

Application of Six Sigma in a Food Distribution SME to improve Supply Chain Management

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Abstract— Six Sigma is practiced by some service industries to indicate the effectiveness of DMAIC in improving the quality in this type of business. The application of Six Sigma along with other quality initiatives including Kaizen, TQM, ISO 9001 and Supply Chain Management in a food distribution SME needs to be studied thoroughly. The results of a questionnaire suggest that many of food distribution SMEs already carry out different works, projects or tasks associated with Six Sigma but are not aware of terminology or the potential impact of proper understanding and implementation. The intention is to analyse in much more detail the level of awareness within the management community and change agents in the food distribution industry and compare it with actual application of associated practices and works which are already being carried out. The results are important in the food distribution industry in developing clear management associations between Six Sigma and training, supervision and motivation.

Key Words: Quality Initiatives, SME, Process Management, Supply Chain Management, Six Sigma

1.0 Introduction

Implementing quality initiatives in any business leads to improvements in the performance of the organisation through the generation of high quality products and services, and improved efficiency and competitiveness. K.Linderman stated that this is consistent with prior research that suggests the degree of implementation of quality practices is positively related to organizational performance (1). Hence, it is more meaningful to apply the quality initiatives in tangible industries including manufacturing businesses. The ‘Customer’ is typically the key source to justify the quality for any quality provider.

Quality initiatives are the systematic tools which provide an environment for the organisation to fully embed the quality characteristics to its associated process or product. TQM, Six Sigma, Kaizen, ISO9001 and J.I.T are the key quality initiatives which were examined in this paper to justify their role in a specific service industry.

There have been many different studies in implementing quality initiatives in the big UK manufacturing companies. However, it feels that small to medium-sized enterprises, usually called SMEs, which represent of the majority of the UK-based employment sources are yet to fully benefit from

quality initiatives. Accordingly, there is no balanced application of quality initiatives within such SMEs. The degree of awareness, resource limitation and management commitment are the key factors to implement these quality initiatives in SMEs. For instance, J. Antony (2005) argued that many of the SMEs are not aware of Six Sigma and many do not have the resources to implement Six Sigma projects. More importantly, The most common reason for not implementing Six Sigma is unawareness of Six Sigma (2). There is a perception that Six Sigma seems to be a heavily data- and training-oriented quality initiative and this makes it difficult for SMEs to apply it. There have been other quality management systems which have already been applied by many SMEs. J. Antony (2005), in the same publication, emphasized that more than 80% of the SMEs have implemented the ISO9000 quality management system with the mean duration of a year based on the study responds(2). The biggest outcome of applying quality initiatives in any organisation is the so-called “Change” in which the management and employee behavior supports the effectiveness of quality initiatives. G Wessel et al (2004) argued it becomes clear that there is no agreement in the literature on whether SMEs are more likely to be resistant or open towards such change (3).

Applying a quality initiative in a food distribution SME will carry all these already- mentioned views. In fact, prior to important elements of quality management in a food SME along with critical role of distribution, the examination of an integrated approach to adopting quality initiatives in a food distribution SME is strongly suggested. This paper intends to review the adoption of an integrated quality initiative to supply Chain Management (SCM). This paper is intended to deeply study the implementation of a quality initiative system to improve the objectives in SCM for a food distribution SME.

2.0 Food Distribution SME

Food distribution firms are indicated as the link between food manufacturers and end consumers. The key feature of this type of business is associated with service industry in which the customer is provided with a series of activities to put more value on the product. Food distribution SMEs adopt two distinct features of complexity in a supply chain, which are “Food” and “Service”. The application of the quality in food distribution SMEs may be faced with difficulty due to interaction of complicated components in the business, including “Food attributes”, “Supply Chain”, “Leadership” and “Culture”. The effectiveness of any quality application depends

on how to deal with these interactions in each level, as each of these aspects are complicated when considered individually. Jiju Antony (2006) stated that it is important to note that the effective application of tools and techniques in a service environment is heavily dependent on effective and planned training, on an uncompromising support from senior management, and on a co-operative environment (4).

Cultural issues have in the past hindered quality application in food distribution SME within the UK. According to the nature of the business, a cultural interaction is very important factor in respect of business strategy and relationships in a food distribution SME as the vast majority of business owners of food distribution SMEs and their customers in the UK are from ethnic minorities. This dramatically impacts on the organizational behavior and the way the firm is approaching the application of quality initiatives. S Lagrosen (2003) indicated that there is an intimate relationship between culture generally and organizational culture. Research has shown several problems in relationship between companies that have their roots in cultural misunderstanding (5) and this will be more highlighted when it appears in a Supply Chain. In fact, a food distribution SME must align its quality with different cultures whilst at the same time a considerable barrage of food legislations must also be considered. As a result of this, implementing quality initiatives in a food distribution SME needs even more rigorous planning and relationship establishment than is normal. Lagrosen (2003) has argued as well that different problems of implementing quality initiatives will appear in different nations due mainly to the differences in culture, and so the way of implementation may need to be somewhat different in different countries.(5)

Human Resource management has always been a big challenge for the service industries, particularly when matters of quality are considered, and, furthermore, quality systems are greatly affected by the organizational behavior in service SMEs. Jiju Antony (2004), in his other publication, suggested that in service industries, the measurement system analysis is often a more general problem of data quality and integrity and that Human Behavioral Characteristics have the major influence on service processes (6).

3.0 Quality Initiatives

Quality initiatives are the key drives to import quality to any processes of SME. There are number of factors in embedding quality which enforce the management to apply them to establish high quality in the organisation. T Pfeifer et al (2004) in his publication stated that in general Quality Management Systems help to enhance product quality and to provide organisations with the means to achieve higher quality processes (7). Planning, resource allocation, a systematic approach and monitoring are the key factors which could be adopted when a quality initiative is applied. Food Distribution SMEs are not in general complicated process-based organisations and, in consequence, do not need highly technical aspects of quality initiatives. The critical affect of the

quality initiatives for this type of business is to reduce the risks and develop a systematic procedure in which the human issues can be fitted with quality aspect issues. In fact, there is no need for highly sophisticated quality programs as there is every chance that it might 'back fire'. "Yeb – You Lim (1999) suggested that highly formalized models do not fit in to an SME environment and could result in excessive bureaucracy (8). In this paper it was the intention to examine some major quality initiatives and their application in a food distribution SMEs. Total Quality Management, TQM, as one of the most fundamental quality initiatives, facilitates the SME to be prepared to more easily apply other quality initiatives in the future. M S Raisinghani (2005) recommended that TQM refers to a 'management methodology' to empower organisations for self-improvement. The implementation is usually top-down starting with upper management (9). In contrast, Six Sigma is a quality toolbox which can lead the food distribution SME to greater perfection. The path in Six Sigma application is also top-to-bottom. Management teams in food distribution SMEs must have a clear strategic view upstream and downstream in order to improve the quality of the service.

Just In Time, JIT, is another quality initiative which will be reviewed in this piece of work. The application of JIT for a food distribution can help it to improve efficiency and customer satisfaction. JIT can be utilized in Supply Chain Management and this may be the key answer to improve the efficiency in a food distribution SME. G Wittenberg (1994) announced that JIT improvement advocates what is termed "Flow Production" as against "Lot Production". The advantages of "Flow Production" are given as small quantities produced in large variety (10). Sometimes the Food Distribution SME is better to experience Kaizen in where the low profile management techniques along with continuous improvement policy can lead the organisation to greater perfection. G Wittenberg (1994) has also indicated in his publication that Kaizen is a policy of gradual continuous improvement at little cost, and this has considerable attractions for many companies. Much of Kaizen-type thinking relates to quality, but not only the quality of products but first and foremost it relates to the quality of people (10). The use of any of these quality initiatives in a food distribution business is not considered to be absolute and it could be affected by many other factors. Training, resource allocation, managerial constraints and level of integration are the key elements in any SME that can impact on the successfulness of quality initiatives.

A.Haikonen et al (2004) suggested that the management role is the foundation for the entire undertaking of improving processes and for enhancing learning (11). Although the management resistance to change is low in SME organisations, and this is one of the advantages, the management team in a food distribution might have been more challenging. Culture, understanding and commitment to the quality are the major reasons to be less interested to change in the food distribution SME. The difficulty to appropriately communicate with the existing and new customers in this particular business can

potentially harm the quality program and the full Integration of Quality initiatives is the best option to overcome this problem. T. Pfeifer (2004) stated that the future challenges for the implementation of Six Sigma will be the link of Six Sigma with the existing approaches of quality management and a 'smart' qualification that is oriented at the existing knowledge in the organization(7). This means that the management team does not need to over focus on one specific quality tool or initiative, since there might be failure to apply that quality tool effectively as the quality initiative and either another quality initiative might give a better result, or its integration with other different quality initiatives could have a better answer. Y.H, Kwak et al (2006) argued that organizations must realize that Six Sigma is not the universal answer to all business issues and it may not be the most important management strategy to apply quality. Researchers are trying to integrate Six Sigma with other existing innovative management practices to make Six Sigma more attractive to different organizations (12). Figure 1 shows that food distribution SMEs can adopt the quality initiatives in an integrated manner. This means that a food distribution SME can improve the understanding, planning and implementation of quality by adopting each of these initiatives and changing the behavior of the company.

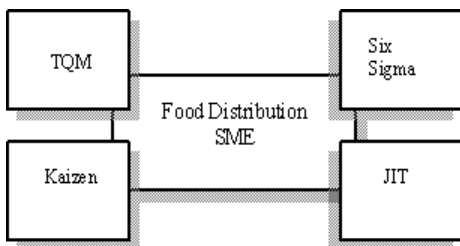


Figure 1 Quality Initiatives in a Food Distribution SME

4.0 Six Sigma

Six Sigma is a project-, data- and technology-driven quality management tool and acts as a business improvement strategy in order to improve the business competitiveness through reducing the defects and improving customer-oriented quality. In this article it was intended to focus more on the Six Sigma as a highly and rigorously systematic approach to greater quality based on figures and facts and it is one of the best tools to measure the performance in an organisation of any size or in any process. A food distribution SME is in the so-called 'service industry' in which quality attribution is unlikely to be clear for the quality management team due to unclear customer assessment and customer satisfaction criteria. Therefore, Six Sigma could be a good approach, since it is a process based on performance measurement and this is a fundamental requirement to improve the Supply Chain. Arguably, Six Sigma is not always a bunch of clear and great results in the service industry. R.S.Behara (1995) argued that Customer satisfaction is a multi-stage process rather than a single-stage process. By this statement he meant that it is even more difficult to reach a level of Six Sigma in the customer Satisfaction arena (13). It has been suggested that implementing Six Sigma in the service industry could be more difficult in the manufacturing side, as

the human recourses and ambiguity could impact on the application of Six Sigma. R McAdam et al (2004) has reflected this suggestion that non-manufacturing organisations must make more effort in terms of Human Resource focus when applying Six Sigma or any other quality initiatives (14).

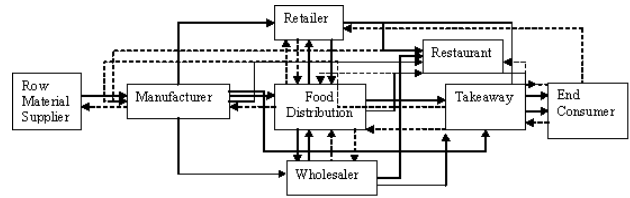


Figure 2 – The complexity of food chain with the food distribution in centre

Six Sigma has a great link with other quality initiatives and our intention is to highlight the values of the integrated approach of all these tools to achieve a collaborative Supply Chain in the food distribution SME. E. D. Arnhieter et al (2005) in his publication has emphasized the importance of the integration of Six Sigma and Lean Management and has stated that today "Six Sigma is a combination of the Six Sigma statistical metric and TQM, with additional innovations that enhance the program's effectiveness while expanding its focus". The main components of Six Sigma retained from TQM include a focus on the customer, recognition that the quality is the responsibility of *all* employees, and the emphasis on employee training (15). The importance of the integrated view of these quality initiatives will enable the management team in food distribution SME to avoid individualistic views and, instead, enlarge their cross-functional view and increase their ability to look at 'quality' from different angles. N. R. Senapati (2004) believed that TQM is an approach to improving the competitiveness, effectiveness and flexibility of a whole organisation. According to Barclay (1993)(29), the impact of TQM on any organisation is first to ensure that the management adopts a strategic view of quality (16).

Six Sigma as a tail of TQM can be next step to identify the most critical aspects of quality and solve the problems through performance measurement in a systematic way. Contribution of Six Sigma in Supply Chain has been acknowledged as its methodology can be adopted to improve Supply Chain through different aspects. Crompton Corporation on their Elsevier publication (2004) have indicated that Six Sigma has proven to be extremely valuable by reducing the cycle time, by providing new problem- solving tools and by providing improved functional and customer alignment and by allowing calculations of the value of R & D(17). Six Sigma has a collaborative interaction with SC as balanced score card is a top requirement for both to define the customer requirements.

5.0 Supply Chain Management and Food Distribution

Supply Chain Management (SCM) is rapidly becoming the most important aspect of business success. Those who manage their Supply Chain effectively will flourish, whilst those who do not achieve success in this respect may not be around in a

few years. This is true for all types and sizes of businesses including food distribution SMEs. A.Gunasekaran (2001) has defined the SCM as a system whose constituent parts include suppliers, production facilities, distribution services and customers linked together via the feed forward flow of materials and the feedback flow of information (18). SCM includes the management of information systems, purchasing, customer service, sourcing, transportation, production scheduling, order processing, inventory management, warehousing and marketing. Therefore, it appears that SCM can tremendously affect the efficiency of any business and the food distribution businesses are in the centre of this attention. A food distribution heavily involves in procurement, order processing, customer service, inventory and warehousing. Figure 2 shows the complexity of the flow of information and goods in the food chain and the effectiveness of a food distribution in the efficiency of the chain. It has been located at the centre of the chain and this makes dealing with the upstream and downstream more difficult in order to meet the quality and service attitude

Customer satisfaction, customer service, flexibility, inventory reduction, lead time reduction, Total Cash Flow, JIT operations, order processing and transportation are the key elements of SC for a food distribution SME. These factors can be hardly met in a complex chain without inserting some sort of systematic quality tool to diagnose, to measure and eliminate the road blocks and problems. For instance, the food distribution needs to have an appropriate customer complaint system to deal with the complicated flow of complaints from customers that need to be transferred to the first or second tier suppliers and being closely monitored up to the point of solution.

Perhaps, Six Sigma could be a good quality tool to lead the management team through the chain and combating the risk of dependability and complexity in the Supply Chain. Lean Six Sigma, JIT or Kaizen can accelerate achieving the Supply Chain objectives through a systematic approach based on performance measurement and data analysis. D.M. Lambert et al (2001) pointed out in his paper that several factors are contributing to management's need for new types of measures for managing the supply Chain including the complexity of Supply Chain Management and the requirement to align activities and share joint performance measurement information to implement strategy that achieves Supply Chain objectives (19).

Performance measurement is a key element in SC in order to improve its performance regardless of the type of the business. Performance Measurement is a process of data gathering, information exchange, measurement and analysis of the data to establish the Key Performance Indicators (KPIs). Gunasekaran et al (2001) has stated that the emphasis is on performance measures dealing with suppliers, delivery performance,

customer service, inventory, logistics costs and customer satisfaction in a SC (18).

L. Lapide (2000) has recommended six major steps to set the performance measurement in SC as including: (20)

- Strategic SC vision and objective
- Define executive level measure for each objective through Scorecard
- Establish managerial objectives aligned with executive measures
- Identify SC initiatives which address the objectives
- Establish a measurable target for all metrics
- Implement new initiatives to keep track of performance improvement

These steps literally represent the whole idea of the Six Sigma methodology of DMAIC and that is the interesting part of the story to support the SCM integration with Six Sigma through a systematic performance measurement system.

6.0 Theoretical Development

The back ground of this investigation was involved in examining the hypothesis of the implementation of various quality initiatives:

Ho . The small and simple projects through quality initiative tools can help the food distribution SMEs to improve the quality of Supply Chain.

The aim of this research was set in two different levels. Clarifying this hypothesis through a questionnaire and Statistical analysis in the first level was the key objective and then indicating the best quality initiative tool to be applied in a food distribution SME was the second objective. The team decided to examine whether Six Sigma, JIT, Kaizen, ISO9000 or TQM can be practical in this type of business. According to the studies, any type of the businesses with any size potentially can improve their quality through projects to achieve the continuous quality behavior. H Neerland et al (2000) emphasized that the main objective of the quality improvement projects is to establish a durable quality development process and culture in which the management and the workforce actively participate and cooperate jointly to achieve the aims (21). This article intended to verify the effectiveness of systematic quality initiatives and Statistical process control tools in a food distribution SME. The fact of "Terminology" and "Understanding" of the quality initiatives were the key concern of the research team in this case. The nature of business, culture, business strategy and training development led the team to distinguish between the food distribution SME and other service SMEs. Therefore, it has been decided that there should be a difference between the food distribution firms in terms of understanding and actual application of the quality initiatives. The target of our questionnaire was set based on level of understanding and actual practice of the quality initiatives.

The quality in the food distribution SME for this research has been defined as anything which can add more value to the Supply Chain. Therefore, all aspects of Supply Chain Management for a distribution business have been emphasized in this article. The degree of effectiveness of understanding and practice of quality initiatives in Supply Chain objectives for a food distribution SME is another aim of this article. Both Supply Chain and quality initiatives intend to meet the business strategy which is the biggest value in the businesses. It is suggested that many of the most critical business strategies for a distribution business are laid on Supply Chain objectives. Integration of quality initiatives internally and with Supply Chain can help to have more effective results to achieve the targets in business strategy and bottom line. M Quayle (2003) stated that Supply Chain Management provides an opportunity for SMEs to align Supply Chain objectives with business strategy. It is an opportunity to understand the steps, the time, the costs and the value drivers. Also, it is an opportunity to develop and maintain relationships and to identify skills and competences (22). It is believed that an integrated approach of Supply Chain and Quality initiatives can help to achieve the requirements of Supply Chain Management. This has highlighted the benefit of this research in which the value adding to the bottom line through Supply Chain objectives will be verified for a food distribution SME by investigating the extend of understanding and practice of quality initiatives.

Ultimately, this study aims to review the Hypothesis through a questionnaire in order to initiate the possible implementation of integrated approach of quality initiatives in a food distribution business. This article is offering some other options with less complexity and risk than the SC models including "Supply Chain Operation Reference" (SCOR) model to maintain the Supply Chain Management for a small food distribution with existing complexity of the chain and limited resources.

7.0 Methodology

A total of 50 well-designed and moderated questionnaires were sent out to those food distribution SMEs in the entire UK with an average employee number of 60 people. The lists of the companies were obtained from the internet and with the help of a local food distribution SME in the North East of England, which was used as local based company for the research.

The response rate of the questionnaire was 28%, which is particularly good for a survey of this type. A total time allowance of three weeks was allowed for distribution of the questionnaires and the collection of the feedback from the respondents.

The questionnaire was made up of three sections, namely sections A, B and C. Section A was designed to collect fundamental information of the industries involved, such as the name of the company, type of business, position of the respondent and the number of the employees. Section B was made up of 25 questions to find out the awareness in the particular SME of the quality initiative tools and to find out

whether they have carried out any type of quality initiative project. Also, the questionnaire asked the respondents to estimate the level of their knowledge about the quality initiative tools, i.e. whether they considered the knowledge to be 'very good', 'good', etc. Section C was designed to find out the principle objectives in Supply Chain for a distribution business including the relationship between the SMEs and their customers, the service provided to the customers, the waste level in their operations and whether or not the SMEs measure their performance and the type of logistic used in the SMEs.

In fact, the purpose of the questionnaire was to align the section C as the SC principles with section B in order to review the possibility and benefits of implementation of the quality initiative tools in the SC to maintain the objectives.

8.0 Findings and analysis

The data was compiled and analysed by using a statistical tool called Frequency Analysis operated using the Microsoft Excel program. In Section A the respondents were asked to indicate their position in the company. As figure 3 below shows most of the respondents were the operational managers, which is ideal because they are the employees in the closest contact with the data and measures.

Respondents were also asked whether they are aware of the different quality initiative tools and 35.7% of them indicated that they are aware of the Six Sigma at some level, although 57% of them,

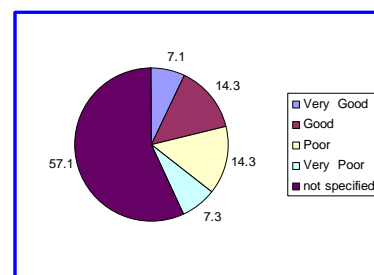


Figure 3 – The percentage of the respondent's roles who were aware did not specify the level of awareness.

Only 7% of the respondents rated their knowledge as 'very good' in respect of programs such as Six Sigma. The information on the responses is shown in a 'pie chart' below as these findings support the view that Six Sigma is a relatively new concept within the food distribution SMEs and indicates that

some sort of awareness program is needed in the industry. However, nearly 36% of the respondents had answered positively to the same concept but through simpler statement without indicating the terminology of "Six Sigma".

These finding has indicated that nearly 43% of the respondents were aware of certain factors such as 'continuous improvement' or Kaizen, but only 29% of them had a good knowledge of the Kaizen system and had actually tried it in their

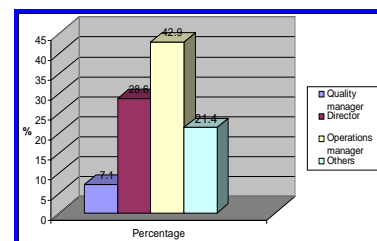


Figure 4- The level of Six Sigma awareness

organisation. When the respondents had been asked the same question but by simpler definition and no terminology of “Kaizen”, they had responded that 57% of them had experienced the same projects.

The results indicate that more than 71% of respondents have tried a project aiming to eliminate or reduce the waste through providing the right goods in a right time and in the right place, a process that is commonly called “Just in Time” (JIT). The level of awareness and practice of the quality initiative tools among the respondents was reviewed and as figure 5 below shows there was an almost same regression between actual practice and awareness in Six Sigma, JIT and Kaizen. Surprisingly, the awareness and practice in TQM didn’t get to the same direction. This means that there could be confusion within the respondents about the terminology of these tools. JIT approach has been the most used tool as nearly nobody responded positive to using the TQM when they had been asked by direct term of “TQM”. However, literally TQM is the base of using other quality tools as it is a basic and fundamental quality philosophy.

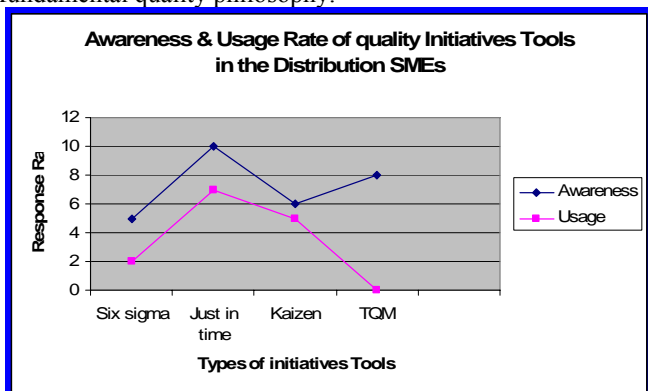


Figure 5 – The level of awareness and usage of the quality initiatives

Presumably, the respondents should never have a genuine practical expertise of other quality initiative tools unless they have the reasonable knowledge over the basic aspects of TQM philosophy.

The research team determined to use the data analysis to verify the effectiveness of the quality initiatives in improving the Supply Chain objectives. Generally, it was observed from the survey that 47.8% of the respondents are *not* aware of quality initiatives, emphasizing the point made earlier. Furthermore, in order to examine the relationship between record keeping as one of the major aspect in Supply Chain performance measurement, doing actual small projects and level of awareness in quality initiatives, the team decided to analyse the level of data collection and record keeping. This study revealed that 79% of respondents had some sort of procedure to keep the records and data analysis. This gives a clear indication that there is a good potential in these companies to measure the performance, since good record-keeping is essential to monitor success. Roughly 33% of these respondents had already experienced small projects with the

same purpose of the Six Sigma and Kaizen methodology. However, in contrast, only 15% of the respondents had responded positively to whether they used the Six Sigma and Kaizen when they had been asked directly in the questionnaire

Responsiveness to a customer complaint is a Key Factor in customer development and Supply Chain Management. Therefore, the research team decided to analyse the relationship between responsiveness to a customer complaint and quality initiative practice. The analysis indicated that more than 70% of the respondents were highly responsive to a customer complaint. More than 78% of the respondents have a specific customer enquiry line to deal with the issues that customers raise and records are kept. The survey has revealed that more than 93% of the respondents want to keep the inventory level low through implementing any kind of quality tool or SC model. Around 50% of the respondents claimed that the level of their supplier’s response is important for them and is in generally between 75% and 95%. The average level of out-of-date or damaged goods among the respondents was found to be less than 5% and more than 78% of the respondents indicated that they have a procedure of performance measurement in their company.

The team have examined the totality of these replies and have endeavored to ascertain which quality initiative tools would be the best for the food distributions SMEs based on the result of the questionnaire and the findings are shown below in Table 1. It has been found that more than 71% of the respondents were aware of Just in Time as 50% of them had applied some sort of projects associated with the JIT. It has also been identified that more than 53% of the respondents had already carried out some works associated with the Six Sigma as just less than 36% of them are aware of Six Sigma. It seems Kaizen was the most successful tool as 57% of them had used some works associated with this tool and 50% of them stated that it had been very effective for the respondents.

	Six Sigma	JIT	Kaizen
Awareness	35.7%	71.5%	43%
Associated projects used	53.6%	50%	57%
Average level of effectiveness	28.5%	36%	50%

Table 1 – Comparing of the quality initiative for a food distribution SME

The research team suggests that the best possible quality initiative tools for the food distribution SMEs is unlikely to be based on a sole tool or practice. The findings suggests that integrated approach of all quality initiative tools along with SCM can not only improve the SC efficiency for these types of businesses through overlapping each other, but can potentially increase the level of knowledge and understanding of these quality initiatives. It is considered that this will ease the terminology and practice of these quality initiatives for the change agents while increasing the chance of applying the most

appropriate practices for these SMEs to achieve the target through verifying the best practice accordingly. These practices are including Continuous Improvement teams, Small Projects, Continuous Performance Measurement and Data Analysis. For example, a small Continuous Improvement Team within an organization can be in charge of doing small projects with the background of Six Sigma methodology of DMAIC by using basic tools. The Team can also adopt the objectives to dramatically improve the JIT approach in the service industry under the name of Six Sigma and the training of 'change agents' and top management team as Green Belt (A part time Six Sigma specialist) or under another program.

9.0 Discussions/Conclusions

9.1 Discussions

Supply Chain Management (SCM) has not currently benefited entirely by the performance measurement yet due to difficulties and complexities in SC. F.T.S. Chan et al (2003) mentioned in their publication the statement that Gunasekaran (2001) and Beamon (1999)(30) believed that, although SCM has become common practice across all industries and a steady stream of articles dealing with theories and practices of SCM have been published, the topic of performance measurement of SCM does not receive adequate attention (23). Implementing a quality initiative tool requires a set of rigorous performance measurement theories and practices in order to materialize the effectiveness of the quality programs. Chan and his co-workers also stated that Waggoner (1999)(31) and Stainer (1997)(32) believed that performance measurement is essential for any business to effectively plan, control and improve the efficiency of the existing processes and to make them more sustainable (23). Referring to these statements from experts, the quality initiative tools can potentially enable the service SMEs to enlarge their view, their cross functionally and should allow them to benchmark their performance while eliminate the variables and dissatisfaction driving elements through small projects and within a defined time. In fact, the timely and sometimes complicated external or theoretical performance measurement models can be replaced by the basic quality tools in service SME to achieve the target value. Kit C.B. Roes (1997) stated that classical measurement methods of service quality such as Benchmarking is too long to provide adequate feedback for front office and that instead well-directed customer survey or risk analysis can be used (24).

These arguments will potentially support the determination of the research team to adopt the appropriate quality initiative tool in the distribution SME. The findings of the questionnaire has indicated that the respondents were confused about the terminology, since when they had been asked about terminology and the practice of the same quality initiative the answers did not support each other. It was realized that there were a number of small projects which had been carried out in the respondent companies with the same purpose as the quality initiative tools like Six Sigma and JIT but they had no idea about the concept, definition and terminology of these quality

initiatives. Hence, this can support the fact that the food distribution SME can implement quality initiative tools. It was realized that 64% of the respondents had been experiencing some types of waste but only 29% of them had already mapped their process. The simple training of the different positions in these companies will enable them to do a process map in order to identify the waste within the process, while there is no need of complicated statistical process control tool. Training the warehouse manager and marketing manager through a simple *continuous improvement* policy and *team working* will enable these companies to reduce the level of inventory and to improve the flexibility and customer satisfaction. In fact, when the management team intends to implement the change, the cross-functionality of the processes can help if all members or departments have enough understanding and are supportive of the changes proposed. This would not be a 'mission impossible' for the food distribution SME as the change resistance is generally low in SME businesses. K.K. Buch (2004) claimed that it is clear that employee expectancies of successful participation require cooperation and coordination between change organizational leaders (25). The research team has found that the managers of the warehouse, marketing, quality, transport, office and the head managers or directors are the key change agents for a food distribution SME.

The established Quality experts believe that there are some weaknesses to implement quality initiative tools in SME as J.Antony argued that there are many weaknesses of implementing Six Sigma in SMEs, which could potentially endanger the application in these types of companies (4, 6). Some of the key weaknesses are:

- Cost of planning, implementation and control
- Less People resources
- Technical constraints
- Lack of knowledge and systematic training

However, these problems could be solved or at least minimized through an integrated approach of different tools to be applied in alignment with SC in the food distribution SMEs. The team argues the difficulty of implementation of Six Sigma in a service SME like food distribution SME by pin-pointing on small, simple projects using basic statistical tools to measure and improve the SC performance of these companies. Implementing SCM itself in the service industry is inherently difficult as service quality is often invisible and difficult to implement in SC or customer / Supplier Co-Development. Service quality can be adopted in integration with SCM for a food distribution SME if its pre-requisites are met within these organizations. B. Edvardson (1998) described the service quality by means of ten basic factors, which included dependability, willingness, competence, availability, courtesy, communication, trustworthiness, assurance, empathy and tangibility (26).

The finding of this research has emphasized the need for basic knowledge and training for the change agents to understand the terminology of the quality initiative tools. The findings have suggested that it is the matter of improving the understanding and training of the stakeholders before applying any quality initiative tools. It is suggested the application of the tools will not be successful unless the top management and change agents in food distribution SME are clear about the purpose, about the planning, about the analysis and the tools. It has also been suggested that the priority of the organizational path in terms of training depends on the tool to be used. If the management team in the food distribution SME decided to apply Kaizen, for example, then it is the responsibility of the department managers and Kaizen Team to motivate and involve the shop floor staffs and drivers. On the other hand, if the Six Sigma system is to be applied it is another story, as the management team needs to be fully trained via Green Belt by the external or internal agents. Warehouse managers, transport managers, marketing managers and office managers are required to be trained through Green Belt as one Six Sigma specialist. Therefore, Six Sigma will need more investment before seeing the benefits. A food distribution SME is very limited in time and employee availability as normally the drivers are out of the company delivering the goods and when they are in the warehouse they are busy with loading or offloading the wagons. So, this makes it more difficult to implement the Six Sigma. However, the research team has identified that if the integration approach of tools including applying JIT and Kaizen through DMAIC is considered, then it will be more practical for the food distribution SMEs to select the small projects through breakthrough activities. T. Bendell (1995) pointed out that management commitment and awareness, planning and team working are three critical success factors for implementing quality initiatives (27). A. Larson (2003)(33) in K.K. Buch's publication introduced the required elements to implement Six Sigma and any other quality initiatives as reward and recognition, uniform measurement, communication, facilitators, senior executive modeling and training (25).

9.2. Conclusion

It has been concluded that in general the quality initiatives, especially Six Sigma, are the new wind blowing for the food distribution SMEs. In today's term, Six Sigma and other quality initiatives are the management practices to achieve perfection in service performance through effective utilization of statistical and non-statistical tools and techniques. The result of this questionnaire has emphasized that food distribution SMEs are not using the quality initiatives in principle while they had already been applying the works or projects with the same purpose. The research has also indicated that integration of Kaizen with JIT, along with adopting the DMAIC methodology of Six Sigma, can be aligned with SCM to improve the customer / Supplier Co-Development, which is the most critical objective in SC for a distribution SME. It is suggested that continuous performance measurement in SC is not a very hard job for the

food distribution SMEs if it is systematic, clear for the management team and understandable and practically easy to use. Also, it has been concluded that the objectives of SCM and quality initiatives are *not* in contradiction with each other. C.H. Kuei et al (2003) quoted the suggestion of Lin et al (2003) paying special attention to operational processes and supplier participation programs if stake holder's needs along the Supply Chain are to be met (28).

It has been concluded that quality initiatives can be used in a food distribution SME if they are clear for the top management and change agents to gain their commitment and involvement. It must be translated to the financial terms to reflect the bottom line and it must be easy, relatively cheap and small in time commitment. There could be numerous issues in terms of warehousing, logistics and marketing for food distribution SMEs to be investigated and improved through revealing the problems, analyzing them and improving the performance. The implementation of the proposed integrated model in food distribution SME can reduce the risk of dependability, out-sourcing, culture and reliability if the bottom line and customer demand is considered. The quality attribute for a food distribution SME as a service industry in food business is ambiguous, uncertain and inconsistent and it is required to have a customer relationship policy before adopting any quality initiative.

Finally it is concluded that Food distribution SMEs have got the potential to implement the quality initiatives if there is an integrated and collaborative approach in alignment with SC objectives and if there is enough knowledge of the terminology, the principles and the tools in quality initiatives.

References

- 1- K. Linderman, R G. Shroeder, A S.Choo, "Six Sigma: The role of goals in improvement teams", Journal of operations Management, 2005,
- 2- J.Antony, M.Kumar, "Six Sigma in small and medium sized UK manufacturing enterprises", International journal of quality and reliability management, Vol22, No8, 2005, pp 860-874
- 3- G.Wessel, P.Burcher, "Six Sigma for small and medium-sized enterprises", The TQM magazine, Vol16, No4, 2004, pp 264-272
- 4- J.Antony, "Six Sigma for Service processes", Business Process Management Journal, Vol12, No2, 2006, pp 234-248
- 5- S.Lagrosen, "Exploring the impact of culture on quality management", International Journal of Quality and Reliability Management", Vol20, No4, 2003, pp 473-487
- 6- J. Antony, "Six Sigma in the UK service organisations: result from a pilot survey", Managerial Auditing Journal, Vol19, No8, 2004, pp 1006-1013
- 7- T.Pfeifer, W.Reissiger, C.Canales, "Integrating Six Sigma with quality management systems", the TQM Magazine, Vol16, No4, 2004, pp 241-249
- 8- Y.Y. Lin, "Success factors of small & medium sized enterprises in Taiwan: an analysis of cases", Journal of small business Management, Vol36, No4, 1999, pp 43-56
- 9- M S. Raisinghani, "Six Sigma: Concepts, tools, and applications", Industrial Management & Data Systems, Vol105, No4, 2005, pp 491- 505
- 10- G. Wittenberg, "Kaizen - The Many ways of getting better", MCB university press, Assembly Automation, Vol14, No4, 1994, pp 12 - 17

- 11- A.Haikonen, T.Savolainen, P.Farvinen, "Exploring Six Sigma and CI capability development: preliminary case study findings on management role", *Journal of manufacturing Technology Management*, Vol15, No4, 2004, pp369-378
- 12- Y.H.Kwak, F.T.Anbary, "Benefits, Obstacles, and future of Six Sigma approach", *Technovation*, 26, 2006, 708-715
- 13- R S.Behara, G F.Fontenot, A.Gresham, "Customer Satisfaction Measurement and analysis using Six Sigma", *International Journal of Quality and Reliability Management*, Vol12, No3, 1995, pp 9-18
- 14- R. McAdam, B.Lafferty, "A multilevel Case Study critique of Six Sigma: Statistical control or strategic change?", *International journal of operation and production Management*, Vol24, No5, 2004, pp 530 – 549
- 15- A D.Arnheiter, J.Maleyeff, "The integration of Lean Management and Six Sigma", *The TQM Magazine*, Vol17, No1, 2005, pp5 – 18
- 16- N.R.Senapati, "Six Sigma: Myths and Realities", *International Journal of Quality and Reliability Management*, Vol21, No6, 2004, pp 683 -690
- 17- Reinforced Plastics, Jul/Aug 2004
- 18- A.Gunasekaran, A.Patel, E.Tirtiloglu, "Performance Measures and Metrics in a Supply Chain environment", *International Journal of Operations & Production Management*, Vol21, No 1 / 2, pp 71 -87

- 19- D M. Lambert, T L. Pohlen, "Supply Chain Metrics", *International Journal of Logistics Management*, Vol12, No1, 2001, pp 1 -19
- 20- L.Lapide, "What about measuring Supply Chain Performance", *AMR Research, Ascet*, www.ascet.com, Vol2
- 21- H.Neerland, T.Kvalfors, "Practical experience with quality improvement in small companies", *Integrated Manufacturing Systems*, 11 / 3, 2000, 156 – 164
- 22- M.Quayle, "A Study of Supply Chain Management practice in UK industrial SMEs", *Supply Chain Management: An International Journal*, Vol8, No1, 2003, pp 79 -86
- 23- F T.S.Chan, H.J.Qi, H.K.Chan, H C.W. Lau, R W.L.IP, " A conceptual model of performance measurement for supply chains", *Management Decision*, Vol41, No 7, 2003, pp 635 – 642
- 24- K C.B.Roes, D.Dorr, "Implementing Statistical Process Control in Service Processes", *International Journal of Quality Science*, Vol2, No3, 1997, pp 149 – 166
- 25- K K. Buch, A.Tolentino, "Employee expectancies for Six Sigma success", *Leadership and Organisation Development Journal*, Vol27, No1, 2006, pp 28 – 37
- 26- B. Edvardsson, "Service Quality Improvement", *Managing Service Quality*, Vol8, No2, 1998, pp 142 – 149
- 27- T. Bendell, R. Penson, S. Carr, "The Quality Gurus – their approaches described and considered", *Managing Service Quality*, Vol5, No6, 1995, pp 44 -48
- 28- C H. Kuei, C N. Madu, "Customer – Centric Six Sigma quality and reliability management", *International Journal of Quality and Reliability Management*, Vol20, No8, 2003, pp 954 – 964
- 29- C A. Barclay, "Quality Strategy and TQM policies: empirical evidence", *Management International Review*, Vol33, No1, 1993, pp 87 – 98
- 30- M.B.Beamon, "Measuring Supply Chain Performance", *International Journal of operation and production management*, Vol19, No3, 1999, pp 275 – 292
- 31- D B. Waggoner, A.D.Neely, M.P.Kennerley, "The forces that shape organizational performance measurement systems: An interdisciplinary review", *International journal of production Economics*, Vol60, 1999, pp 53 - 60
- 32- A. Stainer, "Logistics – a productivity and performance perspective", *Supply Chain Management*, Vol2, No2, 1997, pp 53 – 62
- 33- A. Larson, "Demystifying Six Sigma, AMACOM, New York, 2003
- 34- L C.Chow, W S.Madu, C N.Kuei, Yu.P, "A Structural equation model of supply chain quality management and organizational performance", *International Journal of Production Economics*