

Measuring the lean readiness of Kuwaiti manufacturing industries

Abstract

The purpose of this paper is to measure the readiness of the Kuwaiti small and medium sized manufacturing industries to implement the lean system through an evaluation of their existing quality practices, and compare such readiness among different product sectors and ownership types. This study adopts the measurement framework developed by Al-Najem *et al.* (2013), which establishes six constructs related to lean quality practices, namely: process, planning and control, customer relations, suppliers relations, HR, and top management and leadership. Data were collected from a survey of 50 Kuwaiti small and medium sized manufacturing industries operating in different industrial sectors. One research question and two hypotheses were developed and tested using t-test and Levene's test, descriptive analysis, and one-way ANOVA. The results demonstrate that the Kuwaiti small and medium sized manufacturing industries are far from being ready to implement lean. In addition, the study found that product sector and ownership type have no significant impact on the lean readiness in the Kuwaiti small and medium sized manufacturing industries. This research provides insight into preparing Kuwaiti, and other small and medium sized manufacturing industries, to implement the lean system by creating an assessment of their existing lean practices and lean readiness. This research is among a limited number of studies that have addressed lean within the Arab region, and only the second to examine the level of lean readiness of the Kuwaiti small and medium sized manufacturing industries. It expands the literature on lean in developing countries, particularly in the Arab region, and can provide guidance to research within other countries in the region.

Key words: Kuwaiti small and medium sized industries, lean system, lean readiness, manufacturing industries.

Paper type: Research paper

1. Introduction

Small and medium sized enterprises in the manufacturing and service industries play a major role in shaping economies around the globe (Ghobadian and Gallea, 1997). In Kuwait, there are more than 30,000 registered small and medium sized, from which 85 percent of these are family-owned businesses (Abdalla and Al-Homoud, 2001).

The limited development and contribution of Kuwaiti small and medium sized enterprises, in particular Kuwaiti small and medium sized manufacturing industries, is due to a lack of internal competition and concentration towards those sectors (Burney *et al.*, 2010), and thus Kuwaiti small and medium sized enterprises are considered to be in an infant stage (Rampurwala and Marafi, 2011). In particular, several indicators have shown the limited contribution of Kuwaiti small and medium sized enterprises in terms of job creation and its small impact to the economic development of the country, e.g., Kuwaiti small and medium sized enterprises account for only 7 percent of the country's job creation (Al-Saif, 2002). Compared to other regions, and even other countries in the Middle East, this contribution is low; in the U.S., for example, small and medium sized enterprises provide 51 percent of jobs, while in several countries in the Middle East this ranges from 75 to 86 percent (Rampurwala and Marafi, 2011).

Recently, the Kuwaiti government has begun to realize the potential role that small and medium sized enterprises can play in growing the Kuwaiti's economy and it has hence tried to enhance the role of Kuwaiti small and medium sized enterprises by creating more efforts and subsidies to develop this sector. As widely suggested in the academic literature, one method to develop and improve the contribution of small and medium sized enterprises is by adopting quality initiative such as the lean system, Six Sigma, and total quality management (TQM) (Shah and Ward, 2003).

While the lean system has received significant attention from many scholars around the globe, relatively little attention has been paid to its study in small and medium sized manufacturing industries in the Arab region, and Kuwait in particular. In Kuwait, there is little awareness of the lean system and hence only the study conducted by Al-Najem *et al.* (2013) has tried to assess whether the Kuwaiti small and medium sized manufacturing industries is ready to implement lean. In this case, Al-Najem *et al.* (2013) measured lean readiness in the Kuwaiti small and medium sized manufacturing industries by comparing companies with and without ISO 9000 certification and between small and medium sized firms. The current study expands upon that research by investigating lean readiness differences within Kuwaiti small and medium sized manufacturing industries based on industry sector and ownership type. This will provide further understanding and empirical evidence of the role and effect that these two factors (i.e. industry sector and ownership type) may play on the readiness of organizations to successfully adopt and/or sustain lean system.

2. Literature review – development of research question and hypotheses

Lean system has helped many companies gaining a competitive advantage through eliminating waste, increasing profitability, and improving customer satisfaction. However, despite the popularity of lean system, many organizations around the world have faced difficulties in implementing it (Scherrer-Rathje *et al.*, 2009). These failures arise from different sources, such as ignorance of lean concepts, critical success factors (CSFs), and lean system requirements (Hines *et al.*, 2004), and poor external relationships with suppliers and customers (Nordin *et al.*, 2010). Other researchers suggest that failure can arise from the cultural differences that become highlighted during the transition (Herron and Braiden,

2007).

These issues may be linked to a single cause, which is a lack of understanding of the key elements of lean system. Knowing the requirements of lean system is key before trying to implement it, and organizations must measure their readiness for lean system and understand its requirements, allowing them to save time, effort, and money. Likewise, they must recognize the need to adopt lean system (Al-Najem *et al.*, 2013).

However, there is a lack of in-depth research on lean readiness and CSFs, especially within the context of small and medium sized enterprises (Anand and Kodali, 2008). In order to minimize the lean failure rate, there is a need to assess current practices and realities within the organization to determine whether these are supportive of lean system, or if they must be modified in order to adopt lean system. In other words, organizations need to assess their readiness and preparedness before implementing lean system (Garza-Reyes *et al.*, 2015; Al-Najem *et al.*, 2013; Radnor *et al.*, 2006).

An understanding of the situation in Kuwait is required in order to identify the lean readiness level in Kuwaiti small and medium sized manufacturing industries. This entails a deep understanding of several categories, such as processes, planning and control, human resources, top management and leadership, customer relations, and supplier relations. Al-Najem *et al.* (2013) examined small and medium sized enterprises in Kuwait to determine whether the size of a company or ISO 9000 certification affected lean readiness, but found that neither ISO 9000 nor size have a significant impact on lean readiness. This study adopts Al-Najem's *et al.* (2013) measurement framework to assess whether the type of product (industrial sector) and ownership (family and non-family) differ in lean readiness within Kuwaiti industries. This framework has also been successfully employed by Garza-Reyes *et al.* (2017), Garza-Reyes *et al.* (2016) and Garza-Reyes *et al.* (2015) to measure the lean readiness level of the European pharmaceutical, Hong Kong manufacturing and Turkish automotive suppliers industries respectively.

2.1. Quality initiatives in Kuwaiti industries

Kuwait is both one of the smallest and one of the richest counties, with the highest gross domestic product per capita (GDP) in the world, but has a newly emerging industrial market, and Kuwaiti industries are relatively undeveloped in terms of competing on the world market. According to the Industrial Bank of Kuwait (2001), non-petroleum-based manufacturing accounted for only 2.8 percent of the country's GDP. This is much lower than rates found in developing countries in other regions such as Asia, where manufacturing accounts for 17 to 35 percent of national GDPs (Upadhye *et al.*, 2010).

Quality initiatives such as lean system, Six Sigma, and TQM could be a key for enhancing the role of Kuwaiti small and medium sized manufacturing industries in the Kuwaiti economy. According to Zairi (1996), Arab organizations can enjoy huge benefits from implementing quality initiatives, making them more competitive at an international level. However, the literature shows that Kuwait, like other Arab countries, has yet to consider the importance of quality initiatives (Tannock and Ahmed, 2008). This can be attributed to a number of factors, including the country's high dependency on oil, ignorance towards quality initiatives, and an attitude that there is no actual need for quality initiatives in Kuwait.

Kuwaiti small and medium sized manufacturing industries have the potential to play an important role in Kuwait's economy; therefore, improvements in K-SMMIs could have an enormous impact in this regard, which would eventually contribute towards minimising

Kuwait's dependence on oil. According to Eltony (2007), Kuwait is expecting to rely on oil as its main product for another two decades, which is very risky, as pointed out by researchers such as Blair (2009), who said that failures to create new resources would result in deficits in 2017. In the meantime, oil is the backbone of the Kuwaiti economy, as it accounts for about 92 per cent of total Kuwaiti export (Switzerland Global Enterprise, 2012).

The Kuwaiti government has tried and failed to encourage the non-oil sectors, as most Kuwaiti policy has been built on reactions to situations, rather than on proper study (Eltony, 2007). Harry (2007) declared that the governments in the GCC region prefer to take an expediency approach, rather than providing solutions, and this has become a serious problem for them. Developing the Kuwaiti small and medium sized manufacturing industries is key to creating diversity, but if the Kuwaiti small and medium sized manufacturing industries want to compete globally they must implement quality initiatives, as this will increase Kuwaiti small and medium sized manufacturing industries' chances to gain competitive advantage (Ghobadian and Gallear, 1997).

With regard to quality initiative, Isaa (2007) claimed that many manufacturing companies in Kuwait (mostly large enterprises) have implemented one or more quality initiative, such as TQM, Six Sigma, or business process reengineering. From the figures published by ISO (2008), it can be seen that there are only 254 ISO 9000-accredited companies across the service and manufacturing sectors in Kuwait, whereas Egypt has 1944 ISO 9000-accredited companies, Saudi Arabia has 876, the UAE has 3283, Tunisia has 848, Oman and Morocco have 405, Pakistan has 2268, and India has 37,958 – this shows the slow pace at which companies are moving towards quality initiative in Kuwait.

The adoption of quality initiative initiatives such as lean system might be a solution for improving productivity and quality within the manufacturing industries in Kuwait, as well as the other GCC countries that have begun to emerge. According to Ghobadian and Gallear (1997), quality initiative can improve the competitive advantage of small and medium sized enterprises.

Given the modest role of Kuwaiti small and medium sized manufacturing industries in the national economy, implementing quality initiative in these industries is vital (Zairi, 1996). Mady (2009) emphasised that, for Kuwait, adaptation of manufacturing systems and the various related tools is inevitable. However, applying lean system might not be an easy task, especially for small and medium sized manufacturing, since they can face more barriers than large organisations.

Few researchers have studied quality initiative in Kuwait; however, although they have not focused on small and medium sized manufacturing industries specifically, their studies do provide insight. According to Garza-Reyes *et al.* (2011), Kuwaiti industries, as well as those in other GCC countries, are still in the early stages of understanding ISO/TQM. Zairi (1996) reported that implementation of quality initiative in the Arabic region has occurred more slowly than in Western and Asian countries. Al-khalifa and Aspinwall (2000) concurred that the maturity level towards quality initiative is very low in Arabic countries, and stated that this can be particularly attributed to cultural factors and language barriers, especially when translating those systems to Arabic (Tannock and Ahmed, 2008).

Al-Najem *et al.* (2013) found that Kuwaiti small and medium sized manufacturing industries that have implemented some quality initiatives such as ISO 9000 have done so only to increase sales and not for actual improvement. They found that there were no significant differences in terms of quality practices within Kuwaiti small and medium sized manufacturing industries between firms that were ISO 9000 certified and those that were not, and that neither had a good foundation for lean system. The study also determined that one reason lean has not been introduced in Kuwait yet is due to the lack of competition and urgency within Kuwaiti small and medium sized manufacturing industries; they do not feel

threatened to improve.

Because of the lack of research on lean system in Kuwait, there may be other confounding factors that have yet to be identified for a lack of lean system implementation in Kuwait. This paper investigates potential barriers to lean by assessing lean readiness in Kuwaiti small and medium sized manufacturing industries, which leads to the main research question:

Research Question: Are Kuwaiti small and medium sized manufacturing industries ready to implement lean system??

2.2. Different industrial sectors and their impact on lean readiness

The industrial sector has not been emphasized as a factor that affects lean system, as various authors have suggested that lean system can apply to different types of industries (Womack et al., 1990; Soriano-Meier and Forrester, 2002). In previous studies (e.g. Talib *et al.*, 2011), researchers have attempted to distinguish between quality initiatives practices across different sectors, but the main focus has been on manufacturing versus services industries rather than different manufacturing sectors; i.e., there are no studies that differentiate between the applicability of lean system or quality initiatives to different types of manufacturing industries, such as paper, plastic, metal, etc.

Various researchers (e.g., Reed *et al.*, 1996; Corbett and Rastrick, 2000; Curkovic *et al.* 2000) have shown that different quality and management practices are used in different industries, depending on the activities of firms due to the uniqueness of their business and industry needs. Mady (2009) showed that there is a difference in TQM usage between the food and refractor sectors in Kuwait. In order to understand lean readiness within Kuwaiti small and medium sized manufacturing industries, there is a need to investigate several aspects that might have an effect on lean readiness, leading to the first hypothesis:

H1: Firms in different industrial sectors in Kuwait differ significantly in terms of their quality and management practices.

2.3. Type of ownership and its effects on lean readiness

Ellington *et al.* (1996) conducted a study into the adoption practices of family-owned manufacturing firms, and found that family businesses are less likely to adopt TQM due to requirements such as cost and commitment. In addition, family-owned businesses are mainly centralized, whereas TQM requires decentralized decision making. They concluded that quality and management practices are likely to differ between family- and non-family-owned firms.

Ward (1988) suggested that family-owned businesses are not always willing to fulfil the requirements of TQM, as the techniques require investment and long-term planning, while family businesses favor short-term planning. Levinson (1987) suggested that family businesses are more resistant to change and, although they adopt improvement practices, they do not do so convincingly.

Several authors (e.g. Ward, 1988; Ellington *et al.*, 1996; Hofer and Charan, 1984; Levinson, 1987) have found that non-family-owned businesses are more successful in implementing quality initiatives as they have certain characteristics that family businesses do not have, or are not willing to compromise on.

Other researchers (e.g. Welsh and Raven, 2006; Chua *et al.*, 1999; Davis, 1983) believe that family businesses are better able to manage their resources, especially in terms of customer relations and organization stability. Therefore, the second hypothesis is as follows:

H2: There is a significant difference in the quality and management practices used by non-family-owned firms compared to family-owned firms in Kuwait.

2.4. Importance of assessing the organizational readiness

Many researchers have stressed the importance of organizational readiness before implementing lean system (e.g. Nordin *et al.*, 2012; Radnor *et al.*, 2006, Al-Najem *et al.*, 2012). According to Garza-Reyes *et al.* (2015) the measurement framework to assess lean readiness before lean implementation developed by Al-Najem *et al.* (2013) is deemed to be the most appropriate, as it covers lean essential requirements from different angles such as management and leadership, planning and control, the role of human resource (HR), and the importance of the process.

In an attempt to minimize lean implementation implementation failures, several scholars have shifted their attention towards understanding the readiness for quality initiatives (Garza-Reyes *et al.*, 2016; Al-Balushi *et al.*, 2014; Albliwi *et al.*, 2014), yet there is still a lack of research in Kuwaiti context. Knowing the readiness will allow both manager and companies to mitigate lean system implementation failure and enhancing success rate.

3. Research methodology

In this study, a survey questionnaire adapted from a measurement framework developed by Al-Najem *et al.* (2013) was employed. The questionnaires were designed and distributed, and the responses received were entered into SPSS software to generate different analyses such as descriptive (see Appendix A), Cronbach's alpha (reliability test), Crosstab, independent sample t-test, and one-way ANOVA. These techniques made it possible to answer the research question and test the hypotheses as follow:

Research Question: Are Kuwaiti small and medium sized manufacturing industries ready to implement lean system??

H1: Firms in different industrial sectors in Kuwait differ significantly in terms of their quality and management practices.

H2: There is a significant difference in the quality and management practices used by non-family-owned firms compared to family-owned firms in Kuwait.

3.1. Survey questionnaire

The questionnaire was developed to collect both exploratory and descriptive data. Kuwaiti small and medium sized manufacturing industries firms were selected using the Kuwait Public Authority of Industries database as the population. This study categorizes a firm as small if it has a headcount of fewer than 30 (or capital of less than US\$ 520,000) and medium if it has a headcount of 31 – 70 (or capital of US\$ 520,000 – 1,700,000). No large firms were included in the study.

The survey respondents are plant managers, production managers, quality managers, and CEOs who are involved in decision making, have a good knowledge of their firm's strategy and quality initiatives, and were willing to participate in an interview.

The survey questionnaire consisted of three sections: (1) company background information, (2) information on the respondents, and (3) quality and management practices used. Section 3 consisted of 47 statements and was divided into six constructs: processes; planning and control; human resources; top management and leadership; customer relations; and supplier relations. Statements used in section 3 were selected to specifically assess the companies' existing practices so that readiness towards the adoption of lean system could be identified. The questions are listed in Table 1.

In order to generate valid and reliable results, the questionnaire was sent to academic members of Kuwait University, plus a pilot test of 15 firms similar to the target population. After revision, the survey was distributed to 200 Kuwaiti small and medium sized manufacturing industries selected at random from the Kuwait Public Authority of Industries database. Valid responses were received from 50 firms, which equated to a response rate of 25 percent. Of these firms, 31 were family owned (62%).

The survey used a five-item Likert scale to identify the extent to which respondents had adopted quality and management practices, and to set up valid and reliable numeric results for statistical analysis. Five-item Likert scales were chosen to give the participants the freedom to choose the appropriate rating for their current situation. Responses were entered into SPSS software to conduct different statistical analyses, including a descriptive analysis, Cronbach's alpha, independent sample t-test, and one-way ANOVA.

[Insert Table 1 here]

4. Results and findings

Cronbach's alpha

Reliability analysis to estimate internal consistency was carried out using Cronbach's alpha values with a scale range from 0 to 1. Based on Schutte *et al.* (2000), values above 0.70 are considered to be reliable and sufficient. Table 2 shows that the Cronbach's alpha value for the total scale was 0.929, with each variable scoring above 0.7, indicating a high degree of internal consistency among the items on the scale, and thus good data reliability.

[Insert Table 2 here]

4.1. Research question and hypothesis

Research Question: Are Kuwaiti small and medium sized manufacturing industries ready to implement lean system?

Mean (M) scores were calculated from the five-item Likert scale for each of the quality and lean system-related constructs of processes, planning and control, human resources, customer relations, supplier relations, and top management and leadership. Based on the approaches of Al-Najem *et al.* (2013) and Nordin *et al.* (2010), for the purpose of this paper $M \geq 4$ was considered as the minimum limit to indicate that a Kuwaiti small and medium sized manufacturing industry is ready to implement lean system.

Table 3 shows the mean score for the Kuwaiti small and medium sized manufacturing industries on the five-point Likert scale for each category. The total mean for all 47 items was 2.84, with a minimum of 1.56 and maximum of 4.26, a range of 2.70, and variance of 0.53.

[Insert Table 3 here]

Based on the responses received, the highest lean readiness level was found to be in the top management and leadership construct, followed by processes and planning and control. The data collected also indicates that quality and management within Kuwaiti small and medium sized manufacturing industries do not presently support lean system, as can be seen from the low mean score ($M < 4$) for each of the constructs. This indicate that Kuwaiti small and medium sized manufacturing industries lack the infrastructure and readiness for lean system, and rarely or inconsistently use quality and management practices.

Independent sample t-test

It was assumed that the responses received were drawn from a normally distributed population. In order to run the t-test, it was necessary to decide whether equal variance could be assumed (i.e. by testing a null hypothesis, H_0). To this end, Levene's test was carried out for the six constructs with a threshold value of $p < 0.05$. This test was conducted for family- and non-family-owned firms.

Table 4 shows that the variance can be assumed equal for all constructs ($p > 0.05$), indicating that there is no significant difference with respect to ownership.

A test for equality of variances was likewise conducted by industrial sector (products) to determine whether the null hypothesis ("Firms in different sectors in Kuwait do not differ significantly in terms of their quality and management practices") can be rejected. As show in Table 4, only one construct, supplier relations had $p < 0.05$. Thus, equal variance for all sectors is assumed for all constructs except supplier relations.

[Insert Table 4 here]

4.2. Different type of sectors and their effect on LR

H1: Firms in different sectors in Kuwait differ significantly in terms of their quality and management practices.

According to the Public Authority for Industry (PAI, 2008), there are 1,031 manufacturing industries in Kuwait divided into eight categories: food and beverage; textiles, clothing, and leather; wood, wood products, and furniture; paper and paper products; chemicals, coal, rubber, and plastics; non-metallic minerals; machinery, equipment, and basic metals; and other manufacturing industries. For the purposes of this investigation, these were combined into four sectors, as listed in Table 5.

A one-way ANOVA was carried out to test H1 in order to learn whether sector (product produced) has an effect on lean readiness. Table 5 shows the mean and standard deviation values for each construct in terms of four different sectors, along with the ANOVA results. The results indicate that there is no significant difference between the four sectors in

terms of their use of quality and management practices. Thus, H1 is rejected.

This result is inconsistent with Mady (2009), which found that there is a difference in quality and management practices used by different sectors in Kuwait. Furthermore, this result disagrees with Reed *et al.* (1996), Corbett and Rastrick (2000) and Curkovic *et al.* (2000), who concluded that different sectors have different use of quality and management practices.

[Insert Table 5 here]

4.3. Different type of ownership and their effect on LR

H2: There is a significant difference in the quality and management practices used by non-family-owned firms compared to family-owned firms in Kuwait.

An independent sample t-test was carried out to test H2, in order to learn whether the difference in ownership (family vs. non-family owned firms) has an effect on lean readiness. Table 6 shows the mean and standard deviation values for each construct in terms of ownership structure, along with the t-test results. Both types of firms show $M < 4$, and the results show that there were no significant differences ($p > 0.05$) between the different ownership types in terms of the firms' use of quality and management practices. Thus, H2 is rejected for all constructs.

These results disagree with those of Ellington *et al.*(1996), Levinson (1987), Ward (1988), and Hofer and Charan (1984), who found that there are differences in the implementations of quality and management practices by the two type of firms, with non-family-owned organizations having a better chance of adopting quality and management practices.

[Insert Table 6 here]

5. Discussion of results

Research Question: Are Kuwaiti small and medium sized manufacturing industries ready to implement lean system?

The results indicate that current practices in use by Kuwaiti small and medium sized manufacturing industries do not support lean system and thus there is a low overall level of lean readiness. This section discusses the results for each construct.

Process: This constructs highlights both negative and positive practices carried out within Kuwaiti small and medium sized manufacturing, but when looking at the entire situation it is possible to see that many things need to be considered by Kuwaiti small and medium sized manufacturing industries that are important towards lean system (see Table 7 in Appendix A). The overall M score lies in the "Sometimes" range ($M = 3.1$), which is not a good indicator of lean readiness. Two areas that show particular weakness are documentation and cellular management, with either a lack of skilled workers, or the inability of those workers to take ownership of their workspace and processes. There were also strong indicators that the workflow is not driven by efficiency, and that limited planning for the future, such as for periodic maintenance of machinery, may be taking place, with a greater focus on short-term rather than long-term operations.

Planning and control: This construct demonstrates a mix of responses, some of which were good and supportive of lean system, while others were unsupportive. Based on the results obtained from the questionnaire the majority of firms are not using visual management on the shop floor, and may not consider these to be an important aspect of their processes (see Table 8 in Appendix A). A lack of worker focus groups to solve problems was also revealed, which may indicate that a significant pool of knowledge and creativity remains untapped in many Kuwaiti small and medium sized manufacturing industries.

Customers' relation: For this construct, responses show that the vast majority of the firms claimed to having good customer awareness and knowing what their customers are willing to pay for. However, their remaining responses demonstrate otherwise, as 78 percent of the firms do not have effective communication with their customers in terms of taking customer feedback, meeting with customers, and conducting surveys. Furthermore, it is evident that the firms do not have proper systems in place to collect customer complaints, and failures in this regard might lead losing customers (see Table 9 in Appendix A). The total M score was only 2.5, indicating poor lean readiness in this area.

Suppliers' relation: The results indicate that the majority of Kuwaiti firms do not have a clear strategy to evaluate their suppliers with regards to performance in terms of quality, delivery, and prices. They also show that most of the Kuwaiti small and medium sized manufacturing industries (96 percent) do not see dealing with local suppliers as an advantage for their business (see Table 10 in Appendix A), making it more difficult to maintain lower inventory levels and employ just in time system. Further, it can be seen that the Kuwaiti small and medium sized manufacturing industries are not involving their suppliers in their product design, as is shown from the high percentage (82 percent) of responses in this regard. In addition, most of the Kuwaiti small and medium sized manufacturing industries agreed that they are not receiving good materials from their suppliers, requiring inspections for each delivery and thus wasting time and resources. The overall M score for this construct was only 2.3, the lowest of any category, indicating very low lean readiness level in this area.

HR: It was found that more than half of the Kuwaiti small and medium sized manufacturing industries do not take employee suggestions into account. Only 44 percent of the firms see it as important to improve work based on input from workers (see Table 11 in Appendix A), but even among that group not all of them actually use those suggestions, as the majority (60 percent) of firms indicated they do not implement suggestions made by their workers. The responses show that 62 percent of firms believe their workers are qualified and skillful enough to contribute to problem solving, but at the same time, 56 percent feel their employees are not able to perform different tasks. Overall, the M score for this category was only 2.9, indicating low lean readiness.

Top management and leadership: This construct demonstrated the highest level of lean readiness, but the mean was still only 3.2, still well within the "Neutral" range. The questionnaire shows for that 94 percent of the firms consider visible management important, and 44 percent always adopt it (see Table 12 in Appendix A). 70 percent of the firms indicated they know their workers' capabilities and locate them where they can use their skills and expertise. However, only 50 percent of the firms are committed towards investment in training and encouraging cross-job training, and the majority of the firms (70 percent) do not invest in consultants or outside expertise.

Having some positive practices in place is not sufficient for firms to be considered ready for lean system, as most of the items in the questionnaire represent essential requirements for starting and sustaining lean. The total M score across all variables (M =

2.84) is much lower than 4, and a poor indication of lean readiness. Overall, only 20 of 47 measures scored above a 3 on average across the sample. Kuwaiti small and medium sized manufacturing industries currently lack the infrastructure and readiness for lean system, and rarely use the necessary quality and management practices. In order to be ready for lean system, Kuwaiti small and medium sized manufacturing industries need to address many of the weaknesses that were highlighted from questionnaires, particularly in the areas of customer and supplier relations.

These results are consistent with Zairi (1996) and Garza-Reyes *et al.* (2011), who claimed that Kuwaiti industries are still in the early stages of understanding and using quality initiative, as well as Al-khalifa and Aspinwall (2000), who suggested that the maturity level towards quality initiative is very low in Arabic countries, and with Jaeger *et al.* (2013), who said that quality initiative does not play an important role in Gulf Cooperation Council (GCC) organizations. Moreover, this result proves the findings of Tannock and Ahmed (2008), who found that Arab countries have yet to feel pressure to implement quality initiative.

H1: Firms in different industrial sectors in Kuwait differ significantly in terms of their quality and management practices.

The results show that there are no significant differences between the four different industrial sectors (listed in Table 5) in terms of the use of quality and management practices, since the mean score for the four sectors was found to be almost identical. This result is in agreement in part with Mady (2009), who found that there are no differences among the different types of sectors in Kuwait in terms of their perception of competitiveness priorities such as flexibility, on-time delivery, cost reduction, innovativeness and quality improvement. The reason for this could be attributed to the lack of competitiveness in the Kuwaiti market, and the fact that most types of industries are supplying to the local market; however, these results differ from those of other authors (Reed *et al.*, 1996; Corbett and Rastrick, 2000; Curkovic *et al.* 2000), who found that different sectors have different uses of quality and management practices.

At the same time, these results disagree with other results found by Mady (2009), who found that there is a difference in the quality and management practices used by different sectors in Kuwait. Mady (2009) focused on two groups only, manufacturing and food, while this study compared four manufacturing sectors, but did not include food. Thus, it appears that while there may be differences between manufacturing and food industries in Kuwait, no such difference is found between different manufacturing sectors. These findings likewise disagrees with those of Ab-Rahman *et al.* (2011), who identified different quality and management practices within Libyan manufacturing industries.

Industrial sector has not been emphasized as a factor that affects lean system, as many authors have suggested that lean system can apply to many different types of industry (e.g. Womack *et al.*, 1990; Soriano-Meier and Forrester, 2002). Further, this study is the first to deal with lean system in the Kuwaiti context, so it is necessary to build a foundation from which to obtain a better understanding of Kuwaiti firms. Thus, the findings on sectors cannot be compared to any great extent with those of previous studies.

H2: There is a significant difference in the quality and management practices used by non-family-owned firms compared to family-owned firms in Kuwait.

The results show that ownership (family- vs. non-family-owned firms) does not affect

lean readiness, as no significant differences were noted between family- and non-family-owned firms for any of the constructs or in terms of their use of quality and management practices, and thus no difference in terms of lean readiness.

This result is inconsistent with those of many researchers (e.g., Levinson, 1987; Ward, 1988; Hofer and Charan, 1984), who found differences in the implementations of quality and management practices by the two types of firms, and suggested that non-family-owned organizations have a better chance of adopting quality and management practices. Ellington *et al.* (1996) found that family-owned firms are adopting fewer quality and management practices, because they are more short-term oriented. Further, Ellington *et al.* (1996) explained that family-owned firms are more centralized in their decision making, as the top managers are involved in every decision; this is why they cannot adopt a holistic approach towards quality initiative.

The findings also disagree with several authors (Welsh and Raven, 2006; Chua *et al.*, 1999; Davis, 1983) who have claimed that family-owned businesses are likely to have better relations with customers and be better able to manage their resources; neither of these were shown in this study.

Graves and Thomas (2006) found that non-family-owned firms have better managerial capabilities compared to family-owned firms; this was not the case in the present research study, as both types of firms in the Kuwaiti context were found to be in a similar position with regard to the use of quality and management practices.

6. Conclusions, practical and theoretical implications, and limitations

The main aim of this research was to consider the general situations of Kuwaiti small and medium sized manufacturing industries in order to identify their readiness to adopt lean system, by measuring their current situation through understanding the quality and management practices used by the firms.

The outcome of the study shows that Kuwaiti small and medium sized manufacturing industries are at a low level of lean readiness, with all of the quality practices related to lean system found to be weak and score $M < 4$. Further, no significant difference in lean readiness was found based on ownership or product sector. In order for Kuwaiti small and medium sized manufacturing industries to enhance their lean capabilities they need to consider and enhance their quality practices namely process, planning and control, customers relations, suppliers relations, HR, and top management and leadership. These findings are in agreement with the findings of Al-Najem *et al.* (2013), who conducted one of the very few and most recent studies regarding lean readiness within Kuwaiti small and medium sized manufacturing industries.

In practice, the findings of this research can be used by Kuwaiti small and medium sized manufacturing industries to provide insight into implementing lean system, helping them to assess their lean readiness and consider the quality practices before attempting lean system to see what quality practices needed to be addressed in order to avoid failures and gain complete advantage. Likewise, the findings may assist the Kuwaiti government to formulate an action plan to increase the impact of Kuwaiti small and medium sized manufacturing industries in the economy. The Kuwaiti government is trying to reduce its reliance on oil and gas, and supporting Kuwaiti small and medium sized manufacturing industries could be key to achieving this vision. Thus, in order to ensure the success of lean system and to enhance the role of Kuwaiti small and medium sized manufacturing industries, the government needs to pay attention to this sector by encouraging firms to adopt lean

system, and developing awareness campaigns that highlight the importance of lean system and explain the requirements for the implementation process. This can be done by providing Kuwaiti small and medium sized manufacturing industries with appropriate training and workshops. The findings of this study show the weaknesses of KSMMIs and the requirements for lean system, which can be used by the government to formulate some action points in this direction. One of the main things that need to be done by the government is to create a sense of urgency, and this can be achieved by expanding the market by introducing foreign direct investment, which will increase the level of competition. More importantly, the government needs to have transparency in offering governmental projects and contracts, which should be based on quality rather than links, and decrease the number of procedures required for firms to be established or to expand.

With regard to Kuwaiti small and medium sized manufacturing industries, they need to educate themselves in lean system, as it can help them to manage their resources more efficiently. They should rely on quality labors, and need to understand the importance of empowerment, continuous improvement, involvement, training, and most of the other issues that have been identified in this study. Equally important is the need for them to be aware of the use of essential tools and techniques, such as 5s and visual management, as these will help them to better manage their processes, which will in turn reflect in their production rate.

Further, as most Arab countries – and, more specifically, those in the GCC region – share similar cultures and values, the results can be generalized to them, bearing in mind that lean system requires certain types of cultures, in both an organizational and a national sense.

This study has several limitations. First, the findings of this study are limited in terms of generalizability only to Kuwaiti small and medium sized manufacturing industries, as the study excluded large firms and small and medium sized manufacturing industries in other regions. Another limitation of this study is the small sample size; the author faced difficulty in convincing a larger number of companies to participate and could not cover the entire manufacturing sector in Kuwait due to a lack of time and interest from many firms, plus the fact that some firms did not fit the criteria (i.e. were not small and medium sized manufacturing industries).

There is also a lack of information and published studies regarding Kuwaiti manufacturing industries; further, there is a relative absence of research regarding lean system within GCC countries, and this meant that it was not possible to effectively compare the findings with those of other researchers. Increasing the sample size would have allowed better and more accurate results to be obtained, and would also have provided more robust results with respect to the t-test and ANOVA.

7. Future research

Due to its exploratory and descriptive nature, this study highlights a number of avenues for further empirical research. This study covered only certain manufacturing sectors within the Kuwaiti context, and should be expanded to sectors such as food and beverages; textiles, clothing and leather; wood and wood products; furniture, etc. Increasing the sample size would be another avenue by which to provide more accurate results in the future. In addition, a comparison between small and medium sized manufacturing industries and large firms could provide additional insight.

Furthermore, Arab countries – and more precisely the GCC region – share many values, traditions and cultural aspects with Kuwait, so examining lean readiness for firms in these countries would add a great deal of richness to the lean system literature.

It is especially interesting to note that the framework and methodology adopted from Al-Najem *et al.* (2013) and used in this study was also employed by Garza-Reyes *et al.* (2015) in their study of Turkish automotive suppliers. However, Garza-Reyes *et al.* (2015) found much higher rates of lean readiness than were found in this study. Because the studies were conducted using the same framework but achieved disparate results, investigating how Kuwaiti and Turkish industries differ could provide considerable insight into lean readiness and implementation of lean system in developing countries.

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Appendix A (see Table 1 for questionnaire items)

[Insert Table 7 here]

[Insert Table 8 here]

[Insert Table 9 here]

[Insert Table 10 here]

[Insert Table 11 here]

[Insert Table 12 here]

Table 1 Questionnaire items

Practice	Statement
Process	
5s	1. The workshop is divided into different workplaces and each zone has a specific task.
Cellular manufacturing	2. The processes used within similar operations are placed close to each other in order to eliminate unnecessary steps.
Skilled people	3. Each working zone is controlled and operated by qualified and well-trained workers.
5s	4. Each item/piece of equipment is labelled to ensure it is located in the right zone/location in the workplace.
Pull	5. Production at each station is pulled by demand from the next station.
5s and Standardization	6. A certain person is assigned as a part of his daily activities to ensure that the workplace is clean and all tools/pieces of equipment are put back in their appropriate places.
TPM	7. Equipment maintenance records are posted on the shop floor to be actively shared with employees.
Cellular manufacturing	8. The process flow of material and components is smooth and continuous, as the equipment is grouped.
Pull	9. Products are not produced unless orders for them are received from customers.
TPM	10. Machine operators and staff are engaged in the scheduled maintenance of equipment so that machines are maintained on a regular basis by skilled people.
Documentation	11. There is a well-documented configuration setting for each machine/piece of equipment to avoid uncertainty about how to reconfigure the equipment during changeover.
Standardization	12. The total cycle time is revised for each product on a regular basis in order to reach the optimum level.
Planning and Control	
Problem solving	13. In order to improve production, a focus group of workers is conducted (on a regular basis) to help the company identify wastes and solve problems by generating new ideas and solutions, which are then submitted to the managers.
Benchmarking	14. There is an awareness of the wider industry performance, and a clear strategy is followed to benchmark performance with the top-class firm (at a domestic and national level).

Standardization
Problem solving
VM/KPI

15. There are standard routes for loading raw materials and removing end products, including a standard picking time.
16. Problem-solving techniques such as Fishbone diagrams are used to identify the causes of quality problems.
17. Up-to-date charts showing defect rates, key performance indicators, progress and next job activity are displayed on the shop floor.

Customer Relations

Customer awareness
Customer feedback

Customer involvement
Customer relationship

Customer involvement
Customer involvement

18. There is an awareness of what product features customers value and are willing to pay for.
19. Feedback is sought regularly, and surveys/meetings are often held with customers to improve product design and quality, and service.
20. Customers participate in the initial design process.
21. Valued customers are brought in to visit the plant in order to give them some ideas about quality control that the company can follow.
22. Customers help the company by providing information about their future demands.
23. There is a system in place for collecting customer complaints so that problems can be avoided in the future.

Supplier Relations

Quality suppliers
Close suppliers
Supplier involvement
Quality suppliers
No. of suppliers
Quality suppliers
Supplier relation
Feedback to suppliers

24. A clear strategy is in place by which to evaluate supplier performance in terms of quality, delivery and prices.
25. Local suppliers are used to avoid shipment delays.
26. Suppliers are aware of product designs and participate heavily during design and development.
27. Raw materials and purchased parts are not subject to incoming inspection as they come from qualified suppliers.
28. Active steps are taken to reduce the number of suppliers in each category.
29. Raw materials are received on time from the date of order.
30. Suppliers are cooperative and committed to maintaining a long-term relationship.
31. Suppliers are provided with feedback regarding quality and delivery performance.

HR

Involvement

32. Workspace layout is reconfigured regularly based on feedback from employees.

Multi-tasking	33. Workers are able to perform different tasks
Participation	34. Shop-floor employees drive suggestion programme.
Motivation	35. Numerous awards, incentive programmes and annual bonuses are available for employees who help to improve processes and eliminate unnecessary steps. The evaluation is based on group performance
Skilled people	36. Workers are qualified enough to contribute to solving problems, and are able to work as a team.
Communication	37. Departmental and employee relations are good, and conflict barely occurs.
Involvement	38. Each employee has a clear understanding of his job description.
Training	39. Employees have undergone quality training in terms of developing their problem-solving capabilities and identifying non-value-adding activities.
Empowerment	40. Workers are empowered to stop the production line if abnormalities occur.
Participation	41. Suggestions and ideas from shop-floor employees are actively used and implemented.
Teamwork	42. Employees act according to the interests of the group, rather than their individual interests.

Top Management and Leadership

Visible management	43. Top management encourages and coaches workers by visiting the workplace on a regular basis.
Knowing people's capabilities	44. We locate our worker where they can use their skills, qualifications and experience.
Job security	45. People have job security and workers are regularly promoted to managerial positions.
Commitment to improvement	46. Company invests in training programmes and encourages cross-job training.
Commitment to improvement	47. Company uses external experts/consultants on a regular basis to evaluate the overall company performance and to improve production and quality level.

Table 2 Reliability test for variables by construct

Variable	Cronbach's Alpha	Number of Items	Statements Removed
Processes	0.87	12	None
Planning and control	0.76	5	None

Customer relations	0.79	6	None
Supplier relations	0.78	8	None
Human resources	0.87	11	None
Top management and leadership	0.74	5	None
All variables	0.929	47	None

Table 3 Lean score for Kuwaiti small and medium sized manufacturing industries

Current Practices	Mean
Processes	3.1
Planning and control	3.0
Customer relations	2.5
Supplier relations	2.3
HR	2.9
Top management and leadership	3.2
Overall	2.84

Table 4 Levene test for equality of variance

Constructs	Family vs. Non-Family Ownership		Industrial Sector	
	F	Sig.	F	Sig.
Processes	0.103	0.75	1.4	0.2
Planning and control	4.57	0.03	0.1	0.9
Customer relations	0.21	0.64	1.5	0.2
Supplier relations	1.0	0.30	8.5	0.0*
HR	0.14	0.70	2.1	0.1
Top management and leadership	0.23	0.63	0.3	0.8

Note: $p < 0.05^*$

Table 5 One-way ANOVA test for different sectors

Current practices	Sector 1 (n=16)		Sector 2 (n=18)		Sector 3 (n=9)		Sector 4 (n=7)		ANOVA Test Results	
	M	SD	M	SD	M	SD	M	SD	F	Sig.
Processes	3.1	0.8	2.9	0.9	3.1	0.9	3.2	1.2	0.2	0.8
Planning and control	2.9	0.7	2.8	0.8	3.5	0.9	2.9	0.8	1.5	0.2
Customer relations	2.5	0.8	2.4	0.7	2.5	0.5	2.3	0.7	0.2	0.8
Supplier relations	2.4	0.7	2.2	0.5	2.2	0.2	2.1	0.3	0.6	0.5
HR	3.0	0.8	2.8	1.0	3.1	1.1	3.1	1.3	0.1	0.9
Top management and leadership	3.2	1.1	3.1	0.9	3.2	1.0	3.5	1.0	0.3	0.8

Note: Sector 1: paper, paper products and printing; Sector 2: chemicals, petroleum products, coal, rubber; Sector 3: non-metallic minerals (except petrol activity); Sector 4: metal product machinery and equipment activity.

Note: $p < 0.05^*$, $p < 0.01^{**}$

Table 6 Independent sample t-test (family- and non-family-owned firms)

Current Practices	Family (<i>n</i> =31)		Non-family (<i>n</i> =19)		Independent Sample T-test Results	
	M	SD	M	SD	<i>t</i>	Sig. (2-tailed)
Processes	3.1	0.9	2.9	0.9	0.8	0.4
Planning and control	2.9	0.7	3.1	1.1	-0.5	0.5
Customer relations	2.5	0.7	2.3	0.6	1.2	0.2
Supplier relations	2.3	0.5	2.2	0.5	0.9	0.3
HR	3.1	1.0	2.8	0.9	1.0	0.2
Top management and leadership	3.2	0.9	3.1	1.0	0.1	0.8

Note: $p < 0.05^*$; $p < 0.01^{**}$

Appendix A (see questionnaire items on Table 1)

Table 7 Descriptive statistics for process variables

Items	Never		Very Rarely		Sometimes		Frequently		Always	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Q1	2	4	5	10	0	0	18	36	25	50
Q2	9	18	19	38	0	0	15	30	7	14
Q3	16	32	13	26	0	0	6	12	15	30
Q4	5	10	7	14	0	0	18	36	20	40
Q5	19	38	6	12	0	0	8	16	17	34
Q6	14	28	5	10	0	0	24	48	7	14
Q7	14	28	9	18	0	0	16	32	11	22
Q8	6	12	3	6	0	0	28	56	13	26
Q9	14	28	6	12	0	0	25	50	5	10
Q10	26	52	21	42	1	2	2	4	0	0
Q11	19	38	11	22	0	0	13	26	7	14
Q12	13	26	7	14	2	4	13	26	15	30

Table 8 Descriptive statistics for planning and control variables

Items	Never		Very Rarely		Sometimes		Frequently		Always	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Q13	17	34	8	16	1	2	13	26	11	22
Q14	10	20	4	8	0	0	21	42	15	30
Q15	4	8	4	8	0	0	18	36	24	48
Q16	17	34	10	20	1	2	22	44	0	0
Q17	28	56	9	18	0	0	10	20	3	6

Table 9 Descriptive variables for customer relations variables

Items	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Q18	4	8	4	8	0	0	24	48	18	36
Q19	13	26	26	52	0	0	9	18	2	4
Q20	18	36	19	38	1	2	11	22	1	2
Q21	11	22	29	58	2	4	7	14	1	2
Q22	10	20	30	60	0	0	10	20	0	0
Q23	18	36	21	42	1	2	10	20	0	0

Table 10 Descriptive statistics for supplier relations variable

Items	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Q24	19	38	23	46	0	0	8	16	0	0
Q25	26	52	22	44	0	0	2	4	0	0
Q26	20	40	21	42	0	0	8	16	1	2
Q27	13	26	26	52	0	0	9	18	2	4
Q28	4	8	3	6	0	0	29	58	14	28
Q29	13	26	23	46	1	2	11	22	2	4
Q30	9	18	30	60	1	2	10	20	0	0
Q31	19	38	21	42	0	0	10	20	0	0

Table 11 Descriptive statistics for HR variables

Items	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Q32	7	14	19	38	2	4	15	30	7	14
Q33	15	30	13	26	1	2	6	12	15	30
Q34	4	8	7	14	1	2	18	36	20	40
Q35	19	38	6	12	0	0	8	16	17	34
Q36	11	22	5	10	3	6	24	48	7	14
Q37	14	28	9	18	0	0	16	32	11	22
Q38	6	12	3	6	0	0	28	56	13	26
Q39	14	28	6	12	0	0	25	50	5	10
Q40	24	48	21	42	3	6	2	4	0	0
Q41	19	38	11	22	0	0	13	26	7	14
Q42	15	30	7	14	0	0	13	26	15	30

Table 12 Descriptive statistics for top management and leadership variable

Items	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Q43	3	6	0	0	0	0	25	50	22	44
Q44	12	24	3	6	0	0	24	48	11	22
Q45	14	28	9	18	1	2	10	20	16	32
Q46	11	22	14	28	0	0	15	30	10	20
Q47	17	34	19	38	1	2	8	16	5	10