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Supply Chain Design and Re-Engineering: a Systems Approach

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SUPPLY CHAIN DESIGN AND RE-ENGINEERING: A SYSTEMS APPROACH

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INTRODUCTION

It is imperative that the process of supply chain design or re-engineering is carried out in a logical and systematic manner. One approach to the task adopts a "systems approach". This article presents:

1. Background and philosophy of NITL's systems approach

2. An overview of the main elements of NITL's systems approach

3. The key stages and worksteps of the systems approach methodology

4. Data requirements in the supply chain audit step of the methodology

5. An example of a check list for one step of the supply chain audit

1. BACKGROUND: SYSTEMS APPROACH PHILOSOPHY

Companies have long realised the need for company-wide approaches to organisation design and redesign. The development of systems engineering approaches to manufacturing system redesign in the 1970s and 1980s (Hitomi, 1996) was followed by the focus on organisational re-engineering, often based on business processes, in the 1980s and 1990s (Macdonald, 1995). A common feature of all of these approaches is a recognition that "the whole is greater than the sum of the parts". In other words, optimising subsystems (whether those subsystems are functional departments, production sites or individual processes in the manufacturing cycle) can result in a sub-optimised total system. Lack of efficiency and/or effectiveness is often a result of the poorly designed interfaces between subsystems rather than any inherent subsystem weaknesses. There are numerous examples of companies who have generated significant improvements in competitive advantage as a result of the application of this "total systems" thinking.

It must be recognised that a product is delivered to the ultimate customer through a complex interaction of several companies on the way. The manufacturer's ability to give the customer what they want, when they want it, at the price and quality that they want, is not just determined by the efficiency and effectiveness of the manufacturer's own operation. Inefficiencies anywhere in the supply chain will reduce the chances of the manufacturer successfully competing against other suppliers. Without a proper focus on total supply chain management, therefore, a company will never achieve true competitive advantage (Christopher, 1999). The increasingly international nature of markets and companies has resulted in many companies becoming part of large and complex global supply chains. In addition, the potential benefits associated with emerging electronic commerce technologies provide the potential to simultaneously improve customer service levels and to reduce supply chain costs. These factors have sharpened the focus on the need for improvements in all aspects of supply chain performance.

2. AN OVERVIEW OF THE MAIN ELEMENTS OF NITL'S SYSTEMS APPROACH

NITL's systems approach comprises five main elements:

1. Principles
2. Methodology
3. Guidelines on good practice
4. Techniques
5. Tools

The approach is guided by a set of underpinning *principles*. The *methodology* is the kernel of the whole approach and is the series of steps followed in a typical project. The *guidelines on good practice* are principles of best practice adopted in world class companies and which may be incorporated as part of a supply chain design. The *techniques* and computer-based *tools* exist to ensure that all analysis is carried out in a rigorous and objective fashion.

3. THE KEY STAGES AND WORKSTEPS OF THE SYSTEMS APPROACH METHODOLOGY

The methodology is the series of steps followed in a typical supply chain design project. It comprises five stages and fourteen steps, as follows.

STAGE	STEP
INITIATION	- Set project scope, objectives and time plan
	- Create project team or task force
DATA COLLECTION	- Determine structure of supply chain and objectives of each element
	- Supply chain audit: detailed data collection concerning the companies and their competitors, markets, currently available resources and future resource requirements
ANALYSIS	- Preliminary analysis of supply chain
	- Identification of key supply chain business processes
PLANNING / DESIGN	- Realignment of organisation and operations in line with key business processes
	- Detailed design of organisational structures
	- Detailed design of operational procedures
	- Develop business plans
IMPLEMENTATION	- Development implementation plans
	- Implementation of change
	- Performance measurement
	- Continuous improvement

4. DATA REQUIREMENTS IN THE SUPPLY CHAIN AUDIT STEP OF THE METHODOLOGY

The supply chain audit is one of the most important parts of the process of carrying out a supply chain design or re-engineering project, as shown in the methodology presented earlier.

The supply chain audit can be defined as follows:-

> A review of a company's supply chain, in which its resources, capacity and capability are measured. The review should be structured and objective. The results of the review should be compared with the requirements of the company and its intended customers. From this comparison the suitability of the existing resources and organisation can be assessed, and the requirements for effective supply chain change can be identified.

In our methodology we use the term to refer in particular to the process of the gathering of data. In carrying out supply chain design, we can consider most of the relevant data as falling into four categories:

- The project
- General company background and performance data
- Market data – status and requirements of the market
- Current resource data

The data required at each of these stages is detailed into a checklist as follows.

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PART I - THE PROJECT
●      Project scope

PART II - GENERAL BACKGROUND & PERFORMANCE
●      Corporate background
●      Division specific data
●      Strategy - corporate & div.
●      Overall financial performance
●      Performance measurement system

PART III - THE MARKET - STATUS & REQUIREMENTS
●      The market
●      The customers
●      The order patterns
●      The competitors
●      Current products
●      Future products (at the engineering / design phase)

PART IV - CURRENT RESOURCES AVAILABLE
●      The supply chain structure
●      Purchasing and suppliers
●      Manufacturing or operations
●      Transportation
●      Warehousing
●      Information technology
●      People
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5. AN EXAMPLE OF A CHECK LIST FOR ONE STEP OF THE SUPPLY CHAIN AUDIT

At NITL we have developed a checklist of typical data elements for each step of the supply chain audit. One such checklist (for the *purchasing and suppliers* step) is shown below.

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Purchasing and Suppliers
Number:-
Number of parts:-
Location:-
Transport:-
Lead time:-
Quality:-
Inspection procedures internal and external:-
Order sizes:-
Reliability:-
Basis for make/buy/subcontract decisions:-
Method of assessment/selection:-
Supplier rating procedures:-
Collaboration/partnerships:-
Multi/single sourcing:-
Dependency on suppliers:-
Communication systems:-
Supplier development:-
Current/future trends:-
SWOT:-
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Detailed descriptions of each of these headings have also been developed. A similar checklist is available for each of the nineteen steps.

CONCLUSIONS

The systems approach (to analysing supply chains and improving their performance) provides a basis for achieving world class standards for supply chains operating in all types of industry. The approach involves considering the whole supply chain and avoiding a situation where subsystems are optimised but the whole supply chain is sub-optimal. To apply the approach requires a methodology, a recognition of what constitutes good working practice and the use of tools and techniques to perform the required analysis. The process of supply chain analysis and improvement is complex – it requires total management commitment and dedicated resources. With this commitment and the necessary resources, the use of the systems approach can result in significant improvements in supply chain performance

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FURTHER INFORMATION