Developing Integrated Quality Criteria to Continuously Improve the Supply Chain Process

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Abstract

The article discusses a conceptual model targeted to assisting companies in developing criteria to assess and continuously improve Supply Chain Processes. Model formulation is achieved via the conjunction of key generic areas of concern with core processes for supply chain effectiveness. Model is referred as SCQT – Supply Chain Quality Tool. Motivation underlying SCQT development is discussed and links with the Business Excellence Model are identified. The article concludes with a proposal on applying SCQT in practice and by listing areas for further research on the subject.

A. Introduction

The supply chain process can be considered as the process that determines most of the key performance indicators of an organization and has a major impact in its profitability and competitiveness. It is therefore the aim of this paper to present a conceptual tool for organizations to develop integrated quality criteria addressing the overall supply chain process. In a broadened way, such a tool can help organizations introduce quality management to supply chain in a definite, simply structured and applicable way.

The specific objectives of the Supply Chain Quality Tool (SCQT) are:

- to create a generic roadmap for tailoring the supply chain management requirements to the special characteristics and needs and all sensitivity factors of the organization
- to give the organization the ability to continuously assess the performance of the supply chain process and to redesign to achieve continuous improvement and
- to help the organization adjust elements / modules of the supply chain process according to the changing market environment in a quick and cost-effective way

The organization is considered to be the center of a demand flow, acting as purchaser and supplier continually in a way that has to be balanced and sequenced to serve customer expectations and needs. To achieve that, requirements of internal and external suppliers – customers should be set and /or clarified and met.

It is important to mention that providing a conceptual tool to develop quality criteria instead of criteria assures flexibility and promotes the activation of continuous improvement and self-assessment mechanisms within organizations.

The paper is based on the following structure:

- Part B presents the methodology used for the development of the tool
- Part C gives a full description of the tool and a proposal for its implementation
- Part D outlines conclusions and focuses in areas for further research on the subject

B. Methodology

A **process approach** is adopted for the development of SCQT, in sequence with the ISO 9004:2000 standard [4]. According to the standard, a process approach, in terms of quality management, emphasizes the importance of:

a. understanding and fulfilling the requirements;
b. the need to consider processes in terms of added value;
c. obtaining results of process performance and effectiveness; and,
d. continual improvement of processes based on objective measurement

Additionally, such an approach provides the ongoing control over the linkage between the individual processes within the system of processes, as well as their combination and interaction.

Core processes for the supply chain effectiveness and key generic areas of concern are selected and a matrix-structured linkage is developed to focus processes or activities where quality criteria should be established by the organization. For that reason these processes or activities are considered to be the quality drivers of SCQT. It should be mentioned that:

i. Listing of quality drivers in the matrix provided is not exhaustive.
ii. A tailoring procedure has to take place, according to special characteristics and needs of the organization.

As core processes for the supply chain effectiveness are defined:

- marketing analysis
- new product / service design and development
- production planning
- costing

Marketing analysis can be considered as the process that provides the input for

- identification of customer expectations and needs
- determination of market characteristics and mechanisms of market change / evolution
- overall corporate policy
- product / service outline
- competitors position (benchmarking included)
- development of new or hidden customer expectations and needs
- establishment or re-establishment the corporate position in the market

Production planning is directly related to demand flow parameters, technology available, product characteristics and mechanisms of market change. The effectiveness of production planning process is a function of:

- efficient inventory management
- supplier reliability
- production process integration
- overall management of reverse movements

New product / service design and development is the process of:

- conceptual translation, and
- technical simulation

of marketing analysis input, in relation to what the organizations offers to the market. Product / service competitiveness (quality, cost) is determined by the way design and development process reacts to market changes.

Taking under consideration the ISO 9004:2000 proactive approach [4], this process should integrate the whole supply chain modules / elements and their special characteristics from the very beginning. Indicative examples are:

- stock level
- handling techniques
- transportation and distribution methods
- storing

Costing is a key process to determine supply chain process requirements or even limitations, beginning from the supplier relationship strategy and ending to the product / service price policy. Cost measuring and continuously monitoring activates improvement mechanisms, so it should be incorporated to every distinct supply chain module / element.

Key generic areas of concern for the supply chain management, which actually determine parameters for the tailoring procedure mentioned above, are the following:

- Communication
- Knowledge management
- Organizational structure
- Product / service realization
- Customer structure
- Supplier structure
- External environment.

C. Description of SCQM

The following matrix presents a quality drivers roadmap, to identify the areas of quality criteria setting. The matrix represents the conceptual model of the SCQM. The *Industrial Excellence Awards* model of INSEAD [3] was extensively used to illustrate conjunction between generic areas of concern and core processes.

Quality Drivers Roadmap – Quality drivers are defined as conjunction between core processes for supply chain effectiveness and key generic areas of concern				
Key Generic Areas of Concern	**Core Processes for Supply Chain Effectiveness**			
	Marketing	New Product / Service Design Development (NPD)	Production Planning	Costing
Communication	- Customer Surveys - Opinion on / Perception of products and services - After sales support - On time delivery rate - Complaint ratio - Internal marketing	- Product defect rate - Time to market for major modifications and new product introductions - Breakeven points (across all products) - Number of new products launched per year; distinguish between minor and major modifications of existing products.	-Procurement of materials and services. - Warehousing - Delivery - Visibility into customers' demand requirements	- Warranty costs - Inbound Logistics - Manufactu-ring and assembly - Warehousing - Outbound Logistics - Average cost per unit - Preventive and appraisal quality cost in % of total cost - Cost of internal and external non-conformances in % of total cost

Knowledge Management	- CRM - Sales forecasting (periodically reviewed) - Knowledge discovery from historical data	- Time to translate conceptual designs to concrete designs - New product success rate - % of new projects with schedule overruns	- Frequency of schedule revisions - Reasons for schedule revisions	- Annual NPD budget for design and development - Annual NPD budget for manufacturing process development, tools, and equipment for new products - Integrated supplier assessment
Organizational Structure	- Decision making structure (decentralization vs. centralized decision making) – centralized means that senior management makes most of the decisions; decentralized means that sufficient decision making authority is delegated to operating units. - Roles, responsibilities - Level / variety of expertise - Implementation of human resources management system - Type of organizational structure (process oriented, functional, product, mixed, matrix, etc.) - Use of cross-functional teams across the company - Department(s) that have formal responsibility for customer service. - Employee productivity (e.g. sales revenue per total number of employees) - Implementation of quality management within the company			
Product / Service Realization	- Links with the end user of the product / service provided	- Amount of stock (in days) - Raw material turns - % of capacity lost	- Type of production process (continuous flow, assembly line, batch processing, project management, other) - Breakeven points - Maintenance System	

Customer Structure	- Structure of direct customers - Customer segmentation - Identification of “customer satisfaction” parameters	- Changes of customer expectations and needs	- Average customer order size - Capability to respond to demand volume increases (from one day to within a month; % distribution)	
Supplier Structure	- Supplier satisfaction reviews - Activities held with key suppliers on a common basis	- EDI transactions - Utilisation of supplier’s know-how to improve products and processes	- Triggering of deliveries - Supplier orders delivered late (%) - % of delivered goods from suppliers that are defective - % of deliveries rejected - JIT delivery	
External Environment	- Legal constraints - Impact on society	- Average product life cycle (average across industry)	- Labour law - Warehousing limitations	

To apply SCQT, the following steps are proposed:

1. Establishment of a SCQT management team.
2. Implementation of tailoring procedure to define specific quality drivers.
3. Setting of measurable requirements for each quality driver.
4. Initial self-assessment against each quality driver.
5. Determination of objectives to be met, for each quality driver.
6. Periodical self-assessment – Planning for improvement.

Self-assessment can be carried out by using one of the seven (7) approaches proposed by the Business Excellence Model [2]. Each of these approaches has specific advantages and disadvantages and selection should be based on the organizational characteristics [1].

D. Conclusions – Areas for further research

Costing emerged as a core process and organizational structure as a key generic area of concern appear to "generate" quality drivers common for all matrix elements. This might be translated to the conclusion that these issues are the major parameters for an effective supply chain.

Field research should be conducted to:

a. validate SCQT, and
b. verify the above mentioned conclusion.

References

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[2] Guide to Business Excellence Model 1998, British Quality Foundation 1998.

[3] INSEAD, Industrial Excellence Awards 2001. www.insead.fr/CIMSO/

[4] ISO 9004:2000: Quality Management Systems – Guidelines for Performance Improvements.