CHAPTER 1

INTRODUCTION

1.1 OVERVIEW OF THE STUDY

Liberalization, Privatization and Globalization (LPG) have brought incredible changes in the business environment. It is quite common to observe that the products are subjected to continuous up-gradation and value addition to meet the demand of the customers and stay ahead in the competition. The time to market is shortened, as the products developed in the industries are introduced across the world markets in a quick time. Technological innovation has become one of the principal determinants of business success. The very existence of the organization which is reluctant to upgrade, modify or introduce a new and better product is challenged by the rapidly growing market forces.

Innovation is the essence of all growth. Technological innovation is one of the principal determinants of business success. Innovations in the product design force product life to shrink and new ones are launched at a faster rate with better quality and enhanced features. The success of the firm depends on how quickly it reacts to customer preferences and demand in a short turnaround time with new products. Hence in order to stay competitively in the dynamic business environment, an organization is required to introduce quality new products at the right time and at the right cost. Thus, for a higher level of growth, a firm has to look beyond its existing products. A progressive firm has to consider new product development as a cardinal element of its
product policy. New products become necessary from the profit angle too. Products that are already established often have their limitations in enhancing the profit level of the firm. Profits from products decline as they reach the maturity stage of their life cycle. Thus, it is necessary for business firms to bring in new products to replace old, declining and losing products. New products become part and parcel of the growth requirements of the firm and, in many cases, additional profits come to the firm only through new products.

The present research work is aimed at studying the new product development management process in one of the largest and leading manufacturers in industry which has headquarters in USA. The study was conducted in the organization which has a strong foothold in the manufacture of construction and mining machines, diesel and natural gas engines and industrial gas turbines. The study is also aimed at studying competitive benchmarking of one of the products of the company with its closest competitors in order to vindicate the efficiency of the product.

The rest of this chapter discusses the important concepts related to the thesis work. To begin with, the new product development process has been discussed in detail. Introduction of competitive benchmarking which is another important part of the study is provided. A section on the statement of the product and the detailed objectives of the research study is presented. The chapter also highlights the research design of the proposed study and concludes with the organization of the thesis.

1.2 NEW PRODUCT DEVELOPMENT (NPD)

The global economy is more and more inching its focus towards customers. The market demand for winning products in the marketplace is strong. A number of studies support the view that organizations are under pressure to move ideas from the concept to commercialization stage of
development with little to no failures along the way (Antil 1988; Gupta & Wilemon 1996). The very existence of a firm is often challenged when it fails to innovate new products. New products help form the foundation for long-term firm success. The new product development process is the "pathway" toward business growth (Fox 1974). Booz et al (1968) conducted a landmark study among 700 companies and concluded that business success is strongly linked to the competitiveness of the NPD process. New product has become the nexus of competition for many firms (Clark & Wheelwright 2000). New product development is often considered as a potential source of competitive advantage for many organizations (Brown & Eisenhardt 1995).

New product development process allows firms to progress upwardly in intensive competitive market conditions by facing challenges with continuous growth. Innovation is the key to sustain in the rapidly changing market conditions. New product development is one of the most expensive and challenging tasks requiring acquisition of new knowledge and technologies for the implementation of new processes.

Schoonhoven et al (1990) have stressed the importance of new product development by stating that, more than acquisition and mergers, NPD is a critical means by which members of the organizations diversify, adapt, and even reinvent their firms to match evolving market and technical conditions. Overall it can be concluded that the new product development is an essential process for success, survival, and renewal of organizations in fast paced and competitive markets. According to Zhan (1998), new product development not only opens new markets and attracts new customers, but also influence existing assets and expand an organization’s capabilities.

Cooper (1992) opined that success with new products is not easy for established companies, and there are two ways to achieve it: one is to do projects right; the other one is to do the right projects. The challenge that
established companies are facing is the development of new products quickly, efficiently and effectively (Schilling & Hill 1998). The success of new products is closely linked to the new product development activities in terms of execution and completeness (Cooper & Kleinschmidt 1993). Cordero (1991) state that increased competition among manufacturers has forced organizations to manage the new product development process for speed so as to avoid product obsolescence and decreased competitiveness. The effectiveness of this process in relation to company profitability has been demonstrated (Antil 1988). According to Tsinopoulos & McCarthy (2002), the main objective of any new product development process is to design, develop, manufacture and supply the right product, to the right customer, at the right time.

New products can be broadly classified into two groups: new products arising out of technological innovations and those arising out of marketing oriented modifications. The first group involves innovations leading to intrinsically developed new products with a new functional utility behind them. The second group involves mere marketing oriented innovations in existing products; it gives rise to new versions of the existing products.

New Product Introduction (NPI) is an important process in NPD management. The NPI has changed the world dramatically. Brands can no longer wait for an annual convention to showcase their wares and impress supermarket buyers. With competition for shelf space at an all-time high, brands must reach out to retailers proactively, rather than hoping they will stop by their booth — no matter how lavish.

Many authors believe that NPD activities are the most influential and highly complex activities in business (Clark & Wheelwright 2000). Success in new product development is the one of the key determinants of an organization’s long-term survival.
1.3 BENCHMARKING

Benchmarking is an ever-increasing management prerequisite for implementing meaningful positive changes in an organization. It has proved to be an effective tool for achieving business objectives. Since no one has time or resources to reinvent solutions, organizations benchmark for new ideas, new insights and best practices to ensure a competitive edge. For organizations to create their own successful future, they must learn from their environment - from the best and brightest competitors, markets, products and processes in their industry. Benchmarking has been done in the past under the name of competitive analysis. It has been in existence since the early 1980's and is widely practiced across USA, and has been rapidly growing in Europe, Australia and Asia. In India, although Benchmarking has been widely talked about, only few firms have successfully implemented it.

Benchmarking can be defined as “a continuous, systematic process for evaluating the products services and work process of organizations that are recognized as representing best practices for the purpose of organizational improvement” (Spendolini 1992). It is a process for improving performance, by constantly identifying, adapting, understanding the best practices and process followed inside and outside the company and implementing the results.

1.3.1 Definition of Benchmarking

- American Productivity Quality Center (APQC) defines benchmarking as "the process of identifying, understanding and adapting outstanding practices and processes from organizations anywhere in the world to help your organization to improve its performance".
Camp (1993) defines benchmarking as the continuous process of measuring the products, services and practices against the toughest competitors or those companies recognized as the industry leaders.

According to Professor Malcom Rimmor of Deakin University, benchmarking is "intelligent copying to improve business"

1.3.2 Competitive Benchmarking

Competitive benchmarking is the continuous process of comparing a firm’s practices and performance measures with those of its most successful competitors. In the case of product companies, competitive benchmarking is the “Production Study” carried out by the original equipment manufacturer (OEM) by comparing the class of its product to products of similar class of the competitor. This will necessitate establishing the advantages and positive selling features with respect to performance over the competitor machines in the market.

1.4 NEED FOR THE STUDY

Products manufacturers are under increased pressure to enhance revenues and improve operating efficiency. Challenges in meeting growth targets include changes in consumers’ demographics, increased competition in mature markets, increased spending on services, the rise of private labels and the low success rate of new brands.

New Product Development management process is a key organizational activity, which is very important for the generation of new opportunities and overall growth of the organizations in the competitive
business environment. There are relatively scant of reported research publications on the NPD process specifically related to construction and mining machinery product. Similarly, competitive benchmarking of construction and mining machines is also a relatively new phenomenon which needs further exploration and thorough investigations. Hence it is vitally important to study the NPD process and benchmarking in the context of automobile industry involved in manufacturing construction and mining machines.

1.5 STATEMENT OF THE PROBLEM

Caterpillar (Cat) Inc. USA, is the world’s largest and leading manufacturer of construction and mining machines, diesel and natural gas engines and industrial gas turbines. Caterpillar products and components are manufactured worldwide.

Caterpillar India Private Limited (CIPL) is a 100% subsidiary of Caterpillar, Inc. USA. CIPL manufactures Off Highway dump trucks, front end loaders and backhoe loaders. These products are used in open cast mining, quarrying, irrigation, steel plants, cement plants, power plants in the field of construction and material handling.

With the growing demand for the off-highway trucks for the mining industries in the emerging as well as developed markets, Caterpillar Inc. manufactures a new class of off-highway trucks like 770G/772G. The present study explores the new product development management process in introducing the off-highways trucks and competitive benchmarking of the products with the competitor machines.
1.6 OBJECTIVES OF THE STUDY

Based on the earlier mentioned new product development management framework and competitive benchmarking, the research objectives of the study is confined to:

- To the evaluation of the adherence of process steps in each of the phases of New Product Development (NPD) framework.

- To the identification of Voice Of Customer (VOC) and Voice of Business (VOB) characteristics and verify whether those are met in each of the phases.

- To the Production Studies of the new model of trucks with the competitor machines and generate Production Study data to substantiate the advantages of the new trucks over the competitors.

- To documentation of lessons learnt and create scope for further improvements in the future New Product Development programs.

1.7 RESEARCH METHODOLOGY

In the present study, descriptive research method is followed. Descriptive research is a design to explain the characteristics of the variables as it is. In business research *Ex post facto* research is most commonly used or descriptive research studies. The main characteristic of this method is that the researcher has no control over the variables and can only report what has happened or what is happening. The methods of research utilized in descriptive research are survey methods of all kinds, including comparative and correlational methods. In the present study, it is related to the adherence
of the new production introduction process and the results of the production studies to place the new product in the market. It is based on predetermined objectives and methodology. In the process of study, the objectives are predetermined. The methodology has been designed to fulfill the objectives for the study.

1.8 FRAMEWORK OF ANALYSIS

The study employs following new product development (NPD) tools to verify the NPD process discipline, analyze prototypes and pilot build data, setting and following the timeline, conduct production studies.

- NPD Workflow
- NPD Dashboard
- Process Conformance Index
- Requirements Management Index
- Advanced Product Quality Planning (APQP) Conformance Index
- Product Evaluation Reliability Growth (PERG) Analysis
- Production Study
- Reflection Analysis

1.9 DELIMITATIONS

New product development process has many dimensions and involves almost all divisions of the firm. The present study is limited to following aspects:

- The study is limited to the product introduction process of off-highway truck of Caterpillar Inc. of capacity 40/50T to the growth and developing markets.
• Customer fuzziness of NPD fuzzy front end, not technology fuzziness or competition fuzziness.

• The competitive benchmarking study focuses on only two competitor products for comparing the study products namely off-highways trucks.

• The major factors used for comparison included fuel consumption and productivity.

1.10 ORGANIZATION OF THE THESIS

The thesis work is organized into five chapters.

The **First Chapter** includes introduction, new production introduction (NPI), need for the study, statement of the problem, research gap, proposed research model, objectives of the study, methodology, limitations and chapterization.

The **Second Chapter** reviews the literature related to the core theme of the research. The review begins with the definition of New Product Development (NPD), NPD Models, NPD Management practices in organizations. The chapter also discussed the Benchmarking practices and processes.

The **Third Chapter** describes the research methodology of the study. It details the various NPD tools. The second section of the chapter includes information about the profile of the company – Caterpillar Inc., India in which the study was carried out. The last section of the chapter discusses the overview of the products which were developed through NPD strategy.
The **Fourth Chapter** describes the NPD management framework in detail. Various phases in NPD are discussed. The chapter includes a section on analysis of VOC and VOB data and its role in NPD. The chapter also discusses the benchmarking studies carried out at the client site to evaluate the performance of the vehicles by conducting various rigorous tests comparing with the competitor vehicle.

The **Fifth Chapter** presents the major conclusions of the study, NPD accomplishments, lessons learnt and scope for future work in the present study.

1.11 **OPERATIONAL DEFINITION**

Some of the operational definitions of key terms frequently used in the thesis are presented here.

**NPD**

New Product Development can be defined as the processes that an organization follows to develop and provide new products and services to exceed customer expectations worldwide.

**Haul Road**

The path through which the Off Highway truck travels to get loaded and to dump the material in the dump yard.

**Competitive Benchmarking**

It is a continuous, systematic process for evaluating the products services and work process of organizations that are recognized as representing the best practices for the purpose of organizational improvement.
**Process Conformance Index (PCI)**

PCI is the index which help teams to understand what should be done and how well it must be done. It indicates and identifies areas for improvement in the processes.

**Requirement Management Index (RMI)**

RMI is the index which helps to identify the key requirements of the customers.

**Advanced Product Quality Planning (APQP) Conformance Index**

APQP index is the index which helps to identify and follow the quality planning steps in each of the new product development processes.

**Production Part Approval Process (PPAP)**

PPAP refers to the steps (19 steps) to be followed during development or change in the existing process during development of a new or current product.

**Multi Generation Product and Process Plan (MGPP)**

MGPP is the series of developments or improvements that are to be made in the process or product over generations.