CHAPTER 2

THEORETICAL FRAMEWORK

2.1 Definition & Delimitation of New Product Introduction (NPI)

New product introduction refers to the complete business process of introducing new products to market. It spans the entire product life-cycle from initial identification of market/technology opportunity, conception, design and development through to production, market launch, support, enhancement and retirement.

According to the Product Development and Management Assisiation Hand Book 2nd Edition, New Product Introduction (NPI) is the launch or commercialization of a new product into the marketplace. Takes place at the end of a successful product development project.

A number of alternative terms are used to describe the NPI Process, such as New Product Development or NPD Process, Innovation Process or Product Creation Process. The exact meaning of the terms will vary from company to company, as will the degree of integration across different departments.

In an EMS perspective, new product introduction will refer to the process which primarily concerned with the conversion of the customer product design into a functional and manufacturable reality. As such, new product introduction tends to have more of a manufacturing focus, dealing with the application of new technology and the creation and testing of functional prototypes through mass production.

Nowadays, NPI is more likely to be seen as a vital cross-functional business process, involving both internal groups and external groups such as customers and suppliers.

2.2 The concept of improvement within new product development

Currently, the company has recognised that late design changes are costly and result in less competitive products. As illustrated in Figure 2-1, it shown with a single timescale that the best practice has shorter time and lower design changes than common practice. In order to respond to global competition in the markets as well as compete effectively on a global basis, the company has to change their practice from common practice to best practice by using fundamentally improved approaches for product development as guidance.

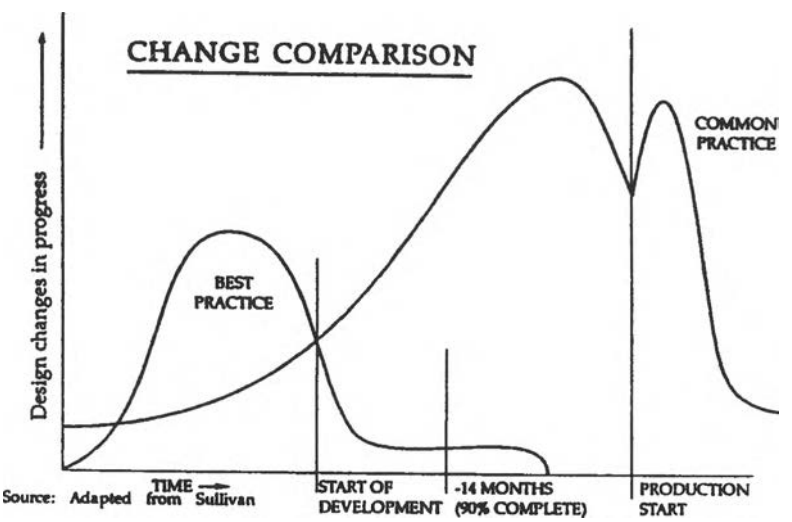

Figure 2.1: Design change profile

(Source: Warwick manufacturing group, October 2001)

As shown in Figure 2-1, the company should have wide initiatives to fundamentally change the process to develop new product. Buss and team (1992) have established the company initiatives as follows;

1. Listing to the Voice of the Customer
    - The company need to improve the process by which the company conceptualize and select new products

2. Reducing new product Time & Cost to Market
    - The company need to reduce the time & cost required to bring new products to market
3. Improving Design for Manufacturability
    - The company need to develop products which are able to manufacture at low cost and high quality

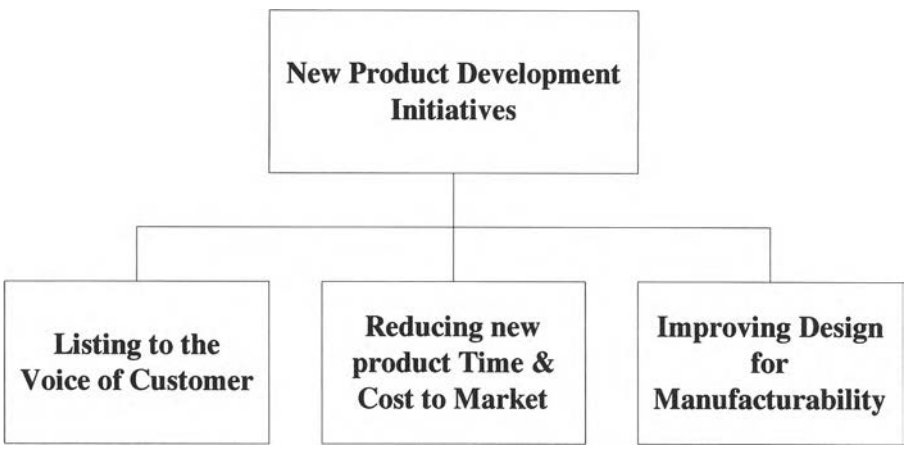

Figure 2.2: New product development initiatives

Priorities need to be developed for implementing the various facets of an integrated product development environment. The company must start by understanding its strategic direction. Next, the company must assess its strengths and weaknesses by focusing on the gap between where a company is and where it needs to be by perform benchmarking against the toughest competitors or those recognised as industry leaders.

Kenneth (2002) describes the improvement framework as represented below:

1. Understanding strategic direction of the company
2. Assess strengths & weaknesses
3. Gap analysis & improvement Plan
4. Understand Best Practices - Benchmarking
5. Determine critical success factors for strategic direction

One way to help disseminate the results of academic work to those in the field may be via industry awards and standards. There are several industry awards and standards which require evidence of procedures for continuous improvement of all company processes including NPD. For example, in the US the Malcolm Baldrige National Quality Award criteria cover translating customer requirements into design requirements, validating designs, and continuous improvement of the new product introduction process (Krehbiel, 1993; Evans, 1996). Companies entering for the European Quality Award (EQA) are required to demonstrate, amongst other things:

- How the organisation promotes the involvement of all its people in quality and continuous improvement;
- How process performance parameters, along with all relevant feedback, are used to review key processes and to set targets for improvement;
- How the organisation stimulates innovation and creativity in process improvement (Ghobadian and Woo, 1996)

The UK Quality Award and most of the other European national models use similar criteria to the EQA. Many firms use these models and evaluation criteria as the basis for a self-assessment process without going on to enter for the award.

2.3 Attempts by companies to improve new product development processes

Some companies have responded to the challenges they face by modifying or re-engineering their process for NPD. For example, in the early stages of this research the author visited a multi-national computer systems company which had recently moved from a formal phase process to a very informal process in order to reduce development time. However, a one-off change in the NPD process may not be enough, because the competitive pressures continue to intensify. This has been recognised by some larger

organisations who consequently have introduced ongoing processes for improvement within NPD. The approaches adopted vary considerably, as the following examples illustrate.

Philips Electronics launched a Product Creation Process (PCP) improvement project because there was a widely felt need to share the learning between different product divisions, but no structure for doing so (Olthuis, 1996). An assessment tool was developed which enables dedicated improvement actions, exchange of experiences and benchmarking within the PCP. The tool takes 6 key success factors (KSF) and measures them at 5 levels following the SEI Capability Maturity Model, and at 3 phases in the process (preparation, realisation, market). The tool is in two parts: a short, high level overview completed by managers, and a much more detailed document completed by operational lines in which each of the KSFs has been broken down into a series of statements. This PCP tool is seen as a catalyst for process improvement, providing both a tool for analysis of strengths and weaknesses, and a tool for measuring progress in improvement. Other aspects of the PCP improvement drive include the organisation of PCP, a PCP newsletter, a series of small events focusing on issues like throughput time reduction and architecture, and a PCP Day to facilitate networking. After 3 years this initiative was reported to have succeeded in creating awareness of the PCP, a common language, an environment for exchange of experiences, and a platform for further improvement.

At Siemens the innovation initiative within the Time Optimised Processes (TOP) programme involves mobilising five 'levers for innovation': product; process; management and employees; information systems; and structure (Jahn, 1996). An example of work on the product lever is a project which reduced product complexity through a modular construction system. This reduced the number of components by 70%, the number of printed circuit boards by 60%, and the number of modules by 50%. As a result product costs decreased from 25-43% and development time was cut by 25%. The reduction of complexity and of cost and time meant that products were customer neutral until assembly and more variants could be produced. The company gained a higher

market share, and benefited from a shorter development schedule, reduced development costs and lower overall costs. Siemens has adopted a decentralised approach to improving the product generation process, with business units able to choose their own approach to improvement, the only restriction being that they have to be successful. Although Siemens have ISO certification, certification did not make the processes faster or the products more reliable. This is why TOP was adopted to streamline and improve the processes. The company also uses the SEI CMM to measure process maturity. About 45-50 Siemens departments have used it and, in 1996, they ranged from around Level 2.5 to 4.

British Aerospace Defence Ltd has adopted a 'pull approach' to the implementation of continuous improvement (Caffyn, 1995). In 1990 the company started to focus on improving its manufacturing operation and subsequently moved CI back into the organisation, as an improved process in one area created a demand for improvement in other parts of the company. Thus the systematic approach to improvement spread first from Manufacturing to Manufacturing Systems Design (1992), then to Product Design (1994) and Systems Design (1995). Common themes from this process, applied in all areas, include demand pull, teamworking, and waste elimination; training underpins all CI activities. The concept of teamworking spread from manufacturing to design, and small integrated design teams were given responsibility for developing a particular part of a product or manufacturing system. Attention then turned to the new product introduction process, the idea being to develop integrated support teams, the composition of which may vary, to focus on a particular part of the product. Each integrated production team (I PT) owns a particular process and is constantly problem solving to improve it. Several teams were coming up with similar problems so the idea of Continuous Improvement Activity Groups (CIAG) was introduced. Now, if a common problem is identified a CIAG investigates it and generates a universally accepted solution which is fed back to the IPTs. There is also a participation scheme which rewards individuals and teams for improvements.