

**UNIVERSITI TEKNOLOGI MARA**

**ENHANCING FACILITY LAYOUT DESIGN  
USING QUALITY FUNCTION DEPLOYMENT  
(QFD) APPROACH**

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## ABSTRACT

Modern manufacturing facility experiences significant changes in product designs, process plans, demand volumes, product mix, product life cycles and production routings. However, limited attention paid to facilities design layout has resulted in a significant shortcoming especially when a wrong selection of machines/workers position increases the travel distance and thus led to 10 to 30 percent increment in material handling cost. A study on integrating QFD approaches with simulation modelling within a facility layout is thus demonstrated which encompasses: (i) identifying the current practice of facilities layout design through assessment in three different manufacturing environments; (ii) adopting Quality Function Deployment (QFD) method to verify the expectation of the customer/worker requirements for facility layout design characteristics and (iii) analysing the outcomes via simulation modelling to allow verification of the floor design without having to rearrange the actual physical layout. Findings revealed that QFD approach is possible to prioritize and implement the new layout solutions at the onset of the design stage before the actual layout implementation. Six characteristics are concluded as the major primary specification for the facility layout design leaving six others as minor. Besides being relevant for enhancing facility layout problems, it is envisage that findings from this study would further catalyse knowledge and technology advancement indicated in the recommendations.

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# CHAPTER ONE

## Introduction

This chapter outlines the overall structure of the study. All information is structured to review the chronological background related to the research carried out. This information covers the previous and current status of facility layout design in manufacturing industries, overview on facility layout problems and its characteristic together with statements justifying this study. Explanatory information is also included on the objectives of the study, potential benefits from the study, research outline as well as an illustration of the research outline.

### *1.1 Background*

#### *1.1.1 Past and Present Facilities Layout Problem*

The efficient design of a facility layout has been recognized as one of the most important issues in contemporary manufacturing systems. Facility layout design is a well known key factor related to improvement of productivity. It is one of the main fields in industrial engineering where much research effort was spent and numerous approaches were developed in the past. The purpose is to attain an effective machine arrangement in order to reduce material handling cost, as well as to reduce manufacturing lead time. A good placement of facilities contributes to the overall efficiency of operations and can reduce about 50 percent of the total operating expenses. It is generally accepted that effective facilities' planning can reduce material