

Chapter 1

1 Introduction

A facility is an entity that facilitates the performance of any job. It may be a machine tool, a work centre, a manufacturing cell, a machine shop, a department or a warehouse [1]. A facility layout is an arrangement of everything needed for production of goods or delivery of services. Facility layout problem (FLP) is a difficult problem to resolve. Determining the physical organization of a production system is defined to be FLP [2]. FLP is known to have a significant impact upon manufacturing costs, work process, lead time and productivity [3]. FLP is even more difficult in the food processing industry. The industry specific food safety, hygiene and good manufacturing practices (GMP) have to be considered in resolving the FLP. Failing to produce according to high hygienic standards has a direct influence on production efficiency by loss of production, but an even greater effect through loss of consumer confidence [4]. The hygienic layout design should help to segregate work area to control hazards and mitigate the risk level to manufacturing process.

There had been very little research on FLP considering unique manufacturing requirements of food processing industry. Food safety and hygiene play a major role in this industry. Food quality is the result of numerous factors such as physical, biochemical and microbiological characteristics [5]. Many practices like hazard area critical control point (HACCP) or GMP ensure the manufacturing process meets food safety and hygienic requirements. These factors should be considered in the layout designing process in the food processing industry.

It is mandatory to ensure food safety in the manufacturing process to protect the consumer. Failures can cause harm to the consumer and damage the reputation of the company. This can lead to prosecution in criminal court for negligence and cause major financial losses to the company. Hence it is essential to consider unique GMP requirements of food industry in the layout designing process. This will ensure GMP of food industry is maintained in the layout and reduce the financial impact as further modifications are not required as all factors are considered during the layout designing process.

1.1 Objectives and scope

The aim of this thesis is to develop a decision support system that can be used in design or redesign of layouts in food processing industry. The system will consider food safety, hygiene and practical aspects of implementation of the developed layout. Objectives of the present research are as follows:

- To develop a less time consuming framework for layout planning – this framework should support the decision making process by considering salient points of food processing industry.
- To develop a model layout suitable for food processing plants – the model should provide a common guideline to locate various sections in a food processing plant.
- To evaluate the framework and model to modify an existing layout – the framework and model should be tested in a layout development project.

A literature review is carried out to identify different layout types, layout planning methods and specific requirements in food processing industry. A framework is designed to facilitate gathering of information and to resolve the FLP using the framework as a decision support system. A model is proposed for location of various manufacturing sections in a layout of a food processing plant. The layout is segmented into five parts; primary manufacturing, secondary manufacturing, utility, warehouse and administration. This framework and the model are practiced as a case study during a layout modification process in a well known food processing factory.

1.2 Thesis overview

Chapter 02 discusses the literature review on quality stranded of food processing plants, layout types and layout planning methods. Chapter 03 discusses on the development of a framework for layout design. The 3rd chapter describes the layout model suitable for food processing plants. The 4th chapter discusses the application of framework and model for modification of a layout in a food manufacturing plant. Chapter 05 presents the discussion followed by the conclusion in the final chapter.