

A Sustainable Supply Chain Management through TQM: A State of the Art Literature Review

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ABSTRACT

Global competition made competitiveness an imperative for sustainable growth of organizations. This competitiveness is influenced by many parameters like quality, delivery, cost, technology, features, flexibility, and customer service etc. of products and services offered by the organizations. Organizational excellence is a result of the composite score for all these performance parameters. Depending upon the business environment and the intensity of competition, importance for different parameters vary. Supply chain management (SCM) decisively influences all these performance parameters thus deciding the sustainability of organizations. Unlike in the past where SCM was considered more as a dominant issue in production operations, it is now the most important consideration in service operations as well, thus becoming a part and parcel of organizational value chain. The issues to be addressed in the enlarged scope of Supply Chain Management are many and invite attention in the context of the inevitable considerations of economic, environmental and social performance which define the Triple Bottom Line of organizations. TQM as a philosophy survived the test of times and continued to be relevant in the context of business excellence and organizational sustainability. In view of its focus on continuous improvement as the basic tenet, all enlightened organizations across the world embedded TQM philosophy into their operational strategies. TQM organizations which could scale business excellence levels continue to survive the onslaught of global competition. While the philosophy promotes a customer-centric culture, the tools and techniques deployed as TQM interventions facilitate operational efficiency and customer satisfaction. This paper focusses to establish the importance of supply chain management in the changed context of competitive business environment and reiterate the relevance of using TQM as a veritable vehicle for ensuring sustainable growth of organizations.

Keywords: *SCM; TQM; Sustainability; Quality; Delivery; Technology.*

1.0 The Dynamic Business Environment and the Imperatives for Survival

Post-globalization, whether an organization operates globally or not, has to face global competition even in local markets. Therefore, all systems, procedures, rules, regulations and criteria for success apply equally even for all local players.

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In view of the intensity of competition and the volatility of global economy, organizations initially focus more on survival in view of the uncertainties and risks involved. Among many conditions for survival, profitable operations attain utmost importance. Profitability depends upon the ability to compete and succeed in the market place through actionable competitive advantage. When it comes to business environment, Indian business scenario is no way different from global picture except for a few advantages it is presently endowed with. "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

1.1 Business challenges and the criteria for sustainability

Economic development keeps on exhausting the planet's loads of normal capital, notwithstanding the endeavours of many organizations to limit their effects, through exercises like diminishing their carbon impressions and developing closed loop manufacturing system. India has 13 out of 20 worst polluted cities in the world. Presently placed at no.3 position, very soon it will occupy no. 1 status, overtaking China. It was established that the present global concern for climate change due to Green House Gas (GHG) emissions is mainly due to industrialization, which was significantly contributed by the developed countries. With shifting of manufacturing activity to China during 90s, due to its low cost operations, China became no.1 in emissions. When India dominates manufacturing scene as predicted, it will overtake China as the topmost polluter.

- Environmental impact of its increasing manufacturing operations will be the highest challenge for India, a major threat to sustainability.
- Associated with environment protection is the need to achieve significant levels of economic performance to service its obligations of generating employment, housing for all by 2022, affordable healthcare, universal education etc. This puts inclusive growth as another inevitable challenge to focus on community development.
- Customers, in addition to best quality at lowest price on demand are insisting on environmental protection, regulatory compliance, ethical governance, corporate social responsibility and profitable operations. Customer delight in an enlarged scope of supply chain operations is yet another challenge.
- Mainstream investors are insisting on value generation through sustainability
- Suppliers expect win-win partnerships on a long-term basis for supporting the operations of the organizations.
- Stakeholders like the regulators, governments, NGOs etc. have their own expectations from organizations to support accelerated socio-economic development

To sum up, **sustainability of operations is the most important challenge for the country** as it addresses the entire spectrum of sustainable performance management. Sustainability enables companies to profit and grow and maintain **competitive advantage**.

Competitive advantage comes through producing goods and services of world class quality by focusing on efficient and sustainable supply chains. Reassessing manufacturing footprint is necessitated by changing trends of global operations.

- The essentials for the sustainability are Productivity, green operations, waste minimisation, optimum allocation of resources and sophisticate IT tools.
- A survey of successful organization suggests that an integrated green supply chain strategy, facilitated by TQM principles is a sure way to ensure competitive advantage and sustainable growth of organizations.

Harvesters, as the companies wedded to sustainability management are addressed, they focus on sustainability through innovation, market share maximization and profit maximization. Significant relations among geographic business units is hall mark of sustenance through regulators, suppliers, NGOs and citizen groups.

Suppliers of Walmart, through a Sustainability Supplier Assessment evaluation ensure that they are in alignment with its sustainability objectives

- Starbucks has hosted a coffee cup suit at MIT for seven years, with the objective of improving the life cycle value of coffee cups, it included the representative and competitors. It ensured the harvesting practiced did not damage the rain forests.
- Nestle faced problem when they used the palm oil ingredient which was sourced from forest nd which is the depleting resource in making kit kat. Nestle was forced to correct the process.
- Coca Cola made substantial investments to redesign pet bottles by using biodegradable sugarcane waste and reduce use of plastic.

Pollution free packaging, sustainable sourcing practices, reducing releasing of industrial affluent are made as central theme of supply chain management. In general the supply chain practices adversely affect the human health and safety. Hence sustainable SCM is aimed at redesigning to reduce the intensity of risks.

1.2 Green supply chain management (GSCM)

While supply chain management is the essential aspect of operational excellence, Green Supply Chain Management offers holistic solutions for sustainable Supply Chain management. Practitioners of GSCM realised some benefits as follows:

- **Financial pay offs** include reduced operating costs, increased revenue, lower administrative costs, lower capital costs.
- **Customer related pay offs** include increased customer satisfaction, product innovation, increase in market share, improved reputation and new opportunities.
- **Operational pay offs** include process innovation, productivity gains, reduced cycle times, improved resource yields and waste minimisation.
- **Organizational pay offs** include employee satisfaction and reduced attrition, improved stakeholder relationships, reduced regulatory intervention, reduced risk and increased organizational learning.

Companies are focusing on sustainable business practices through strategies incorporating climatic changes, scarcity of resources, uncertain regulations and volatility in business. P&G launched a performance rating index and sustainability score card through consumption of water and waste management, GHG emissions to assess the supplier performance.

1.3 Shifting global supply chains

Manufacturing is migrating from China that served as the workshop of the world for two decades, unable to sustain competitiveness. All MNCs, including those in China are looking for low cost locations elsewhere in the world. It has adopted China+1 strategy to achieve global expansion with at least one unit outside China and investing in R&D and innovation.

From the above discussion, following conclusions may be drawn.

- The crucial aspect of SCM is sustainability
- The below factors are impacting the business to focus more on population growth, environmental concerns and scarce resources.
- Sustainability at every stage is playing a major role in SCM, companies are responsible for their suppliers' environmental liabilities.
- Adoption and implementation of GSCM can provide long term strategic benefit to organizations, in addition to providing a competitive edge, putting it firmly on sustainability track.

To understand the shifting economies of global manufacturing, the BOSTON Consulting Group (BCG) studied world's 25 leading exporting economies (which account for 90% of global exports of manufactured goods) along four key dimensions: Manufacturing wages, labour productivity, energy costs and exchange rates.

2.0 Major Findings of the Study

- Manufacturing cost competitiveness of some countries including India held steady.
- Manufacturing must be done at regional level by maintaining the global standards.
- Goods consumed in specific regions will be made at close locations.
- Periodic reassessment of manufacturing footprints to shore up competitiveness.

3.0 Adjusting to Rapidly Moving Cost Competitiveness

Volatility and cost competitiveness will remain dynamic. There are profound implications for global operations calling for a need to enhance productivity levels to global benchmarks.

Supply chain decisions should be based on latest understanding of competitiveness within regions instead of seeing low cost vs High cost. The winners will align their operations with the shifting economies of global manufacturing.

4.0 Advantage India

MNCs are looking at India not merely as a low cost base, but as a place of growing consumption and sustainable market. To capture and capitalize this opportunity, Indian companies must look at the changing patterns of cost-competitiveness and reassess their operations footprints and reengineer their strategies. Government is taking initiatives to ensure ease of doing business in India. Advantages for India are:

- Demographic dividend
- Industry-friendly initiatives of the Central and State Governments) to ensure ease of doing business
- Initiatives like Make in India strategy, Swatch Bharat and AMRUT (Atal Mission for Rejuvenation and Urban Transformation) and Defence offset policy to attract foreign companies with latest technology, upgrade skills, infrastructure, and quality levels and explore opportunities to export products and services made in India.

Sustainability campaign is focussed on the entire spectrum addressing the Triple Bottom Line of economic, social and environmental performance of organizations.

5.0 Supply Chains to be Customer Driven

- Best quality at least cost on demand
- Customer more knowledgeable than the seller.
- Customers demand compliance to environmental regulations and business ethics.
- Want world class products and services and interested to know how and where they are produced.
- Partnering with other organizations.
- Customization is the current trend.
- Competition is led by advances in industrial technology, increased globalization, and tremendous improvements in information availability and creative business designs.
- Sustainable development is reflected by better and more stable economic systems, greater equity, increased health and wellbeing, strengthened communities and improved relations with nature.
- To put a pathway to low carbon, developments in climate resilience needs to be addressed.
- To regionalise manufacturing, companies are establishing manufacturing units' closure to the places of consumption to minimise logistic problems like transportation, local sourcing and talent search.

6.0 Innovation, the Essential Aspect of Sustainable Supply Chains

According to a study by BCG, INSEAD, sustainability champions across the world focused on innovations in resources management as a part of Total Return on Resources strategy. And adopt resource management as a strategic differentiator to give sustainable growth

- Ford advocated sustainability as a performance enabler as energy efficient operations and eco-friendly automobiles are bound to reduce overall costs and increase profitability.
- Renault employed circular economy model and used 90% less water, 80% less energy, 70% less oil and less waste and achieved higher operating margins.
- Toyota, a major victim of Tsunami of 2011 in Japan that disrupted its supply chains chaotically, employed anticipatory supply chains to bounce back to market leadership.

7.0 The Challenges of Supply Chain Management

Organizations spend large part of their budgets on purchasing materials and services. SCM is a significant source of competitive advantage as most of the resources of an organization are deployed there, transformation of inputs into outputs happen, defectives are produced, productivity is judged and the cost of operations is estimated. Achieving business excellence predominantly depends upon the efficiency of SCM. Success of Walmart is attributed to its efficiency in Supply chain management through deployment of latest technology, IT, partnerships with vendors, local sourcing, cost competitiveness and inventory management.

7.1 Green Supply Chain Management (GSCM)

Implementation of TQM, SD, BPR, EMS and Lean are navigating to a paradigm shift in productivity levels and global competitiveness, paving way for sustainable supply chain performance. SCM's entire focus is on resources productivity through minimisation of waste and environmental pollution, low energy consumption and material resources and cutting operational costs.

7.2 Effective waste management is an integral part of GSCM

When waste is managed efficiently, resource productivity is high enabling cost efficiencies, leading to operational efficiency and profitability, ensuring sustainability and competitive advantage.

7.3 Risk management

Tsunami proved that one major event can disrupt many elements of global supply chains. Sustainability is ensure by integrating environmental considerations into supply chain management, such as product design, material procurement and selection, manufacturing

processes, final product delivery to consumers, and product life cycle management according to a useful lifecycle approach.

7.4 Supply chain management challenges

- Globalization of manufacturing operations
- Limited resources and unlimited demand
- Safety and quality products and services
- Shorter lead time, less inventory and better throughput
- Supplier base consolidation
- Access to latest technology
- Green Supply Chain Management and Waste Management

8.0 TQM and its Growing Importance

TQM is not a stage in quality journey but a management philosophy aimed at business excellence. It focuses on quality in management instead of mere quality management.

TQM encompasses every activity an organization does- strategy formulation and deployment, winning and retaining customers, corporate governance, and regulatory compliance, strict adherence to business ethics, environmental protection and community focus. Quality in every activity in the supply chain leads to operational excellence through best quality, lowest costs and fastest process times, all leading to customer delight and sustainable operations.

All global business excellence models, which were earlier called National Quality Awards, are based on TQM philosophy, standards and interventions. All these models insist on efficient supply chains and supplier partnerships to realize benefits of synergy.

Green efforts, lean processes and globalised supply chain are integrated into a complex business environment. The Green Supply Chain Strategy is an effort to minimize the negative impact of a company and its supply chain on the natural environment. Lean focuses on waste minimisation.

8.1 TQM as a facilitator of efficient supply chain

There are many common features between TQM and SCM- Both are customer-centric, organization-wide and insist on excellence. Lean, JIT, Six sigma, Quality at Source, zero-defects make Quality Free, providing best competitive advantage. TQM, when embedded into every stage of SC, enables operational excellence. SCM is tuned to customer requirements and TQM is aligned with customer satisfaction. This is achieved by eliminating inefficiencies, integrating processes and manufacturing products only upon receipt of the order. TQM interventions facilitate efficiency improvement. Focus of TQM is Customer Satisfaction through Continuous improvement, zero defect or right first time and every time

Supply chain management on the foundations of TQM can ensure efficiency in terms of environment management

Systems thinking of SCM as facilitated by TQM Continuous improvement of SCM-PDCA approach

Circular Economy and Reverse Logistics- Reduction, Reuse, Recycling. The circular economy, which minimizes resource and energy consumption and maximizes recycling, has the potential to add up to \$ 1 trillion to the global economy by 2025.

SCM, when embedded with Six Sigma, JIT, Lean, Kaizen, QMS, EMS etc. becomes TQM Elimination of non-value added activities through Waste management addresses reduction, control and prevention by using the waste management hierarchy.

8.2 Important measures for sustainable development

- Technology-appropriate, locally adaptable, eco-friendly, resource-efficient and culturally suitable
- Promoting environmental education and awareness
- Sustainability-based resource usage (sustainability depends on system sustainability)
- Improving quality of life including social, cultural and environmental dimensions

9.0 Conclusions

Sustainable Supply Chain Management is an achievable, actionable and essential proposition in the volatile business environment. A study by MIT and BCG established that

- 70% of the CEOs are permanently wedded to sustainability.
- Most managers believe that sustainability strategy provides competitive advantage.
- Harvesters are integrating their operating frameworks and strategies dynamically in an eco-friendly way.
- Addressing climate change is a huge business opportunity. Companies are taking this opportunity to develop new products and services to identify and address climate risks in their businesses and supply chains.

In the 17 Sustainability Development Goals adopted by the member nations of the United Nations in September, 2015, at least 6 focus on sustainable supply chains- Good Health and Wellbeing, Decent Work and Economic growth, Industry, Innovation and infrastructure, Responsible production and consumption, climate action and partnerships for the goals.

- Realising that resource efficiency is essential for sustainability, champions focused on Total Return on Resources.
- Supply chains are intrinsically linked to cost reduction, resource conservation and speed of delivery, ensuring competitive advantage and profitability
- Both TQM and SCM are based essentially on customer-centric models.

- As both TQM and SCM are organization wide activities, embedding TQM principles all along the supply chain, is bound to produce excellent results, which ensure most profitable and sustainable operations.

This calls for **cross-disciplinary innovation**- sustainability-oriented innovation can create breakthroughs. Today, competition is not between companies, but it is between supply chains.

- Firms with superior supply chain operations will have a competitive edge
- Supply chain managers must be familiar with the principles of TQM and EMS
- Suppliers play a vital role in implementing sustainability practices as most of the materials and services are outsourced.

Measures of Excellence are mostly common to TQM and SCM as both are essentially customer-focused. They provide competitive advantage through reduced costs, enhanced quality and customer satisfaction, happening on the vehicle of continuous improvement. Both focus on energy efficiency, resource efficiency, sustainability, lean management, JIT, Six Sigma etc.

Socially just, environmentally friendly and economically viable supply chains will be a natural consequence of embedding TQM principles in operations.

With better ease of doing business initiatives by the central and state governments, opportunities for India may be immense, aided by its demography. If this bus is missed, the 4th Industrial revolution will go out of India's hands. Country level commitments for environment protection gives businesses certainty and an indication of where investments will be safe and rewarding.

Any mission is leadership driven, more so in India where "Yatha Raja, Tatha Praja is the established work ethic." When leaders decide and resolve, sustainable supply chain management becomes a reality.

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