CHAPTER 1
INTRODUCTION

PREAMBLE

The proposed work deals with the development of an expert system using multi-objective optimization for adjusting the Plant layout to minimize the economic load and check the feasibility aspect of the product to be manufactured.

1.1 NEED OF THE PRESENT WORK

The integration of manufacturing systems and large-scale automation, which has been possible with the development of communications networks at very low cost digital computers, which allow more flexibility and efficiency to meet schedule of production and also lead to higher quality products and lower cost.

- Multi-task mode operate in modern systems and also occur in flexible manufacturing systems, have different types of subsets of machines that can be used to perform multiple tasks or functions. When the companies facing competition from low-cost markets then for increasing number of manufacturing jobs, multitask machining has been used.

Flexible manufacturing systems have been developed to assist manufacturing industry to move forward for the objective of flexible manufacturing systems. Flexibility is very much important for designing the manufacturing systems. There are several examples that can be found in assembly systems and flexible production facilities. In this system, the different and limited amount of product type is there and every product type has to generate a certain quantity.

The development of efficient and effective flexible manufacturing systems where scheduling strategy also an active and important research area. During the machine allocation time, system configuration selection is for the manufacturing system development. At this stage, the configuration of the machine
specifications, system manufacturers and vendors choose by the manufacturer. Multi task manufacturing systems can be manufactured by a number of ways. The configuration that has been selected gives an impression on the entire performance of the system that has its reference with cost productivity and reliability.

A product manufacturing company using multi-production units and sub-production units for manufactures a product. In order to make a newer version of the existing product company has to undergo various changes to adapt to the new features that might include improvisation of the existing production units or advanced technologies.

The problem that arises is the newer version may not be feasible but since the manufacturing units for various components are working it is wasting the time, energy and the resources of the company.

While at the same time this could be avoided by introducing an expert system that will calculate if the newer version of the product is feasible or not and if it is then optimizing the prior scheduling of the manufacturing units to achieve the best.

This expert system based on accessibility analysis is using multi objective optimization algorithm to find out multi state. By its configuration we can measurement of the performance of the manufacturing/ production system. In case, when we are referring to a multi task production system so as to make a choice amongst specific configuration that increase the probability to meet an essential demand for a specific task using availability.

This solution that is provided here, as a solution to the problem is a group of all possible solutions that act as a set of these solution grouped together as into one, which provides the most excellent trade off amongst the various multiple objective functions.
The accuracy provided by this expert system that does all the thinking for human based on pure calculations and zero assumptions makes it worthwhile software for any company to consider. Hence, for future perspective it is a promising solution to the adverse conditions faced by various manufacturing companies.

1.2 OBJECTIVE OF THE PRESENT WORK

The purpose of the present work is:-

(1) Building a knowledge base expert system using Neuro Fuzzy Approach.

(2) To find out the impact of Multi Objective Optimization principle in building knowledge base which can help in Maximization of Profit?

(3) Extension of Multi Objective Optimization in setting the priority and machine scheduling.

1.3 HYPOTHESIS

* Contribution of Neuro fuzzy Technique in building the Expert System increases its efficiency.

* Combining Multi Objective Optimization in Industrial Manufacturing System increases the throughput of the organization and its profitability.

1.4 METHODOLOGIES

We outline the elements of the system on interaction of various parameters:

1. The first step covers creation of knowledgebase derived from Expert System. It accounts the constraint defined by the user and perform the economic analysis.

2. The second step involves in analysis the trade-off between Profit Maximization, Perception and Knowledge creation.
3. The third step involves prioritizing and Machine Scheduling of Machines in order to maximize the Profit. Model developed is supported by a case on Mobile Manufacturing Industry.

1.5 ORGANISATION OF THE THESIS

The whole thesis is divided into 8 chapters.

CHAPTER 1: highlights give the overview of the problem and the need for the present work.

CHAPTER 2: presents the literature review of the Multi Objective Optimization. It highlights the work on Expert System application in industrial control system. It also focuses on how Multi Objective Optimization technique is helpful in developing knowledgebase.

CHAPTER 3: It discusses the introduction of research design and methodology, methodology for sample design, sample sizes, survey plan. It also defines the implementation of the research design, analysis of the survey and inferences from the analysis.

CHAPTER 4: discuss the theory of Multi Objective Optimization. The primary basis of Multi Objective Optimization is to provide satisfaction to Multi Objective without worrying the integrity of the system. The search problems and most real world optimization problems that involve multiple objectives. Multiple distinct solutions may produce trade off amongst another objective. A solution that is marvelous is regarding only one objective that requires to compromise with other solutions.

CHAPTER 5: It focuses on development of a framework for knowledgebase creation using Neuro Fuzzy approach. The inference engine and knowledge base is the heart of the intelligent system. We have developed an Expert Input output business transformation model using the concept of Back Propagation Learning framework. Finally we are able to derive a matrix showing the relationship between Part, Tool and Labor and Processes.

CHAPTER 6: It gives the emphasis on the issues relating to Honda Car manufacturer with Multi Assembly Line. The focus is to optimize the product versus part planning the presence of multiple conflicting objectives. The methodology used is Pareto Optimal Solution for Assembly
Line for Wheel Base. Finally we have developed a convex Pareto relationship between Perception, Knowledge Creation and Profit Maximization.

**CHAPTER 7:** It gives the extension of chapter 5 with focus on applying optimization in prioritizing and machine scheduling using multi task and multi machine scheduling.

**CHAPTER 8:** Conclusion and Future Scope