufacturing. In particular, these organisations present important opportunities to further develop some quality practices such as processes, planning & control, customer relations, supplier relations, human resources, and top management & leadership. The improvement of these quality practices will ensure, according to Al-Najem et al.'s [16] framework, a more effective implementation and sustainment of lean manufacturing in their operations.

1. INTRODUCTION

In the last decades, lean manufacturing (LM) has been widely accepted and adopted by the manufacturing industry worldwide [1,2,3]. One of the reasons is that the benefits gained from the implementation of LM can be both qualitative and quantitative [4]. On one hand, Abdulmalek and Rajopal [4] suggest that the use of LM can improve employee's morale, communication and job satisfaction. On the other hand, quantitative benefits from implementing LM include reduction in lead-time, cycle time, inventory, work-in-process, among others [4]. Another possible explanation for this worldwide trend is that the positive results obtained from LM can be extended to the aspect of quality improvement, better overall financial and operational performance, and control [5]. Ting [6] describes an industrial case where a company successfully implemented LM with the use of a Kanban system during a United States-China joint venture. As a result, the company reduced its inventory cost by \$750,000 US dollars and increased its productivity from 20 percent to 120 percent.

In China, however, the adoption of lean in the manufacturing industry seems to be an uncommon practice [6,7,8]. One of the reasons for this may be the authoritarian leadership and management styles still practiced by many Chinese companies, where staff performance and behaviour is strictly monitored [8]. This managerial style opposes the LM philosophy of utilising team setting and a highly motivated work force [2]. Thus, even though some Chinese firms are able to launch LM, enormous improvements are still needed in various areas to effectively implement and sustain this philosophy in this country [7].

On the contrary, the situation in the Hong Kong's manufacturing industry (HKMI) seems to be different from that of China. According to the Hong Kong Trade Development Council [9,10,11,12], products' quality is one of the most important aspects addressed by manufacturers in this country. In addition, Hong Kong manufacturing firms tend to obtain the ISO 9000 accreditation to facilitate their quality practices and improve

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the management and control of their operations [13]. Yeung and Armstrong [14] comment that Total Quality Management (TQM) is also a method widely adopted by Hong Kong companies to enhance their organisational performance and sustain their competitiveness in the global market. Additionally, some of the Hong Kong's manufacturing sectors also promote the adoption of LM. For example, referring to the HKTDC's research [9], the Hong Kong Auto Parts Industry has adopted the Just-in-Time (JIT) system, which is a major component of LM [15], to reduce the cost of logistic operations and gain a better access to the targeted markets. Yet, research focused on the implementation and use of LM in the HKMI is limited. The objective of this paper is therefore to assess the level of lean readiness (LR) of the HKMI to determine whether this industrial sector in Hong Kong is able to effectively implement and/or sustain LM.

To determine the level of LR, an assessment framework developed by Al-Najem et al. [16] was employed in this paper. A number of assessment tools have been developed by researchers to measure LR, see Garza-Reyes et al. [17]. However, since Al-Najem et al.'s [16] framework evaluates the level of LR based on quality practices related to LM (i.e. processes; planning & control; human resources; top management & leadership; customer relations; and supplier relations), this framework was selected as the most appropriate for this study. Therefore, besides providing an insight into the level of LR of the HKMI, this framework was also able to provide an understanding regarding the quality practices of the HKMI.

2. LITERATURE REVIEW

In recent years, there has been a limited number of manufacturing plants operating in Hong Kong, since most of them have now moved to South China [13]. However, Hong Kong's producer and professional services, which include engineering and related technical services [18], are still one of the pillars of the Hong Kong's economy [19]. Also, it is believed that manufacturing will continue to be the mainstay of the economy in Hong Kong and the Asia Pacific region [7]. HKMI is nowadays a mature industry, which suggests that Hong Kong has an important role in importing new ideas, concepts, systems, methods, and knowledge to China [20]. Hence, it can be deduced that if Hong Kong can successfully implement LM, such production approach should be able to also positively influence the Chinese manufacturing sector.

2.1. RELATIONSHIP BETWEEN HKMI AND LEAN MANUFACTURING

Although some of the sectors in the HKMI promote the use LM [9,10], no research has been conducted to evaluate the level of LR of this industry. In this line, a number of studies have focused on investigating how LM affects the performance and operations of Chinese organisations [6,7,8], whereas others have evaluated quality management practices, such as TQM and Six Sigma, in Hong Kong [13,14,21]. The study of the LR level of the HKMI can be important since the success of the lean adoption depends on how well an organisation started the implementation plan [5], and it can be challenging for a firm to transform its traditional system into LM [22]. For instance, some companies may have difficulties in capturing the reality, which is useful for conducting a Value Stream Mapping (VSM) analysis, during the implementation or planning of LM [23]. Also, the benefits resulted from the implementation of LM would only be observed after companies put LM into practice and use it regularly in the long-term [24]. Thus, long-term commitment is crucial for a firm to implement LM. So, with the potential challenges to effectively launch or maintain LM within an organisation, there is a need to evaluate firms' practices in order to understand if these are supportive of LM, or whether these need to be improved or developed further to effectively implement and/or sustain LM. In this sense, a preparedness (i.e. readiness) assessment is needed to support LM [16]. Considering this, the following research question was formulated:

RQ1: Does the HKMI have a good foundation to implement or sustain LM?

In this paper, the LR level is measured in terms of quality practices instead of "leanness". The difference between the two terms is that "leanness" is an indicator to measure the extent of continuous improvement of the combined efficiency-effectiveness attributes [25], while quality practices are the practices supporting both the implementation of LM and its practices afterwards [16,17]. The reason for adopting quality practices to measure the LR level is that these practices are complementary of lean systems [3,16,17]. Hence, this should be able to provide us with insights beyond the level of LR of our targeted industry (i.e. HKMI), and gives us a better understanding on how quality practices affect LR.

2.2. LEVEL OF LEAN READINESS AND FIRM SIZE RELATIONSHIP BETWEEN HKMI AND LEAN MANUFACTURING

Although there is a vast amount of successful cases related to the implementation of LM in large organisations worldwide [2,26,27], the number of studies related to lean implementation in Small and Medium Size Enterprises (SMEs) is low [28]. In such case, it is necessary to investigate how firm size affects the quality practices of the HKMI, in order to help bridging the gap of having limited researches on the relationship between firm size and quality practices. Achanga et al. [28] suggest that SMEs may face difficulties in implementing LM because of the lack of bargaining power, financial support and human resources. Also, large firms are more suitable than SMEs to implement LM, as the second may lack resources and capabilities to launch or sustain LM [13].

However, Ghobadian and Gallear [29] claim that both large firms and SMEs are applicable to perform the same quality practices, which suggests that firm size should not be a critical factor affecting the implementation of LM. Similarly, Karlsson and Åhlström [30] concluded that LM principles are applicable to SMEs, and that they can even implement LM as effectively as large firms. Hence, considering the literature review above, the first hypothesis (*H1*) of this paper was formulated as follows:

H1: There is a significant difference between SMEs and large companies in terms of their quality practices in the HKMI

2.3. LEVEL OF LEAN READINESS AND ISO 9000 CERTIFICATION

In the HKMI, companies from different manufacturing sectors are mostly recognised with the ISO9000 certification [13], which proves that these firms have established their quality management system (QMS) in accordance to the requirements specified by the ISO standard. The aim of establishing a QMS is to demonstrate that firms have the ability to provide products that fulfil customer requirements [31]. The advantages of obtaining an ISO9000 certification is that the firm can benefit from reducing customers' complaints, errors, and faulty products as well as reducing costs. Also, following the ISO standard, firms can improve their consistency and increase quality awareness throughout the organisation [32]. This may suggest that ISO accredited firms could have better quality practices than non-ISO accredited companies. This may subsequently lead to a different level of LR.

However, Carr et al. [33] concluded, in their research, that there are no significant differences between ISO and non-ISO companies, in terms of quality management practices, except in the areas of process improvement and quality measurement. Thus, due to the popularity of ISO9000 certification among the HKMI and its potential effects, which may lead to different levels of LR between ISO and non-ISO firms, the second hypothesis (*H2*) has been formulated as follows:

H2: There is a significant difference in quality practices used by ISO 9000 firms compared to non-ISO9000 firms in the HKMI

2.4. LEVEL OF LEAN READINESS AND SIX SIGMA

Six Sigma is a business improvement approach developed by the Motorola in the mid-1980s. Its objective is to identify and eliminate the causes of defects in processes and systems [34]. In recent years, some researchers and scholars have advocated the correlation between LM and Six Sigma, which suggests organisations to integrate the two approaches into one single system. Hence, the concept of Lean Six Sigma (LSS) emerged in the last decade [35]. The benefit of implementing LSS is that LM and Six Sigma, in fact, complement each other by overcoming their inherent and natural limitations. LM focuses on qualitative characteristics, while Six Sigma addresses the quantitative aspect. Hence, LSS is believed to be an effective approach to integrate the human and process aspects in a process improvement programme [35]. In this line, it can be deduced that Six Sigma should be an effective contributor to improve an organisation's LR level and overall performance. This suggests that companies that adopt Six Sigma have better quality practices.

However, Bendell [36] argues that LSS is just a philosophy, which is hard to implement in reality as the concepts of LM and Six Sigma are incompatible when dealing with resources and wastes. Thus, it can be implied that companies which adopt Six Sigma are not necessarily effective at implementing and sustaining LM. Thus, the use of Six Sigma may not contribute to the development and/or adoption of effective quality practices, which may result in a low level of LR. These contradictory views on LM and Six Sigma prompted the formulation of a third hypothesis (*H3*) as follows:

H3: There is a significant difference in quality practices between companies adopting Six Sigma and companies not adopting Six Sigma in the HKMI

3. RESEARCH METHODOLOGY

With the aim of answering *RQ1* and testing *H1*, *H2* and *H3*, a quantitative approach was adopted. Thus, a survey questionnaire, based on Al-Najem's et al. [16] framework, was developed to collect data using the Google Online Form. The survey contained two sections, with 62 questions in total. Section 1 consisted of a combination of 10 open and closed questions, which were used to understand the background of the companies and individual respondents. In particular, Section 1 included questions related to firm's size, ISO9000 certification status, etc. Section 2 of the questionnaire consisted of 52 questions, which were divided into six constructs that included: (1) processes; (2) planning & control; (3) human resources; (4) top management & leadership; (5) customer relations; and (6) supplier relations. The objective of Section 2 was to collect information related to the quality practices of the organisations studied. It consisted of the opinion of the respondents, which intended to provide information regarding their feelings towards the quality practices of their companies as well as behavioural information. The second intended to understand the existing quality

practices of the respondents' companies. Section 2 was designed with the use of a five-item Likert scale, from where quantitative and numerical results were generated.

In order to ensure that the survey results were reliable and valid, a small pilot study was conducted to validate the questionnaire. In the study, three academic experts, from the University of Derby and City University of Hong Kong, and three industrial specialists, from the Hong Kong Trade Development Council Online Trading Platform, were invited to participate. Based on their expert opinion, the survey questionnaire was modified, by amending the questions and/or their wording, to improve its unambiguity and robustness.

The questionnaire was distributed via electronic mail to all the members registered in the Hong Kong Trade and Development Council Online Trading Platform and that were classified under the category of manufacturers. In general, 9 responses were obtained. The sample size is relatively small when compared to other similar studies in the fields of Quality Engineering and Quality Management (e.g. [7,13,17]). However, since similar researches in the HKMI have not been conducted, it was considered that this relatively small sample size would still contribute as an initial diagnosis to understand the "lean state" of the HKMI.

4. STUDY RESULTS AND DISCUSSION

4.1. ORGANISATIONS AND SUBJECT'S PROFILE

Figure 1 illustrates the profile of the organisations and subjects from the HKMI that participated in the survey. Their profile include: (a) firm size, (b) proportion of large and SMEs, (c) ISO certification status, (d) whether Six Sigma had been adopted, and (e) whether the respondents had ever heard about the term "lean manufacturing". The respondents were mainly the company's Managers (44%), Directors (11%) and Engineers (45%).

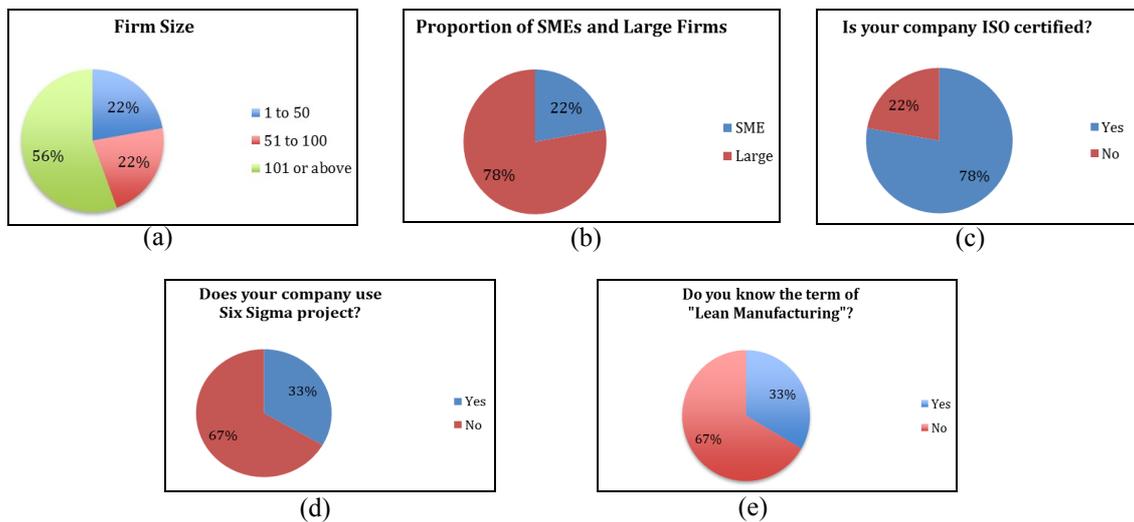


Figure 1: Overview of profiles of organisations and subjects

4.2. RESEARCH QUESTIONS AND HYPOTHESES – RESULTS AND DISCUSSIONS

RQ1: Does the HKMI have a good foundation to implement or sustain LM?

In accordance with the frameworks proposed by Al-Najem et al. [16] and Nordin et al. [22], if the mean score of the six quality constructs is ≥ 4 , a company/industry is regarded as to be ready for the implementation or sustainment of LM. Figure 2 presents the overall average for the HKMI and for every one of the constructs. Figure 2 shows that top management & leadership is the construct with the lowest (3.49) score, whereas customer relations obtained the highest score (3.80). Then, referring to all the 9 responses and 6 constructs, the mean score was computed as 3.5820, which is far below from the score of 4. Thus, the results suggest that the surveyed companies are not able to effectively implement or sustain lean manufacturing practices. Although the limited number of responses does not allow the generalisation of findings, the results provide some indication that the HKMI may not have an adequate and strong foundation to effectively implement or sustain LM.

Despite the customer relations construct represented the highest score, it is still lower than 4, which implies that the companies surveyed should put more effort in building up a better relationship with their customers. This will not only help them to support the effective implementation or sustainment of LM practices but also to gain a competitive advantage, and obtain a lower product development cost. In terms of the construct with the lowest score (i.e. top management & leadership), the importance of top management commitment and involvement has been widely emphasised as a key driving factor for the successful implementation of LM

[16,17]. Thus, according to the results of this study, the Hong Kong manufacturing companies surveyed will most probably expect a low level of commitment from their managers and leaders when trying to implement LM. This can be considered a key barrier for the HKMI to overcome. The rest of the constructs (i.e. human resources, supplier relations, planning & control, and processes) also scored below 4, indicating that the companies surveyed need also to formulate and implement strategies to improve their performance in these areas; otherwise they will struggle to implement and/or sustain LM practices.

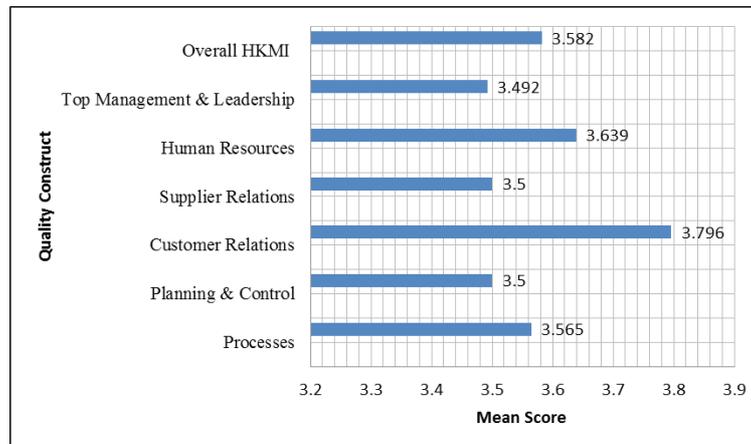


Figure 2: Mean scores for the HKMI and quality constructs

H1: There is a significant difference between SMEs and large companies in terms of their quality practices in the HKMI

By comparing the mean scores obtained by the two SMEs (22%) and seven large firms (78%), it is possible to observe that large organisations obtained higher mean scores in all of the six constructs. In large organisations, processes was the construct that obtained the largest score while supplier relations was the lowest. In the case of the SMEs, processes also had the highest score, whereas planning & control represented the lowest score. In general, the differences between the mean scores of large firms and SMEs were found to be relatively small (i.e. $-1 \leq \mu_{diff} \leq 1$), suggesting the lack of a significant difference.

To verify the results obtained, independent sample t-test and Levene's tests were also conducted. The hypotheses were formulated as follow: H_0 : There is a significant difference between SMEs and large firms in terms of their quality practices in the HKMI (i.e. $\mu_1 = \mu_2$; $\sigma_1 = \sigma_2$) and H_a : There is no significant difference between SMEs and large firms in terms of their quality practices in the HKMI (i.e. $\mu_1 \neq \mu_2$; $\sigma_1 \neq \sigma_2$). At a significant level of 0.05 (i.e. $\alpha = 0.05$), the result from the t-test showed that the p -values in all of the six constructs were greater than the level of significance. This meant that H_0 was not rejected. In addition, with the same level of significant (i.e. $\alpha = 0.05$) for the Levene's test, the result showed that the p -values in all of the six constructs were also higher than the level of significance. Thus, there was not sufficient evidence to reject H_0 for any of the six constructs. In summary, the statistical tests revealed that no difference existed between SMEs and large firms in terms of their quality practices. This suggests that firm size in the HKMI does not affect the company's level of LR. As a consequence $H1$ was rejected.

The results of this study are contradictory with the findings from previous studies [27,37,38]. These previous studies have suggested a significant difference between SMEs and large firms in terms of quality and lean practices, which were mainly attributed to the fact that SMEs do not have enough resources and capital to support lean activities. The contradictory results may come from the fact that, in recent years, the Hong Kong government has launched several funding and loan schemes to support local SMEs, namely the SME Loan Guarantee Scheme and SME Development Fund. Hence, it is believed that SMEs in Hong Kong are now wealthier and hence more capable to support their development, including the implementation of LM. Additionally, since the strategic alliances relationship between China and Hong Kong have been strengthened in recent years, and Hong Kong manufacturers have engaged more in value-added manufacturing support, it is possible that SMEs in Hong Kong are now more well-equipped than before. As a result, the difference in quality practices between SMEs and large firms is almost non-existent.

H2: There is a significant difference in quality practices used by ISO 9000 firms compared to non-ISO9000 firms in the HKMI

Referring to the ISO certification status, seven companies (78%) were ISO certified while two (22%) were not. In view of the ISO certified companies, the highest score was in the construct of customer relations (3.76), whereas supplier relations was scored the lowest (3.464). On the other hand, the non-ISO certified companies obtained the highest score in the category of customer relations (3.92) and the lowest in planning & control

(3.25). In general, the mean difference of each construct between the ISO accredited companies and the non-ISO accredited organisations is relatively small (i.e. $-1 \leq \mu_{\text{diff}} \leq 1$), suggesting the lack of a significant difference.

Similarly as with *H1*, to verify the result, independent sample t-test and Levene's tests were carried out. The hypotheses to conduct these tests were set as follow: H_0 : *There is a significant difference between ISO 9000 firms and non-ISO 9000 firms in terms of their quality practices in the HKMI (i.e. $\mu_1 = \mu_2; \sigma_1 = \sigma_2$)* and H_a : *There is no significant difference between ISO 9000 firms and non-ISO 9000 firms in terms of their quality practices in the HKMI (i.e. $\mu_1 \neq \mu_2; \sigma_1 \neq \sigma_2$)*. Considering a level of significance of 0.05 (i.e. $\alpha = 0.05$), the *p*-values of all the six constructs obtained from the t-test were greater than the level of significance. For this reason, there was no sufficient evidence to reject H_0 . Moreover, in view of the results from the Levene's test, since all the *p*-values from the six constructs were also greater than the level of significance (i.e. $\alpha = 0.05$), H_0 was not rejected. Overall, the statistical t-test and Levene's test reveal no significant difference between the ISO accredited firms and non-ISO accredited firms in terms of the level of LR. This suggests that the ISO certification status in the HKMI does not affect the company's level of LR. For this reason, *H2* was rejected.

This finding opposes some previous studies. For example, in Karthi et al.'s [39] research, they found that Lean-Six Sigma can be further improved with the use of ISO 9001. Thus, and according to them, obtaining the ISO 9001 certification should help organisations to increase their quality practices as well as their level of LR. With this in mind, Karthi et al. [40] proposed an integrated model, which combines Lean-Six Sigma and ISO 9001. Karthi et al. [40] claim that the model is useful in facilitating an organisation's Lean-Six Sigma deployment by shortening the implementation time and reducing the resources needed for this. Thus, these previous studies suggest that there should be a significant difference between ISO firms and non-ISO firms. One of the possible reasons for having contradictory results may be attributed to the fact that many ISO accredited firms in Hong Kong fail to maintain their quality practices, even when they have adopted ISO. For example, Chin et al. [41] mention that around 10 percent of the ISO accredited companies in Hong Kong does not pass the ISO surveillance audit. In this sense, although manufacturers in Hong Kong are keen in implementing ISO [13], doing this may not positively influence the implementation of LM if they are unable to sustain their quality practices suggested by ISO standards.

H3: There is a significant difference in quality practices between companies adopting Six Sigma and companies not adopting Six Sigma in the HKMI

Among the surveyed companies, three (33%) had adopted Six Sigma while the remaining six (67%) organisations had not. Within the companies that had implemented Six Sigma, top management & leadership obtained the highest score (4.10), whereas process scored as the lowest (3.42) construct. On the other hand, within the companies that had not adopted Six Sigma, the highest assessment category was that of customer relations (3.75) and the lowest supplier relations (3.17). Overall, the mean difference of each construct between those companies that had adopted Six Sigma and those that had not was relatively small (i.e. $-1 \leq \mu_{\text{diff}} \leq 1$), suggesting the lack of a significant difference.

Similarly as with *H1* and *H2*, to verify this result, independent sample t-test and Levene's tests were conducted. For this, two hypotheses were formulated, namely: H_0 : *There is a significant difference in quality practices between companies adopting Six Sigma and companies not adopting Six Sigma (i.e. $\mu_1 = \mu_2; \sigma_1 = \sigma_2$)* and H_a : *There is no significant difference in quality practices between companies adopting Six Sigma and companies not adopting Six Sigma (i.e. $\mu_1 \neq \mu_2; \sigma_1 \neq \sigma_2$)*. Considering a level of significance of 0.05 (i.e. $\alpha = 0.05$), the *p*-values of all the six constructs obtained from the t-test were greater than $\alpha = 0.05$. Hence, there was no sufficient evidence to reject H_0 . Furthermore, in terms of the results from the Levene's test, since all the *p*-values from the six constructs were also greater than the level of significance (i.e. $\alpha = 0.05$), H_0 was not rejected. In general, the statistical t-test and Levene's test revealed no significant difference, in terms of quality practices, between companies that had adopted Six Sigma and companies that had not. As a result, this indicates that the use of Six Sigma in the HKMI does not affect the company's level of LR. *H3* was therefore rejected.

The results in this research contradict those of previous researches [35, 42]. These researches recognise that Six Sigma and LM can complement each other, since there is a number of similarities between the two methodologies. The reason of having this discrepancy may be attributed from the fact that ISO firms in the HKMI fail to deal with some aspects of Six Sigma, e.g. correctly identifying the Critical-to-Quality characteristics, Voice-of-Customers, etc. [43]. Also, companies in the HKMI may lack finance resources, and long-term strategic vision to support Six Sigma activities [44]. As a result, the use of Six Sigma was found not to necessarily contribute in improving quality practices. Moreover, it may actually be difficult for Hong Kong manufactures to adopt Lean and Six Sigma at the same time. In Albliwi et al.'s research [45], 34 critical failure factors in adopting Lean-Six Sigma are defined, and it is suggested that companies have to be aware of their readiness before using Lean-Six Sigma. Referring to the result obtained from *RQ1* in this research, since the companies in HKMI do not have a good foundation to implement or sustain LM, it is possible that their quality practices may not even be ready and supportive to the use of Six Sigma.

6. CONCLUSIONS

This paper presents a study that investigates the level of LR, through quality practices, of the HKMI. Overall, the results indicate that the manufacturing industry of Hong Kong is not ready to effectively implement and/or sustain LM. Thus, it has important improvement areas in relation to processes, planning & control, customer relations, supplier relations, human resources, and top management & leadership.

In terms of the practical implications, this research contributes by helping the HKMI to better understand its current quality practices. This may allow them to further enhance and develop the basis to successfully implement or sustain LM. In such a way, the competitive edge of the companies could be strengthened [1,2] through enjoying both the qualitative and quantitative benefits resulted from the successful implementation of LM [4]. In relation to the theoretical implications, since there is a need for companies in the HKMI to be more aware of the modern quality management concepts [41], it is believed that this piece of research would help in complementing the research area regarding how developed the quality practices of the Hong Kong manufacturers is.

Regarding the limitations of this research, it mainly comes from the inherent characteristics of using a questionnaire instrument to collect data. In particular, although the questions included in the survey allowed us to determine the level of LR of a company/industry, it cannot illustrate the rationale of why the company/industry obtained a higher score in some of the constructs than in others. However, the use of a survey for this study can reveal some patterns in the sampled population and identify some possible relationships. For instance, the survey results successfully indicated that the manufacturers in Hong Kong are generally not ready to effectively implement or sustain LM. The study also revealed that the effects from a firm's size, ISO 9000 certification status, and the use of Six Sigma are not significant, within the context of the HKMI, to effectively implement or sustain LM.

In this research, since the sample size is relatively limited (i.e. 9 responses) and the analysis was done in a quantitative manner, it would be beneficial to conduct a larger scale study using of both qualitative and quantitative methods (e.g. interviews and survey). As a result, a deeper understanding towards the LR of the HKMI should be able to be obtained. Consequently, a more comprehensive understanding of the LM readiness level could be obtained. In addition, the scope of this research can be further extended to the service industry, or narrowed into a particular manufacturing sector.

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