

INTEGRATION OF JUST IN TIME AND TOTAL QUALITY MANAGEMENT WITH SUPPLY CHAIN MANAGEMENT: MANUFACTURING INDUSTRY PERSPECTIVE

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ABSTRACT

Indian industries are in the process of implementing best production practices of Supply Chain Management (SCM), Just in Time (JIT) and Total Quality Management (TQM). These practices are being applied in isolation and collectively in different combinations. The integration of these practices is a major issue which this paper will try to address. Models of these practices as applicable to industry are being studied and analyzed. An integrated model has been formulated. The effect of integration needs to be analyzed in terms of parameters like customer delight, reduced cost of poor quality, reduced inventory, reduced wastage of raw material, better reputation in the market, increased productivity and less error. The integrated model will provide insight into the process improvement methodology, product quality and product delivery. This model can be generalized to suit manufacturing organizations of north India. Thus, the conceptual model is being based on the available literature on these practices. The integrated conceptual model as proposed can be further validated using case study.

Keywords: Just in Time, Flexibility, Lean Manufacturing, Manufacturing Industries, Model, Supply Chain Management, Total Quality Management

I INTRODUCTION

Globalization has effected and affected the competitiveness of industries in India, very much as other part of world. We need to understand SCM, JIT, and TQM, in isolation. How they effect an organization and what are parameters through which it can be measure is available in the literature. The supply chain concept is theorized from the formation of a value chain network consisting of individual functional entities committed to providing resources and information to achieve the objectives of efficient management of suppliers as well as the flow of parts (Lau and Lee, 2000). Supply chain management (SCM) includes a set of approaches and practices to effectively integrate suppliers, manufacturers, distributors and customers for improving the long-term performance of the individual

firms and the supply chain as a whole in a cohesive and high-performing business model (Chopra and Meindl, 2009). Supply Chain competitiveness has been described as a multidimensional and relative concept. The significance of different criteria of competitiveness changes with time and context. Theories and frameworks need to be flexible enough to integrate the change with key strategic management processes if their utility is sustained in practice. We want to study the effect of their practice when integrated.

Just in Time is both a philosophy and collection of management methods and techniques used to eliminate waste (particularly inventory). Waste results from any activity that adds cost without adding value, such as moving and storing. Just-in-time (JIT) is a management philosophy that strives to eliminate sources of such manufacturing waste by producing the right part in the right place at the right time. JIT has been applied in practice since the early 1970s in many Japanese manufacturing organizations. It was first developed and perfected within the Toyota manufacturing plants as a means of meeting consumer demands with minimum delays. Just in time (JIT) is capable of improving profits and return on investment by reducing inventory levels, elimination of waste like overproduction, waiting time, transportation, processing waste, unnecessary movement, product defects, variability, production and delivery lead time and costs such as those associated with machine setup and equipment breakdown. TQM is the integration of planning and control activities regarding quality. It is basically an integration approach toward quality function in any design. The basis of TQM is to reduce the errors produced during the manufacturing or service process, increase customer satisfaction, streamline supply chain management, aim for modernization of equipment and ensure workers have the highest level of training. One of the principal aims of TQM is to limit errors to 1 per 1 million units produced. Total Quality Management is often associated with the development, deployment, and maintenance of organizational systems that are required for various business processes. Total quality management (TQM) is a philosophy mainly dominated by large companies but the fear of losing contracts prompts small and medium enterprises to bring quality into their system.

The aim of our paper is to review and analyze those surveys / studies that have been reported on the relationship between SCM, JIT & TQM integration, and to highlight a number of concerns with regard to this type of research. In this paper the research is driven by theoretical considerations and follows a clear process, as this allows conclusions to be drawn on the basis of available literature.

Thus we try to identify major works on Total Quality Management, Just in Time, research integrating with Supply Chain Management, and thereafter, to classify them so as to identify gaps, issues and opportunities for further study and research.

II LITERATURE REVIEW

2.1 Supply Chain Management

Mentzer et al. (2001) consider SCM as a systemic, strategic coordination of business functions within an organization and between organizations within the supply chain, for improving the long-term performance of individual companies and the supply chain as a whole. Furthermore, Lummus and Vokurka (1999) add that SCM

links all the departments within an organization as well as all its trading partners (viz: suppliers, customers, 3PL providers, and information systems providers). There is mutual collaboration and companies work together to make the whole supply chain competitive. Information technology is widely used to share information and generate demand forecasts. The underlying idea in SCM is that the entire process must be viewed as a single system Bowersox and Closs (1996) argued that to be fully effective in today's competitive environment; firms must expand their integrated behavior to incorporate customers and suppliers. This extension of integrated behaviors, through external integration, is referred to by Bowersox and Closs (1996) as supply chain management. In this context, the philosophy of SCM turns into the implementation of supply chain management: a set of activities that carries out the philosophy. This set of activities is a coordinated effort called SCM between the supply chain partners, such as suppliers, carriers, and manufacturers, to dynamically respond to the needs of the end customer

2.2 Just In Time

Demmy and Constable (1988) discussed various techniques of JIT such as quality, work methods, layout, relationships with customers and suppliers and production scheduling and control. It was concluded that JIT is a philosophy of eliminating waste and involvement of people in the management. Gupta and Haragu (1991) had shown that, JIT is not just a way to reduce inventory but it is a mean of solving problems that block the building of an excellent manufacturing organization. Its applications and benefits apply not only to the shop floor but also to the marketing, purchasing and accounting aspects. But benefits from this system cannot be achieved overnight. Aksoy and Ozturka (2011) used a novel approach based on a neural network for supplier selection and performance evaluation in JIT production environments. In the neural network based supplier selection system, suppliers are represented as an input vector in terms of quality. Inman et al. (2011) theorized and tested a structural model incorporating agile manufacturing as the focal construct. The model includes the primary components of JIT (JIT-purchasing and JIT-production) as antecedents and operational performance and firm performance as consequences to agile manufacturing. Using data collected from production and operations managers working for large U.S. manufacturers, the model is assessed following a structural equation modeling methodology.

2.3. Total Quality Management

Jose et al (2005) suggested that there is a parallelism between TQM companies and those who are committed to flexibility by Correlation Matrix. Corinne et al. (2004) interactive effects of machine and labour flexibility on mix flexibility. Alvaro et al. (2003) examines TQM program in a public sector interact with the work environment.

III INTEGRATED MODEL OF JIT AND TQM WITH TQM

3.1 SCM Model: Supply chains encompass the companies and the business activities needed to design, make, deliver, and use a product or service. Businesses depend on their supply chains to provide them with what they need to survive and thrive. Every business fits into one or more supply chains and has a role to play in each of them.

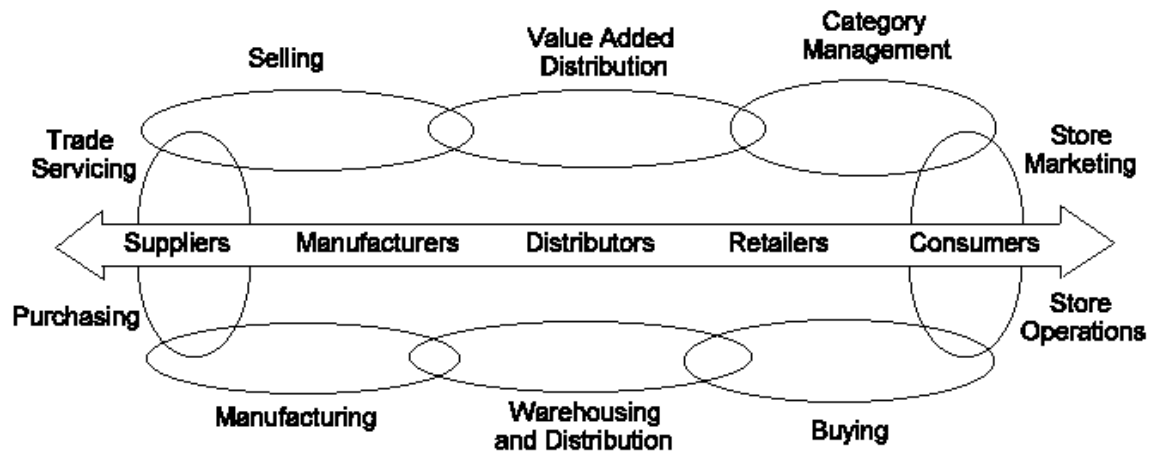


Figure 1:- Demand-Supply Model Supply Chain Management (by Bill Copacino in 1997)

To have an effective supply chain management framework; organizations must have a clear understanding of the supply - demand nexus and its implications for strategy and implementation. There is an interdependent relationship between supply and demand; organizations need to understand customer demand so that they can manage it, create future demand and, of course, meet the level of desired customer satisfaction. Demand defines the supply chain target, while supply side capabilities support, shape and sustain demand.

The core process of the supply and demand chains viewed from a broad cross-enterprise vantage point rather than as discrete function. To gain the maximum benefits, organizations need to identify the core processes across the demand and supply chain, as well as exploring the impact of each of these processes on the different functions.

Supply chain management is the process of planning, implementing, and controlling the operations of the supply chain as efficiently as possible. Supply Chain Management spans all movement and storage of raw materials, work-in-process inventory, and finished goods from point-of-origin to point-of consumption. Figure shows the SCM model, how this work. Basically this is from customer to customer, it start from the customer and end at the customer.

3.2 Jit Model : JIT is a manufacturing system, where the parts that are needed to complete the finished products are produced or arrive at the assembly site, as they are needed. We mostly use JIT in manufacturing of high cost product according to the customer requirement. Productivity is increased by using JIT and increasing lot of benefits and mainly every field of production system. It includes product design, process design, organizational elements manufacturing planning and control. It means to eliminate the waste.

Just-In-time (JIT) is defined in the APICS (American Production and Inventory Control Society) dictionary as “a philosophy of manufacturing based on planned elimination of all waste and on continuous improvement of productivity”. It also has been described as an approach with the objective of producing the right part in the right

place at the right time (in other words, “just in time”). Waste results from any activity that adds cost without adding value, such as the unnecessary moving of materials, the accumulation of excess inventory, or the use of faulty production methods that create products requiring subsequent rework. JIT (also known as lean production or stockless production) should improve profits and return on investment by reducing inventory levels (increasing the inventory turnover rate), reducing variability, improving product quality, reducing production and delivery lead times, and reducing other costs (such as those associated with machine setup and equipment breakdown). In a JIT system, underutilized (excess) capacity is used instead of buffer inventories to hedge against problems that may arise.

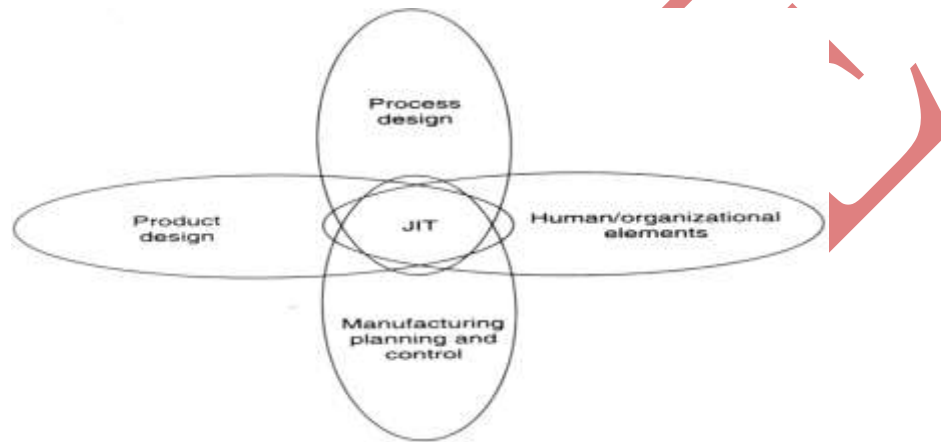


Figure2:-Just in Time model

JIT is just not a technique or set of techniques of manufacturing, but is an advanced approach or philosophy which embraces both new and old techniques and provides a wide range of benefits by renovation of existing manufacturing systems. A simple definition of JIT is to produce and deliver finished goods just in time to be sold, subassemblies just in time to be assembled into finished goods, fabricate parts just in time to go into subassemblies, and purchase parts just in time to be transferred in to fabricated parts.

The basic premise of JIT is to have just the right amount of inventory, whether raw materials or finished goods, available to meet the demands of production process and the demands of end customers. The focus is on minimizing raw material, work-in-process and finished goods inventory with a view to cutting inventory costs and also helping to expose other more serious inefficiencies (poor maintenance, inspection backlogs, etc.) in the manufacturing cycle

3.3 TQM Model : TQM is based on the premise that the quality of products and processes is the responsibility of everyone involved with the creation or consumption of the products or services which are offered by an organization, requiring the involvement of management, workforce, suppliers, and customers, to meet or exceed customer expectations. The basis of TQM is to reduce the errors produced during the manufacturing or

service process, increase customer satisfaction, streamline supply chain management, aim for modernization of equipment and ensure workers have the highest level of training.

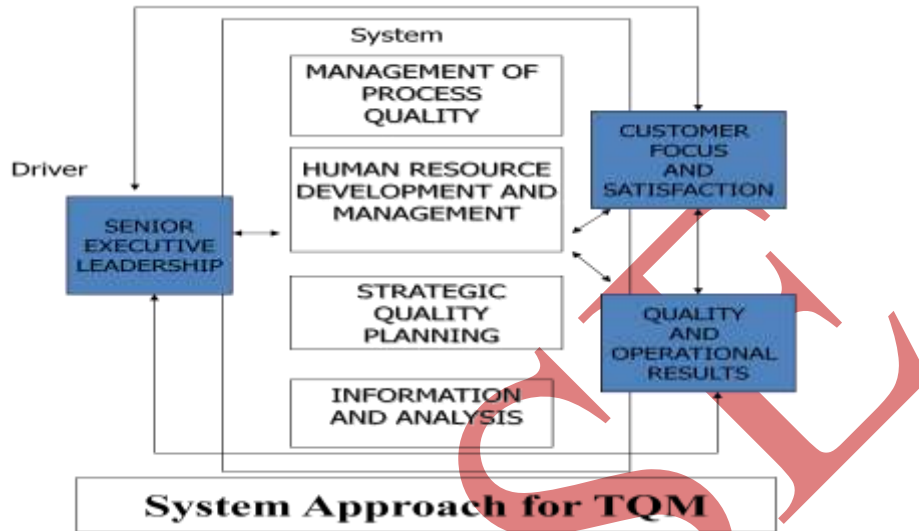


Figure3:- Total Quality Management model

It includes management of process quality, human resources development and management, strategic quality planning and information and analysis and focus done on it to increase quality and customer satisfaction.

3.4 The Integrated Model:

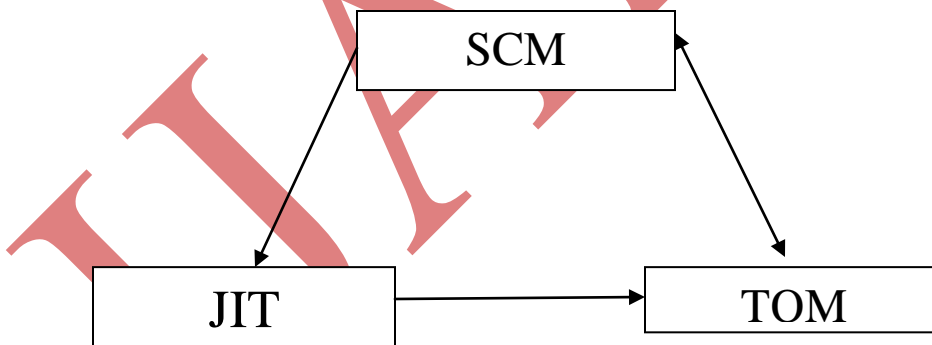


Figure4:- Integrated model of SCM, JIT and TQM

SCM principles with the constructs to the JIT and TQM. Most of these works lay fractured as the philosophies of TQM itself is meant different to different people. Recent studies in the SCM, JIT and TQM philosophies have brought out some consensus among the researchers and academicians. In this direction, certain frameworks for the practical application of TQM philosophies are developed and put to work. By integrating these we have to increase our product quality, production, Reduce cost of poor quality and less total cost of production. They have most effective in the manufacturing industries from raw material stage to finished stage of product.

IV INTEGRATED MODEL: A BRIEF DISCUSSION

Integration gives the new concept and modification in Indian industries generally for increasing profit and reducing the cost of final product. The quality role in SCM, JIT and TQM will be shaped by the goals of reducing procurement risk, overhead and productivity. It is a vital that they must continually reach new customers and attract their existing customers also improves margins and retains and increase market share. This involves reducing the effects of sub-standard materials on process efficiency, product quality, and exposure to product liability. Overhead reduction involves transferring incoming inspection responsibilities to vendors and moving the customer's quality function to an audit mode. Critical health and safety issues still require inspection. The procurement model evolves from lowest price to a lowest total cost, highest value model. This process requires ever closer vendor-customer data interchange, process integration and process simplifications.

Management of a SCM, JIT and TQM means managing all the different processes and activates that produces value in the ultimate consumer. Companies that intend to compete globally should implement SCM, JIT, and TQM. It is a vital that they must continually reach new customers and attract their existing customers. The leading companies, who have implemented the approach, are found to operating with lower logistics cost than the average. Management of supply chain requires the planning and control of activities a desired goal and shaping the organization by coordinating activities, goal interest and relationship to be able to resolve conflicts and make good decision. It provides- right product, right quality, right cost, right time, to the right customers. In order to minimize system wide costs while satisfying service-level requirements and maximize value & lower waste. It shows how these three are related to each other in the manufacturing industries. Management of supply chain requires the planning and control of activities a desired goal and shaping the organization by coordinating activities, goal interest and relationship to be able to resolve conflicts and make good decision.

A number of issues currently facing the practice of supply chain management , including the global expansion of supply chains; expanding the supply chain's influence to include second-and third-tier supply chain members; the greening of supply chains; increasing the responsiveness of supply chains; and reducing supply chain costs through purchase cost reductions, outsourcing supply chain functions, and managing supply chain inventories more efficiently. As competition among supply chains increases and the demand for varied products and services continues, supply chain members will need to become adept at improving the performance of their supply chains to maintain profitability. This has already become a continuous effort among leading supply chains and their members. The main aim is to provide the highest degree of customer satisfaction at the lowest possible cost.

V CONCLUSION

By using SCM, JIT, and TQM in any manufacturing industries. It seeks to integrate all activities, related to quality planning, quality design, quality manufacturing, quality control, quality implementation in any organization. This simply help in achieving or attaining customer delight, reduced cost of poor quality, continuous quality improvement and maintain definite quality assurance if their implementation is in proper manner.

It maintains the quality from raw material to service after sale and having best reputation in the market. The above models of SCM, JIT and TQM show that how they are related to each other and having better quality product as a result also produce the concepts of lean manufacturing system.

It gives us lot of Silent feature such as it Reduce cost of poor quality and less total cost of production, Continuous quality improvement, Total participation ,Reduce error, Top management commitment, Less wastage, Customer satisfaction, Reduce cost of final product, It promote team work, Process improvement methodology, Improve market reputation, Increase productivity. Reduce inventory, Reduce wastage of raw material, Better reputation in the market, Produce high quality product.

Its future scope remains at the top of the agenda for many enterprises today as a way to reduce operating costs and be more responsive to customers. A growing understanding that optimizing supply chain we can manage our supply chain efficiently in the manufacturing organization, but we are creating downstream inefficiencies. The integrated model will provide insight into the process improvement methodology, product quality and product delivery. The main purpose is that we whole can save money. In this process if managing strategic and tactical operations planning, while supply chain execution involves the tactical steps necessary to meet the demands of that plan by managing transactions. These helps in Optimization tools to help identify the realistic solutions that best fit the company's criteria, Modeling capability to allow creation of realistic models of your business, Collaboration tools to support business partner involvement, Analytics to evaluate and report performance relative to key performance indicators, Integration to other enterprise applications.

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