Service Quality Improvement Through Lean Management at King Khalid International Airport in Saudi Arabia

by

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Abstract

This thesis aims at investigating the level of service at departure area of KKIA. The study further measures the perceived quality of service and passenger satisfaction in term of tangibles, reliability, responsiveness, assurance and empathy by using five steps of lean six sigma (Define, Measure, Analyse, Improve and Control).

The study aims to implement and evaluate the effectiveness of using a lean six-sigma managerial approach to the departure area of KKIA to enhance the level of service (LOS) and customer satisfaction.

The passenger flow through the airport is used to measure the quality of services. Existing studies that discuss lean six-sigma implementation in airports were evaluated. Data was collected about KKIA departure area and its LOS both before and after the lean six-sigma implementation. Additionally, a SERVQUAL questionnaire was used to evaluate pre- and post-implementation review. The questionnaire features easy-to-collect data to measuring the perceived quality of service and evaluate passenger satisfaction with the LOS in KKIA.

Before the study concepts of LOS and Lean was unheard within the airport community. Initial evaluation show poor customer service and many delays (waste) within the departure are at KKIA. During the study a growing awareness of Lean and LOS showed improvements in the customers' experience, e.g, removing the shop at the entrance, improving flow thought the airport. Concluding the study, there was a total reduction in waiting from 54.74 minutes to 34.87 minutes (35.7% reduction). Also the LOS on the IATA Performance Standard went from E (Inadequate) to C (Good). This is

improvement, excellent but without continuous improvements the Airport's LOS will reduce back as passenger numbers grow from 16 million passengers per year (up from 9.8 million in 2004), to an expected 25 million by 2025.

Interesting different cultural approaches to lean management became evident during the study when compared to other implementations in Europe to the Middle East. Cultural difference will always affected the reliability of the results. However, by considering these cultural effects in answering questions and interviews, the lean implementation was still successful. As culture changes are ongoing, evaluation of the situation at KKIA is required for ongoing improvements.

Best-practice for the continued improvement of ongoing lean management is suggested for the departure area at KKIA. These key strategies and best-practice approaches are useful to future implementations at other airports.

Keywords: Service Quality, Lean thinking, Six Sigma, Lean Six Sigma, KKIA, Change Management, Saudi Arabia culture, SERVQUAL, Level of Service

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Dedication

This thesis is dedicated, with deepest love and everlasting respect, to my parents, wife, sons and my daughter without your prayers, support and encouragement I could not have reached this stage.

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Lastly, I offer my regards and blessings to all of those who have supported me and given assistance to me in any respect during the completion of this dissertation.

Declaration

This dissertation is the result of my own work and includes nothing which is the outcome of the work done in collaboration, The results and conclusions embodied in this thesis are the work of the named candidate and have not been submitted for any other academic award. Some of the material contained herein has been accepted and presented in the form of the following publications, next page (dissemination Page). The length of this thesis including footnotes and appendices is approximately 62,500 words.

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List of Abbreviations

5S	Sort, Set in order, Shine, Standardize and Sustain
ADA	Americans for Democratic Action
AOC	Airport Operations Centre
APM	Automated People Mover
ATM	Auto Teller Machines
BIA	Bandaranaike International Airport
BPR	Business Process Reengineering
CI	continuous improvement
CTQ	Critical To Quality
DEA	Data Envelopment Analysis
DM	Decision Makers
DMAIC	Define, Measure, Analysis, Improve, Control
DPMO	Defects Per Million Opportunities
FID	Flight Information Display
FIDS / AODB	Flight Information Display System/ Airport Operational Database
FMEA	Failure Mode and Effects Analysis
GACA	General Authority of Civil Aviation
GRA	Gray Relation Analysis
HKIA	Hong Kong International Airport
HR	Human Recourses
IATA	International Air Transport Association
IT	Information Technology
JIT	Just in time
KFIA	King Fahd International Airport
KKIA	King Khalid International Airport
KMO	Kaiser-Meyer-Olkin

KPI	Key Performance Indicators
KSA	Kingdom of Saudi Arabia
LAN	Local Area Network
LOS	Level of Service
MA	Multi-criteria Analysis
MADM	Multi-Attribute Decision Making
MAG	Minimum Annual Guarantee
MCDM	Multi-Criteria Decision Making
MCP	Mobile Command Post
MSP	Managing Successful Programmes
ORTMA	O.R Tambo International Airport
PCA	Principle Component Analysis
PCP	Permanent Command Post
PMO	Project Management Office
PSR	Primary Surveillance Radar
SBM-NDEA	Slacks-Based Measure Network Data Envelopment Analysis
SERVQUAL	Service Quality
SIPOC	Suppliers, Input, Output, Process, and Customers
SWOT	Strengthens, Weaknesses, Opportunities, and Threats
TPS	Toyota Production System
TQM	Total quality management
VI	Visibility Index
VIKOR	VlseKriterijumska Optimizacija I Kompromisno Resenje
VOC	Voice of customer
VSM	Value stream mapping

Chapter One: Introduction

1.1. Background

The King Khalid International Airport (KKIA) in Riyadh is one of the three main international airports in the Kingdom of Saudi Arabia (KSA). Since opening in 1983, it has been the gateway to the capital of the kingdom, Riyadh. The airport is located approximately 25 kilometres away from Riyadh's city centre with four passenger terminals (Kloosterziel et al., 2009).

Lean six-sigma is a process of continuous improvement in services or products to achieve high product/service quality, competitive costs and reduced delivery times, leading to the satisfaction of customers (Hines et al., 2006). The aviation industry nowadays requires continuous improvements to customers' satisfaction levels, which can be achieved through many managerial procedures (such as lean six-sigma procedures), in order to ensure the business's viability. Airports are complex organizations whose areas of comparative advantages and efficiency hinge on elements that the airport management is more likely to control and on applying the lean six-sigma philosophy in such areas. This will ideally result in the optimization of resources, efficiency in performance and the continuous gradual reduction of all forms of waste (Appelbaum and Fewster, 2004). This research considers the application and possible implementation of lean six-sigma in the aviation sector, with specific consideration of (KKIA).

The level of services (LOS) that is provided in the departure area at KKIA was studied. The study evaluates the sizes of the gaps between expectations and perception in the service quality. Then, the researcher discusses what problems cause travellers' dissatisfaction with the services provided at KKIA and then offers solutions to these problems from the point of view of passengers and airport workers and managers. These solutions' applicability to the gaps is discussed such as the quality of the offered services, achievement of the passenger satisfaction, analysing work stress problems and poor management, which often cause problems and difficulties. The study follows a descriptive, analytical and exploratory approach to assessment in order to achieve its objectives.

1.2. Problem Statement

Very little prior studies service quality status and lean implementation at KKIA have been found (see chapter 2). This absence of prior work is requiring an integrated scientific method for understanding service quality, and applying lean and other management techniques to an airport in Saudi Arabia specifically KKIA. In the midst of global developments, there are some foreign initiatives that refer to quality management in terms of quality levels (Okar et al., 2011; Gupta & Rao, 2011), but they do not specify the operations that need to be applied the quality management in service organizations to be clear and precise.

KKIA in general and the departure hall in particular suffer from an insufficient applied quality management system. A more robust system would contribute to the identification of problems and solutions, provide a database to measure, and monitor the provided quality of service and the extent of development. There is also a lack of a scientific method and modern management to determine the level of service in the provided quality of service. These gaps have been revealed from the analysis of the managerial procedures followed at KKIA.

This study focused on improving the quality services levels in the departure area at KKIA in detail, as well as creating a good level of service. The fact that KKIA operates in a vital sector is important, particularly as there are many services and businesses that operate under its care. Considerable attention has been paid to KKIA's levels of service quality, especially in the departure hall. Hence, this study focused on the improvement of the service quality in the departure area at KKIA through the use of a questionnaire (SERVQUAL: service quality) (Parasuraman et al., 1988) in the basis of lean six sigma approach.

1.3 Rationale of the study

The expected return of this research was the improvement in the overall services at KKIA. This was measured via improved passengers' satisfaction and an improved flow of operations within the airport. The rationale for the use of lean six-sigma principles in KKIA and the effect of their use is discussed

1.4 . Aims and Objectives of the Study

1.4.1. Aim of the Study

The main aim of this project was *to improve passenger flow through the departure area of KKIA in the KSA by implementation the principles of lean management.* Successful implementation was measured in terms of improvements in customer satisfaction and reduction in waiting times.

1.4.2. Objectives of the Study

This study aimed to address the following objectives in order to achieve the main aim of the study:

- Investigate service quality at KKIA to provide a suitable organizing structure for implementation toward Lean Management.
- Conduct a detailed study of the departure area at KKIA and the current passenger flow through the airport to measure the service quality.
- Investigate the use of Lean and six sigma, including other management tools to validate successful implementation of Lean at KKIA.
- Undertake an IATA Performance Standard service level evaluation in the KKIA departure area to validate successful Lean Management change.
- Understand existing studies that discuss lean six-sigma implementation in airports through exploration of the literature.
- Integrate lean and six sigma quality management techniques within KKIA.
- Conduct an in-depth evaluation of different models for the implementation of lean six-sigma in the departure area at KKIA.
- Provide a list of quality management implementation strategies for KKIA to guide senior management to identify the levels of service quality, strengths and weaknesses of their operations.

- Suggest a best practice lean six-sigma methodology for the departure area at KKIA and relate these outcomes for implementation at other airports.

1.5. Research Hypotheses

The main hypotheses for this study cover the following aspects:

- Lean management has a positive benefit for customer service quality at KKIA.
- The implementation strategies for KKIA can be applied to other airports.
- The activities of surveys, discussions and management feedback normally would improve service quality for customers. However Saudi Arabia airport management culture is different. How much will this change to the expected response if compared to UK or similar management culture

Therefore, null hypothesis of this study is:

$H1_0$: There is no statistically significant effect of lean management practices on the quality of service / customer satisfaction (including tangibles, reliability, responsiveness, empathy and assurance).

1.6. Methodological Approach

In this study, the use of descriptive, analytical and exploratory purposes, as well as case study, was used to evaluate the reality of the level of services provided within the departure area at King Khalid International Airport, in order to achieve the desired results of the study. Reviewing previous literature is used to define the main gaps of the study topic and to define the main terminologies of the research. The literature review was followed by a case study analysis, which focuses on the management of the departure area at KKIA and customers' satisfaction with the level of services LOS.

Mixed quantitative and qualitative approach methods were used to measure customers' satisfaction through the steps of implementing the lean six-sigma procedure for the airport management. A questionnaire, based on the SERVQUAL model was distributed among the passengers to assess the quality of service in the departure area at KKIA. In

addition, some structured interviews were conducted with managers in the departure area at KKIA.

This study will follow the six sigma DMAIC (Define, Measure, Analyse, Improve and Control) methodology (Weimar, 2011) by the use of different DMAIC tools. After the services had been improved, the satisfaction of customers was the main concern in the collection of data through questionnaires based on the SERVQUAL model (Parasuraman, Zeithaml and Berry, 1988). The SERVQUAL model uses five specific criteria that recognize and evaluate the quality of service rendered. Questions were drawn from the five criteria below, which can be seen as identifying the gaps between existing perceptions and expectations in terms of quality. (In chapter 4 explains SERVQUAL). These criteria can be viewed in relation to KKIA as follows:

- *Tangibles*: related to physical facilities, equipment and personnel.
- *Reliability*: related to the ability of personnel to perform the service accurately and dependably.
- *Responsiveness*: related to the eagerness and willingness of staff to help customers and provide prompt service.
- *Empathy*: related to the caring level that is shown by staff and the amount of individualized attention given.
- *Assurance*: related to the ability to inspire trust and confidence with courtesy due to good knowledge of the job and the needs of customers.

The research design is illustrated in the following points:

1. *Define:*

   This step involved defining the main aims, objectives, and questions of the study by collecting some data about the status of the departure area at KKIA from different sources. This step used each of the following tools: (see chapter 5):

- Observations
- Voice of Customer (VOC)
- Critical-To-Quality Tree (CTQ tree)
- Value Stream Mapping (VSM)
- Strengthens, Weaknesses, Opportunities, and Threats (SWOT) analysis
- Suppliers, Input, Output, Process, and Customers (SIPOC) process map
- Problem and Goal Statement

2. *Measure:*

   According to the problem that had been defined in the previous step, this step entailed measuring and collecting data to determine the current service quality in the departure area at KKIA by use of the following tools:

- Value Stream Mapping (VSM)
- Critical-To-Quality (CTQ): by the use of SERVQUAL questionnaires
- Conducting Interviews

3. *Analyse:*

   This step involved analysing the data collected in the previous step by use of different tools and methods, as follows:

- Sort, Set in order, Shine, Standardize and Sustain (5S) strategy
- Statistical Analysis
- Interviews Analysis

4. *Improve:*

   In this step, the lean six-sigma approach was applied. Its influence on service quality was measured by use of the following tools:

- Sort, Set in order, Shine, Standardize and Sustain (5S) strategy
- Queuing Methods for Reducing Congestion and Delays

SERVQUAL and statistical analysis

5. *Control:*

   This step included developing suggestions for a three-year plan for other improvements in the departure area at KKIA in order to increase the level of service. The tools used for this step were:

- Control plan
- Kaizen Theory
- Failure Mode and Effects Analysis (FMEA)

1.7. Thesis Outline

Chapter 1: Introduction:

This chapter introduces the whole thesis by providing background information on the application of lean six-sigma procedures, KKIA, and continuous improvement. This is followed by the identification of the main problem of this study and the study's main aims and objectives. After that, the study hypotheses and the general design of the study (based on the DMAIC procedure) are defined.

Chapter 2: Literature Review:

This chapter explores related previous studies in the field of lean six sigma and lean management in the aviation industry. Also, many managerial models are discussed in this chapter. The main aim of this chapter is to identify the gaps in previous studies related to the implementation of lean six sigma and the level of service in the departure area at KKIA in order to cover them through this study.

Chapter 3: Cultural and Managerial Procedures in KKIA:

This chapter explains the current status of the managerial procedures in KKIA, including the implementation of lean management. The social variables, culture influenced and practical obstacles to change management in KKIA was analysed. The research showed that Saudi culture effects implementation with in KKIA and the middle east aviation industry. Reflective review about different dimensions of Hofstede model in context of Saudi Arabia was summarised.

Chapter 4: Research Methodology:

This chapter explains in detail the methodological approaches followed in this study. It explains the philosophy, purpose, and research approach of this study. Also, this chapter explores the system thinking of this study and the research framework. Moreover, it explains the lean six-sigma procedure and the tools that were applied in this study. The mixed qualitative and quantitative methods used and the reasons for using them are illustrated.

Chapter 5: Implementation of Lean Six-Sigma Management in the Departure Area at KKIA:

This chapter includes the first three steps of implementing the lean six-sigma approach in this study, starting with 'define', followed by 'measure' and then 'analyse'. These are the steps that were applied in the lean six-sigma procedure before applying suggested changes in the departure area at KKIA. This was done in order to see how these modifications would suit the case study.

Chapter 6: The Implementation of Lean Six-Sigma Management Through Continuous Improvement:

This chapter includes the implementation of the last two steps of the DMAIC approach: 'improve' and 'control'. The final step includes a suggestion for a three-year plan for future modifications in the departure area at KKIA.

Chapter 7: Conclusion and Recommendations:

This chapter includes a conclusion of the final findings of the study. Based on the results of this research, the chapter also provides recommendations for KKIA and future work and research in the same field. In addition, this research study has made several contributions to extant knowledge.

Chapter Two: Literature Review

2.1. Introduction

The aim of this chapter is to collect, understand, and discuss recent research related to the main topics within this thesis. The chapter will also serve to frame the main objectives of the study, since the literature review is considered as a primary methodological approach within the present study. To this end, the chapter will begin by briefly explaining lean management, followed by the SERVQUAL method and leadership means. It will then identify and justify the methodologies and procedures selected for use within this thesis. Following this, service quality in general will be explained from different perspectives, and level of service (LOS) within airports will be outlined, along with some recent studies that have sought to develop it. The research will then focus on the perspectives of passengers and other airport customers in order to explain their attitudes about airport services.

The chapter will also briefly identify and discuss several models that have been designed to measure service quality in airports all over the world, along with some recent attitudes that focus on the management of passenger flow in airports. Some recent related studies about service quality in various Saudi airports will then be explained and discussed. Finally, a brief conclusion will be built at the end of the chapter in order to explain the researcher's standpoint on the recent studies, and the most beneficial aspects of all the discussions in the context of the present research.

The aviation industry is considered a very sensitive environment that requires a great deal of attention to many different aspects and details in order to increase the LOS and raise customers' satisfaction regarding these services. Many researchers have conducted various studies to achieve these aims for airports. Ensuring the quality of services in the aviation industry requires a special field of management strategies called quality management (QM). The importance of quality in any organization comes from its effect on customers' satisfaction, especially within organizations where customer attitudes have a direct impact on the companies' success within their industries. The aviation industry is one example of a field that is highly sensitive to customer satisfaction. However,

controlling the quality of services and products cannot be achieved without QM, which can be simply defined as the guaranteed application of quality standards to services and products (Bartley, 2011).

In fact, increasing and enhancing the quality level of services in the aviation environment has become one of the most significant tasks of human resource management (HRM) departments. Therefore, many strategies have been adopted by HRM departments within airports in order to increase the service quality, which leads to customer satisfaction. The main aims of HRM in the context of the aviation industry can be represented by two related points: customers' satisfaction, and the quality of services. Meeting these aims requires high levels of attention to both aspects by the HRM departments. International airports, in particular, must pay close attention to the two factors, although the factors will be affected by many additional external influences, such as cultural differences between customers, contact between aviation staff from different airports, educational differences in the aviation industry, and many other difficulties that face HRM managers (Appelbaum and Fewster, 2004).

However, many researchers have suggested and tested a range of strategies that have been built in order to maintain customers' satisfaction and the quality of services within international airports throughout the world (Appelbaum and Fewster, 2004). Some of these strategies have succeeded, and some have failed. One of the most well known strategies in this field is lean management. It is worth to note here the first evolution of lean thinking is dated to the Toyota Production System (TPS). The following section will explain this managerial strategy in more detail.

2.2. Lean and Lean Management

Lean management aims to increase the productivity of an institution, using its existing resources. Lean management focuses on delivering the required outputs with better quality, and in an improved delivery time. In other words, lean management quickly increases quality, by making use of the resources already present within the organization. Accordingly, lean management can be considered a very effective tool for development in any institution, since it utilizes all the available resources in addition to facilitating higher-quality outputs (Levantar, 2012).

Lean focuses on presenting more benefits to the customers of a business field through increasing the production capacity and reducing excessive practices by achieving equilibrium in process operations (Levantar, 2012). Lean is not just a business tool, however; it is also a philosophy that should be driven from the top to the bottom of the team if the required level of knowledge and beliefs surrounding the concept are to be fostered. It is often difficult to successfully implement lean, however, because it requires a substantial amount of time, which is precious to any organization. Therefore, numerous organizations stop their lean programme in order to deal with other essential problems in business performance that can be solved more quickly (Ross and McKee, 2004).

When a business culture takes on the responsibilities of lean, it must also bear in mind that improvements require a number of developments that are changeable. Furthermore, lean must be adopted in accordance with many institutional laws, cultures and reporting systems of management performance, in order to achieve the desired results. When implementing lean, the company's performance, systems and processes cannot be ignored – they must be utilized as a cornerstone. The main notions of lean are coherent with several other development methods, and thus lean should be presented as an integrated method, which can identify and expand the company's existing strengths (Institute for Healthcare Improvement, 2005).

A lean programme must be presented as inclusive, and is effectively the mortar between the blocks (bricks) of the initiatives. Lean should be presented as a concept that will enable the business to meet customers' needs and business aims, rather than something that must be managed by a specialist or competent team. If a selected programme of management performance already exists, then this will lead to successful lean progress that may include only one additional "brick" or two (e.g. a suitable lean tool such as a value stream mapping). Studies have learned from previous programmes, and thus make use of the identified advantages, while avoiding problems and developing powerful plans for the future (Ross and McKee, 2004).

The thinking behind lean is neither new nor unique, but it may require changes to the mentality of the business. The key concepts must be totally grasped for any programme to achieve success in a lean programme. One such pivotal concept includes the fact that

the implementation involves end-to-end operational lead-time. An often-made mistake is to identify the endless aim of eliminating waste as the only target of a lean programme. However, although eliminating waste is appealing and seems to present significant benefits to the organization with respect to cost. This is merely a pre-condition to creating a lean operation. Rather, the main purpose of the process is to eradicate waste in order to reveal the potential of the operational performance and attitude. This provides a better understanding of the operation, which in turn leads to more efficient operational design and performance (Institute for Healthcare Improvement, 2005).

There are many popular tools for selecting and illustrating, such as value stream mapping, 5S (workplace organization), process mapping, fishbone analysis, and Pareto analysis. However, it is not the number of tools, but the selection of the most appropriate, that leads to success. Every one of these techniques can be disseminated at different levels of difficulty and at different stages of the analysis-to-solution implementation track (Shah and Ward, 2002).

It is worth mentioning that there are many famous aspects of lean building, which are used in different business scenarios. These aspects are composed in 5S, and there are many other programmes that constitute elements or complete parts of lean programmes, such as customer pull and Kanban, systems, Kaizen group technology, continuous improvement, visual management systems, and concurrent or simultaneous engineering (Shah and Ward, 2002).

Value stream mapping is considered one of the most well-known lean tools, and is derived from the mapping of standard operations. This development tool is connected to customers' values. Moreover, it gives organizations the opportunity to imagine the best outcome of a lean process in order to generate more benefits from a business activity through the use of certain institutional standards (Shah and Ward, 2002).

Such visions of success are important in generating greater realization of many different relationships within businesses, such as the relationship between customers and suppliers. However, this operation is considered stable and simple, and it does not always represent the most important and realistic complications. Some important enterprises have

employed a simulated operation in their managerial aspects in order to empower them to analyse dynamic operations, consisting of various product mixes, with further certainty. Additionally, the process of lean management has been applied effectively in various creative ways. The most effective methods do not depend on texts, which are employed as "mantras", but rather are derived from inventive methods that are activated from outside of the workforce. In order to assess the performance of this process for institutions such as hospitals, banks, factories, or police forces, involving real experts is a must (Institute for Healthcare Improvement, 2005).

2.2.1. History of Lean Management

The lean was known as "Taiichi Ohno" in 1940s by TPS (which is dated back to the Second World War). The developments of this system was done be TPS in order to create a system that meets Toyota desires (Melton, 2005). So, the origins of lean management can be dated back to the end of the Second World War, when many large institutions faced problems in rebuilding their manufacturing bases with the available resources in a short time. The solution to this problem lay in applying three main conditions: (1) acquiring the necessary resources, (2) eliminating resources that were without value, and (3) halting any ineffective plans immediately. These three processes can be considered the basis of lean management (Harvey, 2004). First, *acquiring the necessary resources* requires the organization to identify and acquire the most-needed resources (for example, infrastructural resources) in order to conduct the subsequent stage. Secondly, *eliminating resources without value* requires the organization to decrease the expense of unnecessary resources in order to control the financial status of the whole organization. Finally, *halting any ineffective plans immediately* ensures that inefficient plans are stopped in time to ensure minimal losses (Harper, 2007; Harvey, 2004).

In fact, in simple terms, these three qualities follow the same direction as lean management processes; however, although they are effective in cases that require changes in a short amount of time, in their simple form these points cannot be effective in most cases of organizational management. Lean management has thus developed these steps into an effective management procedure, and many models have been built by

various researchers in order to improve and develop the implementation of lean management in different fields and institutions (Weerdt and Keijser, 2012).

2.2.3. Levels of Lean Management:

Lean management consists of two main levels: strategic and operational. At the strategic level, the lean thinking procedure is followed in order to obtain a good understanding of problems based on five principles: Define, Measure, Analyse, Improve, and Control (DMAIC) (see section 2.2.5). The operational level is related to the strategic one, since implementing any process at the operational level requires lean thinking in order to apply it. The operational level cares mainly about eliminating waste, and this process contains many tools to manage lean production, while considering variability, availability, production control, quality, responsiveness, and capacity, as can be seen in Figure 2.1 (Radnor et al., 2006).

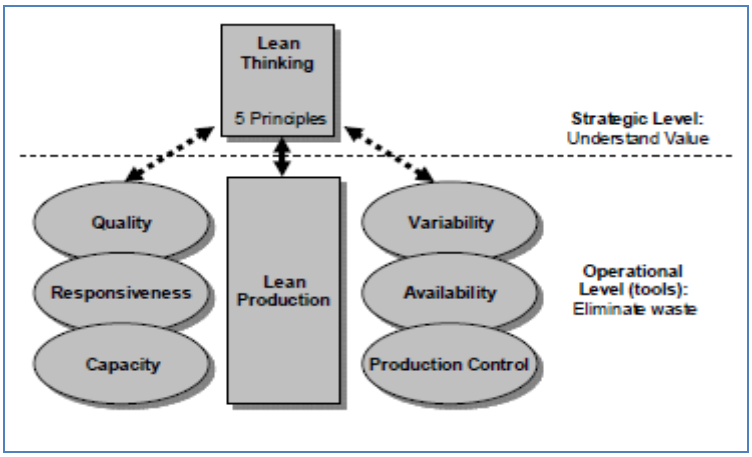


Figure 2. 1 : The framework of lean management (Radnor et al., 2006).

According to Womack and Shook (2005), lean management is a very effective approach to controlling organizations, but it needs good managers and leaders in order to achieve its aims, based on a full understanding of lean means (Mayer, 2011**).**

2.2.4. Forms of Waste

There are many forms of waste that can be eliminated by lean management; namely, over-processing, transportation, motion, inventory, wait time, defects, over-production,

and unused human resources. *Over-processing* includes worthless values that are added to a product, or values that will not benefit customers. *Transportation* includes moving unnecessary information, raw materials, or products. *Motion* consists of the needless movement of people within the institution. *Inventory* includes the flow of work-in-process, which is not needed for customers. *Wait time* includes the time involved within the unnecessary flow of work-in-process. *Defects* consist of low-quality products which do not meet customers' satisfaction requirements. *Over-production* refers to numbers of products exceeding those that are required. Finally, *unused human resources* include unnecessary employees or workforces within the institution. Lean management aims to eliminate waste in all its forms in order to improve the performance of the institution, thus leading to the institution's development (Govekar and Agarwal, 2011; Abilla, 2010; Grainger, 2006; Sutherland and Bennett, 2007).

2.2.5. Lean and Six-Sigma

According to Hoerl (2004), there is an increasing trend of the integration between Six Sigma and the Lean as Six Sigma projects are added in Lean initiatives. Antony et al, (2003) affirm the views of Hoerl (2004) by highlighting strengths of both initiatives and discussing the theoretical synergies, which can be obtained through the use of both. Assarlindet al, (2012) summarized the synergies as the combination, which benefited a firm in facilitating a focus on flow, variation reduction, waste reduction and value streams by developing a structured and statistical problem solving tools and techniques.

Pepper & Spedding (2010) defined that the term 'lean Six Sigma' is effective to describe the integration between the philosophies of lean and Six Sigma. But Bendell (2006) says that this concept as an approach for the process improvement in the organization is not fully matured in the specific area of academic research. Lean Six Sigma is defined as the strategy, which is effective to increase the performance of the organizational processes and consequently to enhance the customer satisfaction and bottom line results in terms of finance (Snee, 2010). Lean Six Sigma is also recognized as an effective tool for the development of effective leadership. Welch and Welch (2005) affirm the views of Snee

(2010) by depicting that capacity of developing a unit of a great leader is the most unheralded benefit of Six Sigma approach obtained by the firms.

Lean Six Sigma can be defined as a simple process that follows the lean management procedure in order to find suitable solutions (see figure2.2).

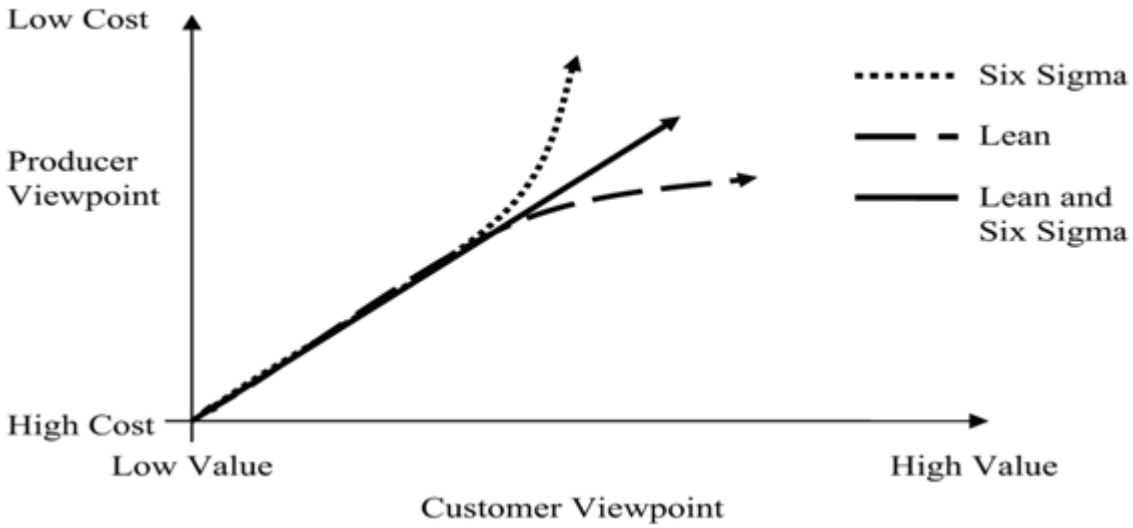


Figure2. 2: Producer-Customer relation for using lean & six-sigma (GoLeanSixSigma, 2012)

The main aim of the integration between these two approaches of the continuous improvement is the state of equilibrium, which is required to be achieved between the two. At the same time, to move away from the inflexible approach in any one direction only, response to the market risks and eliminate the impact over the value creation of a single inflexible approach are also the major concepts behind the integration of these two approaches (Krogstie & Martinsen, 2013). Similarly, to increase concentration on the reduction of the variation from the customer requirements and consequently reduce the unnecessary resources for pursing zero variation are other extreme for this integration. The balance between the both approaches is effective to create value from customers' point of view for the purpose of maintaining the market share and to reduce variation at acceptable level without over engineering the process, so that lower costs can be achieved in the business processes (Stonemetz, et al, 2011).

The Six Sigma approach is beneficial to reduce and remove the variation with the application of different statistical tools and supportive software, while lean approach benefits in the reduction and removal of waste in the organizational processes and value analysis. Bendell (2006) depicts that both the methods are origin in Japan as the improvement practices, but these are largely extended in North America. Since human errors facilitate undesired variation and waste, these approaches are developed as mistake proofing (Fairbanks, 2007).

Due to increase in the business needs, lean manufacturing has now extended as the lean services originated in Toyota, Japan, while Six Sigma is an American packaging of the statistical approach, which is widely used in the Japanese industry (Stonemetz, et al, 2011).

Lean Six Sigma is usually denoted by DMAIC, which refers to the most significant processes in lean-six sigma (Define, Measure, Analyse, Improve, and Control). These processes are explained below (Arbor, 2012; Raifsnider and Kurt, 2004; Mandahawi et al., 2012):

- Define: within this process, the problem that needs to be solved is identified, including its variables, purposes, and scopes. Through this step, the manager can highlight the main problem and understand its concerns.

- Measure: this process requires the manager to find suitable methods by which to collect the required data in order to identify the real variables and effects of the problem.

- Analyse: within this process, the manger must select a suitable data analysis tool in order to analyse the data collected in the previous step. This step provides the results required to calculate the real size of the problem.

- Improve: according to the results of the previous process, this step aims to improve the systems that are related to the problem in order to find the most effective solution. Following this, the measure and analyse processes must be

repeated in order to ensure that the improved process achieves its aims; otherwise, this process has to be repeated until the most effective solution is found.

- Control: this process involves quality assurance, which requires observation from the manager regarding the flow of the final plan, in order to ensure that quality has increased from implementation to the end of the project.

2.2.5.1 Lean Misconceptions

The major misconceptions about the lean management are described in the points below:

- Arnheiter and Maleyeff (2005) say that most of the people misinterpret the term lean as layoffs. Actually in lean management, if workers are engaged to do non-value added activities in their job then management and employees both work-out together to determine the better way for doing the job with the elimination of the non-value added activities. It is determined that laying-off the employees would be harmful for the firm in case of unavailability of the knowledgeable person and the remaining employees in the organization show their unwillingness to take part in the future waste elimination projects of the organization. Arnheiter and Maleyeff (2005) also replied to Emiliani, (2001) for wrong meaning of lean by saying that layoffs cannot be associated with lean management until it becomes essential for the managers and there is need to re-assign and re-train the employees due to their failure.
- Another misconception is that Lean only works in Japan because of the uniqueness of their culture. But it is not true as it is a universal system and most of firms with the successful implementation of lean management are non-Japanese. The main reason for this misconception is that Japanese workers are more frugal in nature in the comparison of the people from other nations. But still, if this statement were true then there would be a conflict between eliminating waste and being frugal in conditions when an engineer designs inferior part for the purpose of saving money (Arnheiter and Maleyeff, 2005).

- Another misconception is that lean is manufacturing only, while Arnheiter and Maleyeff (2005) argue that lean management facilitates the inspection of each step as the service step, which enable the firms to reduce waste and add value for the customers. Claim processing in the insurance industry, patient treatment in hospitals, evaluation of loan application in banking industry etc are some of the synonymous under the lean management practices. Lean management can be practiced successfully in any business, where the business activities are conducted to satisfy the customers.
- Lean is significant to work in certain environments only is another misconception for lean management approach. This is generally heard from the managers of large batches operations and at diverse job-shop operations, while these type of operations does not fit with the principle of 'lot size of one'. Arnheiter and Maleyeff (2005) determine that lean is more than designing manufacturing process as the identification and elimination of non-value added activities throughout the business is an important aspect of lean management among the businesses. Other aspects of lean management are also adopted, while implementing new manufacturing technologies.

2.2.5.2 Criticism of Lean

Lack of flexibility is the major criticism of lean concept, which can lead to the delay the delivery of products and services to customers (Dove, 1999; Cushman, 1994). Mast (2004) and Andersson, et al (2006) also discuss whether it is applicable to all industries or not as it mainly developed for the manufacturing and distribution aspects. At the same time, the application of lean methodology becomes susceptible for the impact of change in the organization as it facilitates reduction in flexibility and consequently ability of the firm to address the new situations and conditions (Fairbanks, 2007). Another criticism is that JIT deliveries cause excessive accumulation of products in the supply chain, which lead late deliveries, shortage of workers, pollution etc.

2.5.5.3 Six sigma Misconceptions

Below are the key misconceptions of Six Sigma:

- Six Sigma is new, which is pushed by quality consultants in the same way of Deming management, Total Quality Management TQM, Business Process Reengineering BPR and ISO 900. But there are always consultants, who take the seminars and proclaim themselves expert for a quality tool for benefit and Six Sigma is not an exception.

- Six Sigma determines that the goal of 3.4 defects per million opportunities DPMO is absolute and it should be applied for each specification and opportunity tolerance without considering the importance of it in the customer value expression. But 3.4 DPMO was derived at Motorola as per the characteristics of its products.

- Another misconception is that it is only quality related program, while as described earlier; the quality in this concept is directly related with the entire aspects of the customer value.

2.5.5.4 Criticism of six sigma

The major criticism is that there is nothing new in Six Sigma and it has the same features as TQM. It is also stated that Six Sigma is highly disciplined, top-down and data oriented approach, which is based on four stages namely measure, analyze, improve and control. It also includes statistical decision tools, which shows a clear link of the tactical and strategic aspects (Zu, et al, 2008). It is because statistical tools are used systematically for variation reduction and improvement in the processes along with the focus on results as per customer needs. The Six Sigma also includes complexity in achieving and exceeding the customer needs and consequently the customer satisfaction. It causes the use of voice of customer tools (VOC) in the define phase by the organizations that claims that Six Sigma approach failed to create the conditions of involving everyone, which is more focused in TQM (Parast, 2011).

To face these problems, Lean approach is required to integrate the use of targeted data for decision making and for adopting more scientific approaches to bring quality in the system. In the Six Sigma training programs only a single project can be started with certain level of savings, which is often executed by the project members in a department (Parast, 2011). It leads the improvement in the project members of the department, but at the same time, change in another department can cause a decline in quality and expected results, so, it is sometimes accused with the lack of a system view. Thus, there is a need to adopt the wide system approach in Six Sigma with the consideration of the effects on the whole system and consequently the quality and variation levels (Zu, et al, 2008).

2.2.6. Principles of Lean Thinking

The main aspects of thinking to achieve lean management consist of five principles: define value, map value stream, create flow, establish pull, and seek perfection (see Figure 2.3) (ITC, 2004). Firstly, value is defined by considering the end-customer perspective in order to diagnose the problem effectively. Then, the value stream is mapped by identifying the values within the stream for each service, in order to eliminate waste (Jones and Mitchell, 2006). Next, flow is created within the process in order to ensure accuracy in eliminating waste such as waiting time. To establish pull, any unnecessary or worthless services are eliminated, while worthwhile or necessary ones are added. Finally, seek perfection aims to improve the final plans, projects, and even flows in order to improve the whole procedure (Poppendieck, 2002; Lean Enterprise Institute, 2012).

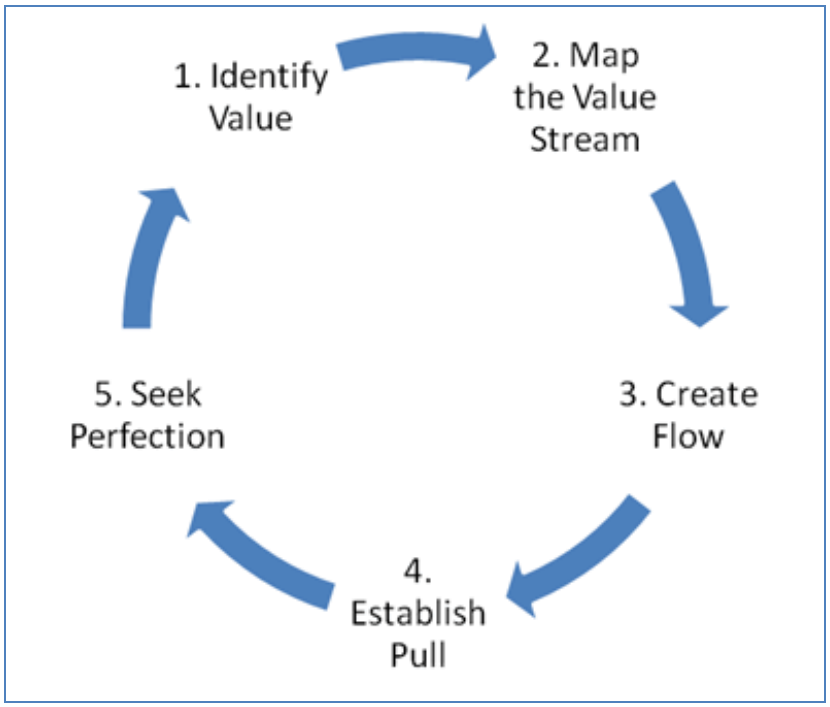


Figure 2. 3 : Five principles of lean thinking (Lean Enterprise Institute, 2012)

The organizations look at lean as a success key in the market based on Toyota's experiment and success. This might be a kind of blind imitating that could have very negative effects on the organization as a result of the failure. The question appears here is what are the reasons of lean failure?. Indeed, many previous studies illustrated the causes of the failure, which are concluded in the following 15 reasons as mentioned in Pabon (2010) study:

1- Considering 5S as an action to implement in an area

2- Implementing 5S as a strategy of top-down applied one regardless considering the bottom-up implementation

3- Considering the gained values of reducing waste as a cost cutting values

4- Misusing end-to-end value stream mapping

5- Considering value stream mapping as a current state analysis use although it is used for future state

6- Incorrect equating of top-down visual communication by considering visual workplace one of its variables

7- Considering the total productive maintenance as a proposed improvement of maintenance and engineering employees

8- Considering Overall Equipment Effectiveness as an operation's evaluation tool instead considering it an improvement's evaluation tool

9- Miscalculating of procedures by adding the standard work to it

10- Considering industrial tourism as a benchmarking tool

11- Following solutions of one-size-fits-all to control and plan production

12- Discounting the reduction of inventories of supermarket as a waste elimination tool

13- Considering the waste elimination as a goal of continuous flow to preconditioning

14- Considering that applying lean is only achieved by using lean tools

15- Building the organizational strategies based on lean

2.2.7. Lean Thinking and Six-Sigma

Procedures within lean thinking and lean Six Sigma vary slightly, and use different perspectives (Pyzdek, 2000). The two approaches have been compared by Nave (2002), as shown in Table 2.1.

Table 2.1: Comparison of Six Sigma and lean thinking (Nave, 2002)

Programme	Six Sigma	Lean Thinking
Theory	Reduce variation	Remove waste
Application guidelines	1. Define 2. Measure 3. Analyse 4. Improve 5. Control	1. Identify value 2. Identify value stream 3. Flow 4. Pull 5. Perfection
Focus	Problem	Flow
Assumption	A problem exists. Figures and numbers are valued. System output improves if variation in all processes is reduced.	Waste removal will improve business performance. Many small improvements are better than system analysis.
Primary effect	Enable uniform process output	Reduce flow time
Secondary effects	Less waste. Fast throughput. Less inventory. Fluctuation – performance measures for managers. Improved quality.	Less variation. Uniform output. Less inventory. New accounting system. Flow-performance measures for managers. Improved quality.
Criticisms	System interaction not considered. Processes improved independently.	Statistical or system analysis not valued.

Both lean and Six Sigma are popular improvement procedures which have been followed over the last few decades. The implementation of such programmes arises from

institutions' wishes to increase and enhance both performance, and the quality of their products (Xerox, 2009). The main aims of the two programmes are very similar; therefore, many institutions try to combine them into "lean Sigma". Lean Sigma achieves the main aims of the two separate approaches, and implements the following objectives from each (Nave, 2002; Mandahawi et al., 2010; Avraham, 2009; Avraham, 2009).

- The Six Sigma approach first appeared at the end of the nineteenth century within Motorola, with the aim of controlling product quality and decreasing defects. The "Six Sigma" approach has a strong and statistical source that is related to the influence of defects on the quality level of products. Similarly, the lean procedure concentrates mainly on increasing the speed of workflow achievement and removing waste processes from the workflow in order to enhance the quality level. It appears that both lean and Six Sigma aim to enhance the quality level of products in different and separated ways.

- Lean and Six Sigma differ in terms of the procedures followed, but can be applied at the same time, within the same organizations, and for the same aim. The DMAIC method within Six Sigma can be effective if implemented through the lean procedure, and can contribute to achieving the shared aim of the two procedures.

- Six-Sigma involves gathering, purifying and analysing the important quantities of statistical data; therefore, training employees in statistical data analysis is a requirement of applying the Six Sigma programme throughout an organization.

- Both lean and Six Sigma can be implemented together or separately to achieve the objectives, since they both contribute towards increasing service quality, as well as customers' satisfaction.

2.2.8. Continuous Improvement in Lean Six Sigma

From a managerial perspective, continuous improvement is a necessary step to ensure the success of the whole management process. The continuous improvement process in lean Six Sigma requires some continuous observation of plans following implementation, in order to modify them and encourage successful aspects. In fact, continuous improvement

may change a whole plan if necessary, since it not only aims to control the implementation, but also to increase the productivity as far as possible. However, continuous improvement is a necessary process that ensures the success of the lean Six Sigma managerial procedure (Radnor, 2010; Peters, 2010).

2.2.9. Main Obstacles of Lean Implementation

There are many obstacles and challenges faced in the implementation of lean management throughout organizations. One of the most well-known obstacles is related to disorganized-planning of the lean programme prior to implementation. The lean programme is just like any other managerial procedure, in that it requires well-built plans prior to implementation; therefore, removing this step will affect the success of the lean programme implementation. Planning is key for the success for any managerial programme or procedure, since a well-built plan will measure the suitability of the programme to the organization. Planning is not the only key to success within the programme, but discarding the step will lead to failure. Planning can ensure many conditions before implementing a lean programme, such as cultural acceptance, employee preparation, compatibility of the programme aims with those of the company, and the financial suitability of applying such programmes. Therefore, skipping the planning step is considered a high-risk obstacle (Kilpatrick, 2003).

The shortage in having the high level of evaluation of performance "visibility and integrity" is another obstacle faced within the implementation of lean programmes as a managerial procedure. This obstacle will affect the process of driving successful results and measures of business, which lead to strengthening beliefs and confidence within all parts of the organization. In fact, until the sixth to ninth month of the lean programme's implementation, achieving the programme aims is often considered easy, as reflected in the fact that they are recorded in the majority of organizations that apply the lean programme. Furthermore, there is a high level of activity and interest from all parties within the organization during the early stages; which can be called the "honeymoon period" of implementing lean programmes. After this honeymoon period, shortages relating to the levels of visibility and integrity of the performance may start to appear,

thereby decreasing the programme's success, and ultimately leading to its failure (Kovacheva, 2010).

Throughout the implementation of a lean programme, it is important to keep some lean experts on hand to guide the process. The skills and knowledge of lean specialists will support the programme and the organization to achieve its primary aims; therefore, the unavailability of lean experts constitutes a very large obstacle for the organization (Kilpatrick, 2003).

The lifecycle of the lean programme should be supported with honest communication between all parties within the organization regarding both failure and success, in order to ensure that the procedure is controlled and any surprise problems can be overcome. Open communication from all parties, including employees and managers, will affect their behaviours. Moreover, honest communication will enhance problem-solving procedures throughout the organization during the programme's implementation (Kovacheva, 2010).

The challenges and obstacles outlined above influence the implementation of lean programmes, and cannot be completely avoided; however, lean programmes are considered highly effective, and, with clear managerial thinking, can deliver the desired lean aims to organizations.

2.2.10. Lean Six-Sigma in Airport Management

The lean Six Sigma methodology has been used in many studies to date. For instance, Su (2006) introduced quality as a solution for slow processes and variations in quality of service, as reflected in customer satisfaction. Su showed that quality could be obtained using a combining of lean and Six Sigma management approaches as an integrated methodology (lean Six Sigma) to improve service quality. The effectiveness of lean methodology can be measured through helpdesk services that deal directly with customer complaints. While Six Sigma uses the DMAIC methodology to solve business problems, as well as lean process mapping, the rationale behind combining both methodologies is rooted in their shared objectives of cost reduction and productivity enhancement. Nevertheless, while Six Sigma focuses on minimizing process variations and enhancing control, lean eliminates waste and promotes flow and standardization within work. Pure

Six Sigma does not focus on the development of inventory management areas, or on improving the speed of processes, while pure lean does not include any considerations for statistical control, and does not include any strategic review or any improvement (Devane, 2004).

Su (2006) concluded that applying lean Six Sigma to a case study can improve both consistency and service quality, since it combines the competencies of both approaches, thereby resulting in increased profits. Chen (2010) concluded that this finding cannot be generalized, however, because it was applied to only one case. Su's (2006) article did serve to introduce questions for future research in the field, such as whether lean Six Sigma can be applied annually; whether there are more opportunities to be explored in a lean Six Sigma strategy that would enable additional benefits to be obtained; and finally whether the methodology can be implemented through all stages of the service development cycle. Brussee (2006) suggested that the DMAIC process improvement methodology is also a lean management practice. The basic DMAIC process was defined in section 2.2.4.

2.3. Service Quality in Airports

Rendeiro and Cejas (2006) analysed the quality level of facilitation services in Gran Canaria airport in order to evaluate the quality of services within tourism in general. It is worth mentioning that service quality in airports was discussed in the report of Airport Council International (ACI) (2011), and a discussion paper by Wilkie (2009). However, the level of service was determined based on the airport's check-in procedure, using a linear programming model. The parameter's relevance was associated with the tourists' time spent in the terminal building at the airport. Rendeiro and Cejas (2006) discussed that the parameter gave them an indirect measure of the tourists' perceived satisfaction towards services.

According to Rendeiro and Cejas (2006), the first and last quality perception that took place at the airport in a tourist destination is the services quality. Services should meet reasonable and reliable standards; otherwise, a poor quality assessment will result. Tourists' perceptions of facilities with respect to controlling the level of crowding and the average waiting time at the airport are two relevant quality aspects that are assessed when

they arrive at their destination. The check-in facilities at Gran Canaria airport were deemed excellent for regular flights; however, the level of service for charter flights was found to be in need of improvement. Rendeiro and Cejas (2006) highlighted that this latter aspect should be addressed, because charter flights accounted for an average of more than 60% of the airport's flights. In addition, the authors suggested that improvements to the quality of Gran Canaria Airport's facilities were crucial for the tourism sector within the island, particularly with reference to two specific points. The first was that tourists should have time to do last-minute shopping in the airport's commercial area, which would contribute to their overall positive assessment of the airport. The second was that the commercial and leisure areas within airport were in need of development; this would lead to more opportunities to generate commercial revenue, which would cross-subsidize the overall cost of the operation. The authors suggested that users might pay a non-monopoly price for facilities in the airport.

The performance measurements of service quality in airports have been discussed in several reports and studies, such as that by Humphreys and Francis (2002), Francis et al. (2001), and Zenglein and Muller (2007). Humphreys and Francis (2002) considered performance measurement in terms of airports' present, past and future. They found that airports' performance measures are important for constant operational management, as well as for business, government and other stakeholders, such as airlines and passengers, and regulatory agencies. Force was applied on measurement systems for the development responding of the actual changes in the organizational contexts. With the pressures in the changing ownership's pattern to changing comings (such as the increased regulation, commercial, the increased nature of environmental concern, rapid passengers' growth, and technical innovation) the lessons have to be learned and the experience has to be shared; the article has implications for both practitioners and academics. The authors concluded that airport performance measurement evolves within a dynamic environment. The introduction of new forms of ownership, regulations, rapid growth in technical innovations, and traffic are all factors that were found to put pressure on innovation. Within the study, airport managers, regulators, and governments all called for performance improvements. In traditional methods of performance measurement, the emphasis was on keeping them simple. The authors stated that these traditional measures

need to be developed in order to deliver the required information to concerned parties within the airport industry. Greater emphasis on commercialization has been created through changing ownership patterns, and this has lead to the introduction of financial-oriented measures that are consistent with maximizing the wealth of shareholders. This may also have shifted managerial attention to what have traditionally been considered as non-core activities (Humphreys and Francis, 2002).

The authors stated that regulating information is vital with respect to maintaining and monitoring safety and environmental standards, particularly in the context of increased commercial pressure. However, undertaking the responsibilities may be determined by the authority decree that is owned by people who are responsible; in addition to the form and nature of the performance's measures that they had through their disposal. Airports are considered important contributors to countries that they serve, as well as these countries' economies. The national implications and the degree of effectiveness of airports depend on the use and the nature of performance indicators by a complete set of stakeholders.

2.4. Development of Level of Service in Airports

The LOS in a passenger terminal determines the end-users' satisfaction, in that passengers prefer attractive departure halls and short check-in times. On the other hand, LOS affects the airport's total operating cost. To ensure a high LOS, large numbers of international and local airports are using the International Air Transport Association (IATA) standards in order to guarantee a certain LOS. Therefore, some airports have implemented certain agreements to ensure the implementation of IATA standards. The IATA standards range from level 'A' (excellent comfort level, no delays, and free flow) to level 'F' (unacceptable comfort level, system breakdown, and cross-flow). The achievement of a high LOS can be obtained via the development of well-thought-out airports that provide excellent service. Bandeira et al. (2007) developed a model that can be used to analyse the overall LOS offered to departing passengers. Several components are included within the model, such as departure hall design, parking facilities, and check-in facilities. The researchers concluded that statistical analysis is recommended in order to evaluate the effects of redesign programmes for passenger processing on

capacity indicators. However, Bandeira et al. (2007) only focused on the level of service efficiency processes, and the perceived quality revealed by provisional performance indicators.

Tam and Lam (2004) discussed an important factor in the evaluation of service quality in airports: passenger orientation within the passenger terminal. In some cases, passengers are unable to find the area of the airport they require; however, signs are available to guide them to their required gate/terminal. Tam and Lam (2004) used a quantitative measure and a visibility index in order to evaluate passengers' perceived ease of finding their required terminal at Hong Kong International Airport (HKIA). They proposed a set of standards for the LOS with respect to the passengers' orientation within the airport. The proposed standards were based on the terminal's visibility indices. The authors identified the terminal facilities that required orientation improvements, based on matching the facilities' weight and the corresponding visibility index. Hence, the visibility index and the proposed standards of LOS were shown to be effective ways in which to improve the terminal design in order to better facilitate passengers' way-finding and orientation.

Barros et al. (2007) highlighted that there is a large difference in the needs of transferring passengers, compared to terminating and originating passengers. As an example, they stated that the airport's access roads were not used by transferring passengers. Depending on the type of transfer, the operational configuration of the airport and the airline's other service facilities, may or may not be used. In spite of the increasing importance of transferring passengers in the context of airport operations, and the need to identify their requirements, little research had been conducted in this area prior to Barros et al.'s (2007) study. The authors analysed the views of transfer passengers within the terminal building at Bandaranaike International Airport (BIA) in Sri Lanka regarding the quality of service. This airport is always considered to be the most important hub in South Asia, especially from the viewpoint of the Sri Lankan airlines. In order to identify the airport's services and facilities for transfer passengers, regression analysis was used, with the strongest effect on the general perception of LOS. This showed that the quality of the flight information display (FID) and the courtesy of the staff during security checks are in the

middle of the list of aspects that are most valued by transfer passengers. The authors concluded that for many hub airports and airlines, transfer passengers are becoming an important market. Catering to and understanding the exact needs of this group are therefore necessary in order to meet demand. The data collected from BIA in Sri Lanka was used to build a linear model; furthermore, it was found that passengers place a great value on the treatment that they receive from security check staff as a result of the regression analysis.

Barros et al. (2007) also mentioned that there was a significant need for airports to improve security, and the overall experience of passengers, which would thus improve passengers' overall evaluation of the airport's quality. They recommended that close attention must be paid towards the training of security staff. It was also concluded that the quality of orientation and FID systems are greatly valued by transferring passengers after using the linear model. Thus, these systems should be taken into consideration and receive close attention by airport authorities.

Correia and Wirasinghe (2005) presented a methodology that can be used for developing the LOS within airport terminals, based on the perceptions of users. Their methodology uses a technique that was developed in order to derive quantitative values of passengers' perceived LOS, and uses surveys of the airport, as can be seen in Figure 2.4.

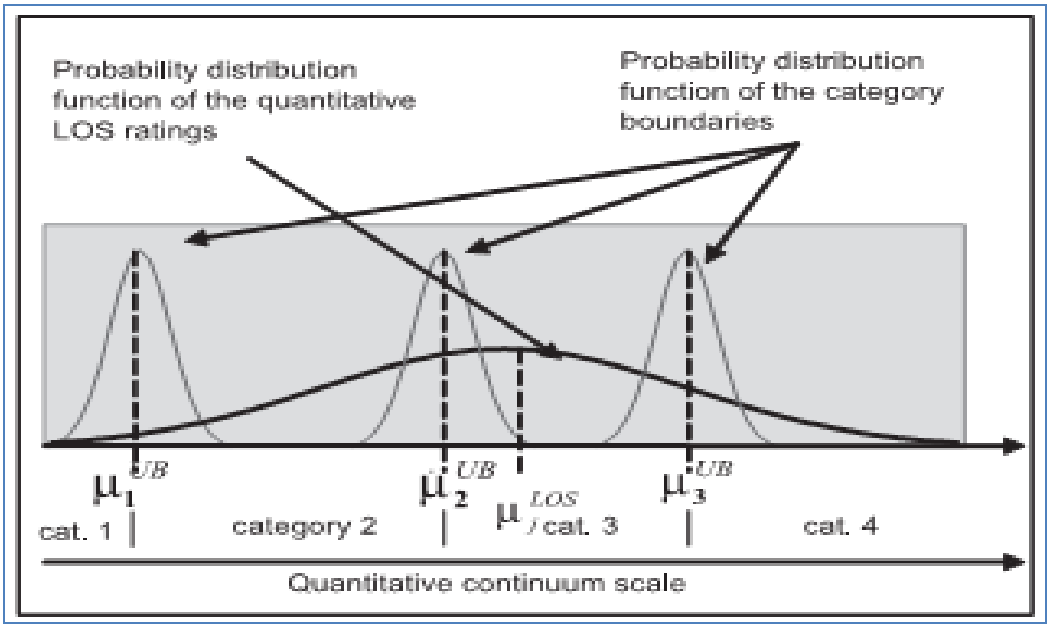


Figure 2.4: Successive categories method presented by Correia and Wirasinghe (2005)

An evaluation of the check-in counter was conducted by considering the factors that had an impact on the perceptions of service users, including available space per person, waiting time, and processing time. Data obtained from a survey conducted at São Paulo/Guarulhos International Airport is shown in Figure 2.5, 2.6 and 2.7.

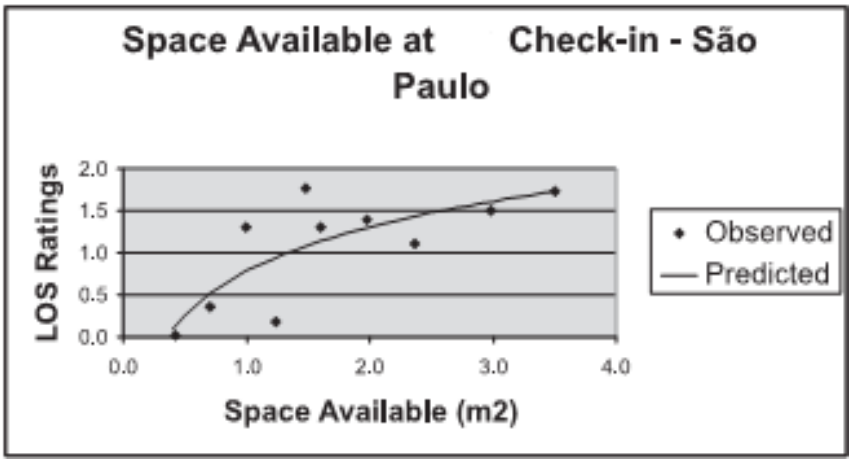


Figure 2.5: Space availability against LOS at check-in counter (Correia and Wirasinghe, 2005)

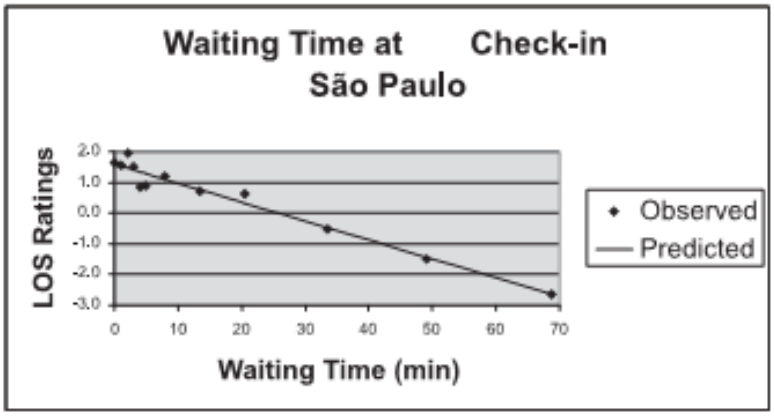


Figure 2.6: Waiting time against LOS at check-in counter (Correia and Wirasinghe, 2005)

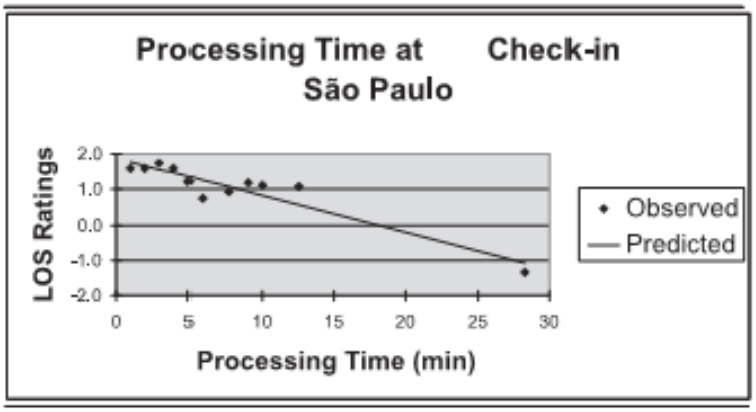


Figure 2.7: Processing time against LOS at check-in counter (Correia and Wirasinghe, 2005)

The results indicate that quantitative perception scales can be derived from a qualitative data survey. The authors mentioned that their work showed that LOS research in relation to airport passengers represented a critical need, and hinted that many researchers have failed to provide a correlation between ranges of LOS according to users' perceptions, and the characteristics of facilities. Through supplying the lighted critical need, the evaluation of LOS approach has been proposed. And then, through employing and applying the theory of psychometrical scaling as a mathematical tool, that was used to transform the qualitative data into quantitative data, the main objective is the enabling of noticed user's perceptions of LOS on the state of quantitative results.

The LOS ratings were supposed to be correlated to the availability of space, processing time, and waiting time. Thus, the authors were able to obtain equations by which to individually measure correlations. Furthermore, the authors suggested that the evaluation of LOS within airports could be predicted through using the approach provided. They discussed that the approach was capable of identifying the perceptions of LOS for passengers in an effective and simple way for most airport components. Finally, they concluded that if their research was extended to a large number of airports, and the number of variables increased, the method could be used to contrast and compare LOS within airports at both national and international level.

In another study, Correia et al. (2007a) introduced a global index to evaluate the LOS of operational components within airports. This index was found to be useful in the evaluation of the overall LOS, according to users' perceptions, within a single scale. The overall LOS was assumed as a function of individual LOS components, such as departure lounges and socio-economic variables. Regression analysis was used to obtain an arithmetical relationship between LOS universal ratings, and the individual operational components of LOS. The methodology was again illustrated using data obtained from Sao Paulo/Guarulhos International Airport in Brazil, where 119 passengers were interviewed. The researchers thus provided a methodology by which to estimate a global index for the evaluation of LOS within airport terminals, which made it possible to classify the airport's most important aspects. As one of the most important factors, the

methodology helped from the curb side of the passengers' terminal contributing to the passengers' awareness of LOS.

The results indicate that other terminal attributes that were not tested in the research might make an important contribution to the passengers' evaluation of LOS. Airport planners could use the proposed method to forecast the overall LOS of these other aspects for future facilities. For entity components such as lounges, check-in, and so on, estimates of LOS can be obtained from standards and conventional methods, such as those are provided by IATA. On the other hand, they do not provide an indication of the overall terminal LOS at any airport; if the methodology proposed by Correia et al. (2007a) was calibrated according to passenger descriptions, it could provide an overall LOS for each factor.

Data-based methods are often used to compare airports with respect to the LOS offered to passengers such as Correia et al. (2007a). Airport managers can use the results of these methods in order to understand the importance degree that users of airport terminals allocate to different characteristics and components. These weights are valuable because they can be used by airport managers to improve the services offered. They can also be applied within future research on other airports, in order to offer a more inclusive and complete understanding of the relationships between the measures and the LOS associated with them. Correira et al. (2007a) also recommended that other variables, which were not surveyed in the research, should be tested in order to improve the explanatory power of the model.

Correia et al. (2007b) presented measures to identify the overall LOS within terminals, again using Sao Paulo/Guarulhos International Airport in Brazil. They stated that these measures are useful to evaluate the overall LOS, according to the users' perceptions, within a single scale. The procedure they used consisted of observing passengers, and collecting data on several physical and socio-economic variables which might influence the users' evaluation of the airport as a whole. In order to obtain quantitative ratings of LOS from their survey data, they used a psychometric technique. They also conducted regression analyses to identify mathematical relationships between the quantitative LOS

ratings and global indices (two orientation indices: total walking distance, and total service time).

Correia et al.'s (2007b) research provides a method by which to collect data on passengers' perceptions of the overall LOS within airport terminals, along with the most important and significant overall measures according to each passenger interviewed. The research obtained overall measures, which were used to identify the quantitative relationships between passengers' responses and physical measures. The overall measures were represented as an important step for the evaluation of overall LOS within the airport. The researchers stressed the need to determine new standards of LOS, and highlighted the lack of research on the subject. The standards are useful within the context of Sao Paulo/Guarulhos International Airport, as well as other Brazilian and international airports.

This study of Priporsa and Psychogios (2007) sought to examine the extent and spread of the concept of total quality management to managers in the service sector in Greece, the sample included 18 Director,s use the corresponding tool to study, and the study found that, although total quality management concepts and applications known to managers in the public and private sector, awareness of the actual (lean) is often superficial and that managers have a relative understanding of poverty.

In a study by Martinez-lorente et al, (2006) target Finder to identify the relationship between the use of information technology, the application of total quality management, the sample included 444 service companies in Spain, the most important results was that there was a direct correlation between the use of information technology and the application of total quality management affect organizational performance in terms of service quality, and time management.

2.5. Passengers' Expectations regarding Airport Service Quality

Fodness and Murray (2006) conducted a study that aimed to develop a conceptual service quality model that could be applied within any airport through an empirical investigation regarding passengers' expectations of airport services. The same purpose underscored a study implemented by Lubbe et al. (2010) in the context of South Africa. Fodness and

Murray (2006) developed a self-reporting scale by using quantitative research to measure passengers' expectations of airport service quality. Following this, they tested the model's dimensionality, and finally evaluated its scale validity and reliability. This study provided several implications about airport service quality for research and practice.

First, Fodness and Murray (2006) showed that the services available to passengers while they are waiting at the airport are critical compared to their expectations of what these services should be. Secondly, they extended a theory on the role of waiting time in service quality through examining which activities (leisure, productive, maintenance) passengers undertook while waiting. Thirdly, they found empirical and direct relationships between expectations of service quality on the one hand, which are considered higher-dimension factors, and the order of primary service on the other. They also found evidence for relationships between primary dimensions, and two composed sub-dimension services that contribute to the productive activity and maintenance of passengers.

Fodness and Murray (2006) also advanced three aspects regarding strategic and logical thinking about service quality within airports. Firstly, they demonstrated that there is a structure underlying passengers' expectations of airport service quality. Secondly, the study provided implications for airport marketing strategies, by identifying the service scope's key roles and service providers, and the competitive landscape of the service industry. Thirdly, the study built a measurement method in order to determine the expectations of passengers with respect to airport service quality. This method can be used as a basis from which to easily and concisely administer self-reported measures by which to manage and identify service quality strategies in increasingly competitive environments in order to gain and keep advantages. The study was limited, however, as it only conducted a single study of passengers' expectations; the authors encountered difficulties in terms of offering a construct of global expectations whose results are homogenized. Figure 2.8 shows the final model developed in their research.

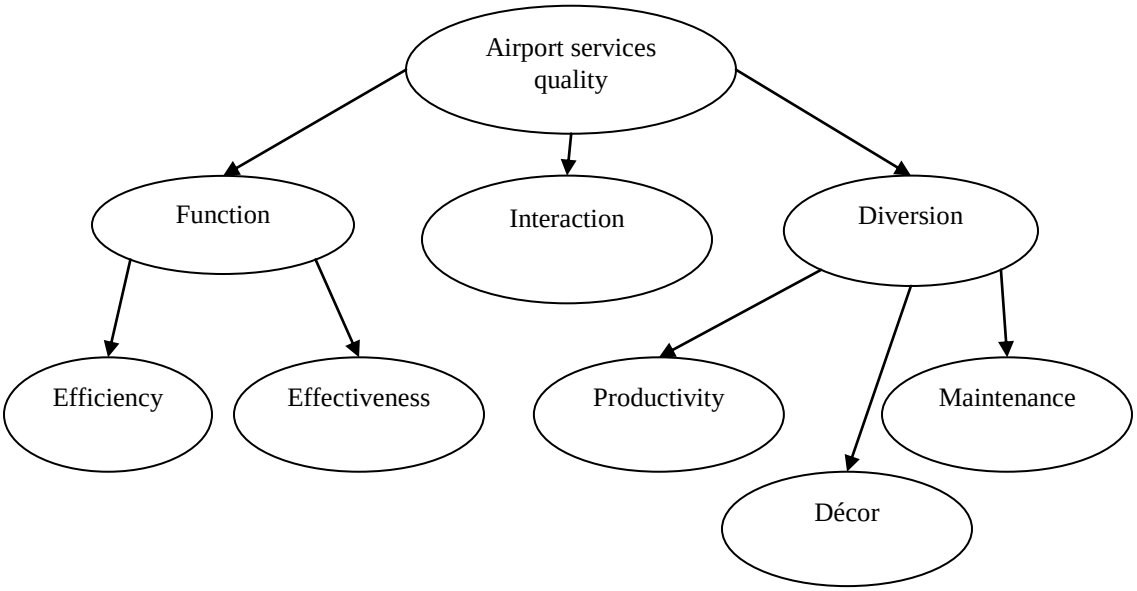


Figure 2.8: The hierarchical structure for expectations of airport service quality (Fodness and Murray, 2006)

In addition to Fodness and Murray's (2006) study, many other studies and reports have also considered the issue of passengers' expectations of airport service quality (e.g. Tenge, 2012; Mostert et al., 2009; Consumer Protection Group, 2009).

Lubbe et al. (2010) also considered passengers' expectations of service quality within airports, and found that these expectations become increasingly important as airport traffic grows. Lubbe et al. (2010) investigated passengers' perceptions of service quality at OR Tambo International Airport (ORTIA) in South Africa. The authors applied an existing model which used passengers' expectations to measure specific airport performance levels. In airport investment terms, the results made it possible to improve the areas highlighted, as well as staff training. The authors also found that there were significant differences between the perceptions of frequent, compared to infrequent, travellers. Figure 2.8 shows the modifications made to Fodness and Murray's (2006) hierarchical structure by Lubbe et al. (2010).

According to Lubbe et al. (2010), service quality management and measurement within airports can be seen as an important aspect. They found that passengers themselves are responsible for evaluating and defining airport services. They investigated the important

dimensions of airport service quality according to the passengers' perceptions by referring to Fodness and Murray's (2006) model, which assessed the performance at ORTIA in the context of South Africa. They also found that when diversion, interaction, and function were compared, interaction was the most important aspect, according to passengers, followed by function and diversion. In other words, the service received from the airport staff may be used by passengers to determine whether the overall experience is satisfying.

Fodness and Murray (2006) suggested that there was a need to take frequency and purpose of travel into account, as well as the characteristics of the airport; this was taken up by Lubbe et al. (2010). Lubbe's et al. (2010) research provides some evidence that frequency and purpose can influence the importance passengers assign to the area and quality attributes of services, and their ratings of the airport that they are departing from. Interaction, function, and diversion for business passengers were found to be less important than they are for leisure passengers. Further, passengers who travel more rated ORTIA's overall performance lower compared to than those who travel less, although the importance of the various service dimensions remained the same for both groups.

Correia et al. (2008) provided a method for collecting passengers' responses towards the LOS provided by an airport. The results made it possible to derive a (quantitative) relationship between the passengers' responses and the physical measures. A psychometric technique was used to scale the results in order to obtain the quantitative level of service measures. The authors then used regression analysis to obtain the relationships between the global indices and the quantitative level of services.

Tam et al. (2003) found that passenger orientation is one of the most significant factors when designing the layout of terminals in airports. They assumed that it was common for some passengers to face difficulties in reaching their destinations in the airport, in spite of the availability of information signs. The researchers concluded that consideration of passengers' way-finding is an important aspect in airport terminal layout planning and design. In order to facilitate passengers' orientation, it was deemed necessary to evaluate passengers' ease of orientation in the terminal building. For this, terminal facilities were classified into primary and secondary categories. Tam et al. (2003) concluded that

improvements made to existing signage were needed, and some respondents indicated that existing aids were inadequate. In particular, the automated people movers (APMs), lost and found offices, seats in public areas, airline information booths, trolleys, and auto-teller machines (ATMs) were highlighted by passengers as being difficult to find, and in need of better signage.

2.6. Models of Airport Service Quality

Many approaches have appeared recently in the field of measuring airport service quality. The following sections will explain some unique models based on related theories and methods, in order to analyse their case study.

2.6.1. The Model of Fuzzy Multi-Criteria Analysis:

The model of fuzzy multi-criteria analysis (MA) is considered effective for the purpose of measuring service quality within airports, since it depends on the analytic hierarchy process (AHP) to analyse multi-criteria problems such as those relating to airport service quality (Deng, 1999). One such study that depends on MA to analyse service quality problems in airports is that by Chang and Yeh (2002), who introduced an effective approach by which to evaluate the service quality within domestic passenger airlines through customer surveys considering a multiple service attribute perspective. The results of the survey were processed and represented as fuzzy sets. A fuzzy MA model was then used for the purpose of formulating the evaluation problem, while an effective algorithm was employed to create the model; this algorithm incorporated the attitudes and preferences of decision makers (DMs) in order to assess the performance rating and criteria weights. The fuzzy MA model, which was able to effectively handle the fuzzy data, was developed for the purpose of evaluating the airline's performance in terms of the service quality perceptions of consumers.

The preferences and attitudes of DMs, which were used to assess customers' performance ratings and criteria weights, could be specified to reflect the customers' major concerns regarding various options. An empirical study on domestic routes in Taiwan was conducted in order to demonstrate the effectiveness of the approach; the outcome of this provided a means by which airlines could identify the external and internal competitive advantages in relation to their competitors. In addition, it provided airlines with

guidelines on LOS with reference to the needs of customers. The concepts used within the approach were comprehensive, and the survey computations and process were simple and straightforward.

Many researchers in other fields have also used the fuzzy MA model; for example, Hsu and Pan (2004) in the healthcare field, and Clemes et al. (2008) in the aviation industry in New Zealand. It is worth mentioning that Chang et al.'s (2002) findings have also been supported by several other studies, such as the KLM Marketing Division (2009) report, and a study by Boland et al. (2002).

2.6.2. The Fuzzy Approach to Multi-Attribute Decision Making

The fuzzy approach to multi-attribute decision making (MADM) is another model that is used to make decisions in cases that have multiple attributes (Nikitha et al., 2012). For instance, Yeh and Kuo (2002) introduced a decision making model that uses a fuzzy multi-attribute approach for evaluating service quality of Asia-Pacific International Airport's customers through the 14 majors of the airport via surveys. It is worth pointing out here that the 14 majors airports are mentioned in the right side of Figure 2.12. However, the performance index for overall service was obtained, based on the concept of optimality degree, along with the DMs' level of preference and confidence on the fuzzy assessments of respondents, as can be seen in Figure 2.9.

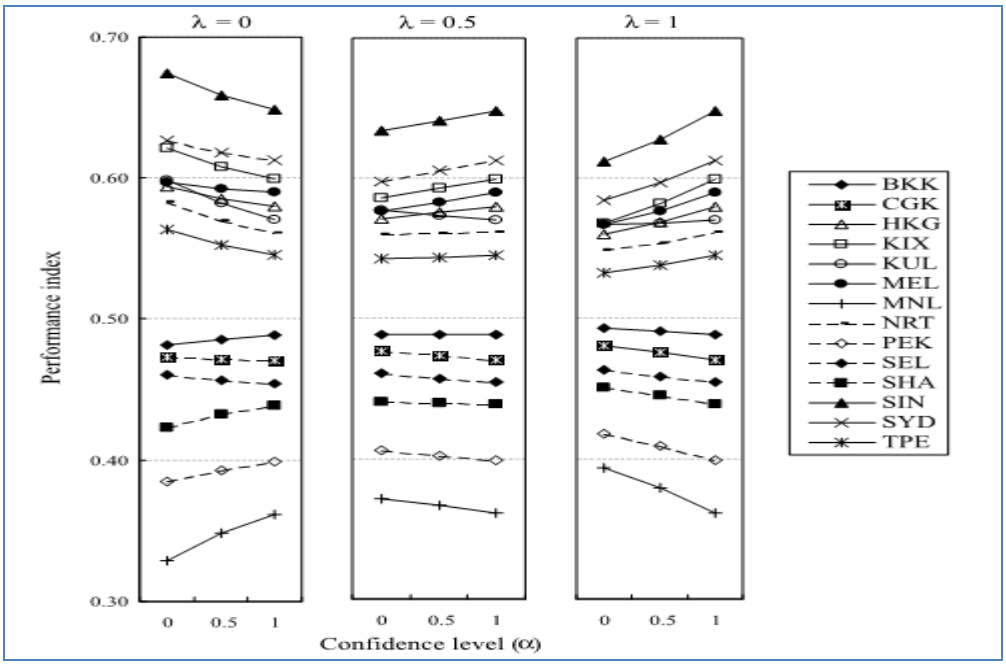


Figure 2.9: Service performance index and ranking of the airport under different decision settings (Yeh and Kuo, 2002)

The proposed index, as shown in Figure 2.9, helped airports to understand their rankings, since the rankings were relative to the attributes of manageable terms related to passenger services. This approach made it possible to evaluate airport service performance using assessments containing qualitative attributes, as stated by Chen et al. (2011). Yeh and Kuo (2002) concluded that the rapidly growing international traffic had resulted in international airports adopting management practices regarding customer orientation. The purpose behind this was to improve the satisfaction of airport passengers via a quality level evaluation mechanism, which was applied to other, comparable airports. The authors thus used a fuzzy approach to MADM for passengers' evaluations of services offered by Asia-Pacific International Airport through the 14 major airport via surveys.

To formulate their problem, Yeh and Kuo (2002) identified six manageable and distinctive service attributes to represent the functional quality of airport services. The purpose behind identifying fixed attributes was to reduce the respondents' cognitive burden during the survey process; to facilitate their subjective assessments, linguistic terms were used and represented in the form of triangular fuzzy numbers. In order to solve the problem of the airport with the fuzzy MADM, the authors developed an

effective algorithm through which DMs' preferences and attitudes regarding the respondents' fuzzy performance ratings and attribute weights could be specified to reflect various and several decision settings.

Yeh and Kuo (2002) also mentioned that their study, which evaluated service quality in a number of airports, could be formulated as an MADM problem. The MADM approach, which involves simple computations and concepts, was of practical use in evaluating airport service performance, and involved the subjective assessment of qualitative attributes. The MADM model was also discussed in a study by Bashiri at al. (2012), who agreed with the explanation of the MADM model presented by Yeh and Kuo (2002).

2.6.3. The Model of Multi-Criteria Decision Making

Kuo and Liang (2010) presented an approach by which to evaluate the service quality of Northeast Asian International Airport (NAIA) by conducting a customer survey. They found that the service quality evaluation involved multi-criteria decision making (MCDM); this refers to the fact that complex decisions sometimes involve fuzzy conditions and multiple requirements, which must be considered simultaneously. Through combining the concepts of VlseKriterijumska Optimizacija I Kompromisno Resenje (VIKOR) method (a technique that relies on defining the negative and positive ideal points of a concept); ideal points are proposed to solve real-life problems within decision making that involves multi-criteria and multi-judges (Wei, 2008).

The model of MCDM gives solutions through effective algorithm that was formed by linking the attitude of DM and/or preference and precedence in order to assess customers' performance and weights in each criterion rating. The results of Kuo and Liang's (2010) study showed that the approach was effective in responding to the problems of MCDM, which involves personnel assessments of qualitative attributes in a fuzzy environment. They highlighted increases in the international prices of airfare travel fuel, and the expectations that these costs would increase further in future; they also stated that national incomes had decreased during the economic recession period, and that a rapid growth of international passengers had been seen within Northeast Asian International Airport (NAIA). (Kuo and Liang, 2010).

Additionally, the method proposed by Kuo and Liang (2010) can be easily coded by a computer program in order to derive assessments of fuzzy linguistics; furthermore, objective fuzzy and non-fuzzy assessments can be conducted by one person. The proposed method can be applied to problems such as selection of material, selection of information project, selection of location and many other problems relating to management decisions, or problems of strategy selection, although the proposed method in Kuo and Liang's (2010) specific case was illustrated through a consideration of service quality problem evaluation in the context of airports.

2.6.4. Non-Additive Model

Liou and Tzeng (2007) developed a non-additive model for the purpose of improving and evaluating airline service quality, and compared the results of this to the conventional additive method. It is worth mentioning that their non-additive model was later used by Janawade (2011) and Yang (2010). However, Liou and Tzeng (2007) mentioned that the quality of service comprises various and several attributes, and that independent characteristics are part of many attributes in the system; they assumed that these characteristics might be incorrectly evaluated when using the conventional additive method. For this reason, they proposed a fuzzy integral model. For the purpose of extracting some common, independent factors, they used factor analysis as an initial step. After that, the fuzzy integral method was used to integrate the inter-dependent performance of the attribute ratings for each common factor. For the hierarchy analytic process, a comparative pair-wise approach was adopted to determine the weights that connect each independent common factor together. Finally, simple additive methods for weight, and Grey relation analysis (GRA), were used in order to identify airline service quality. Liou and Tzeng (2007) tested their model on international airlines. Figure 2.10 shows the revised assessment system.

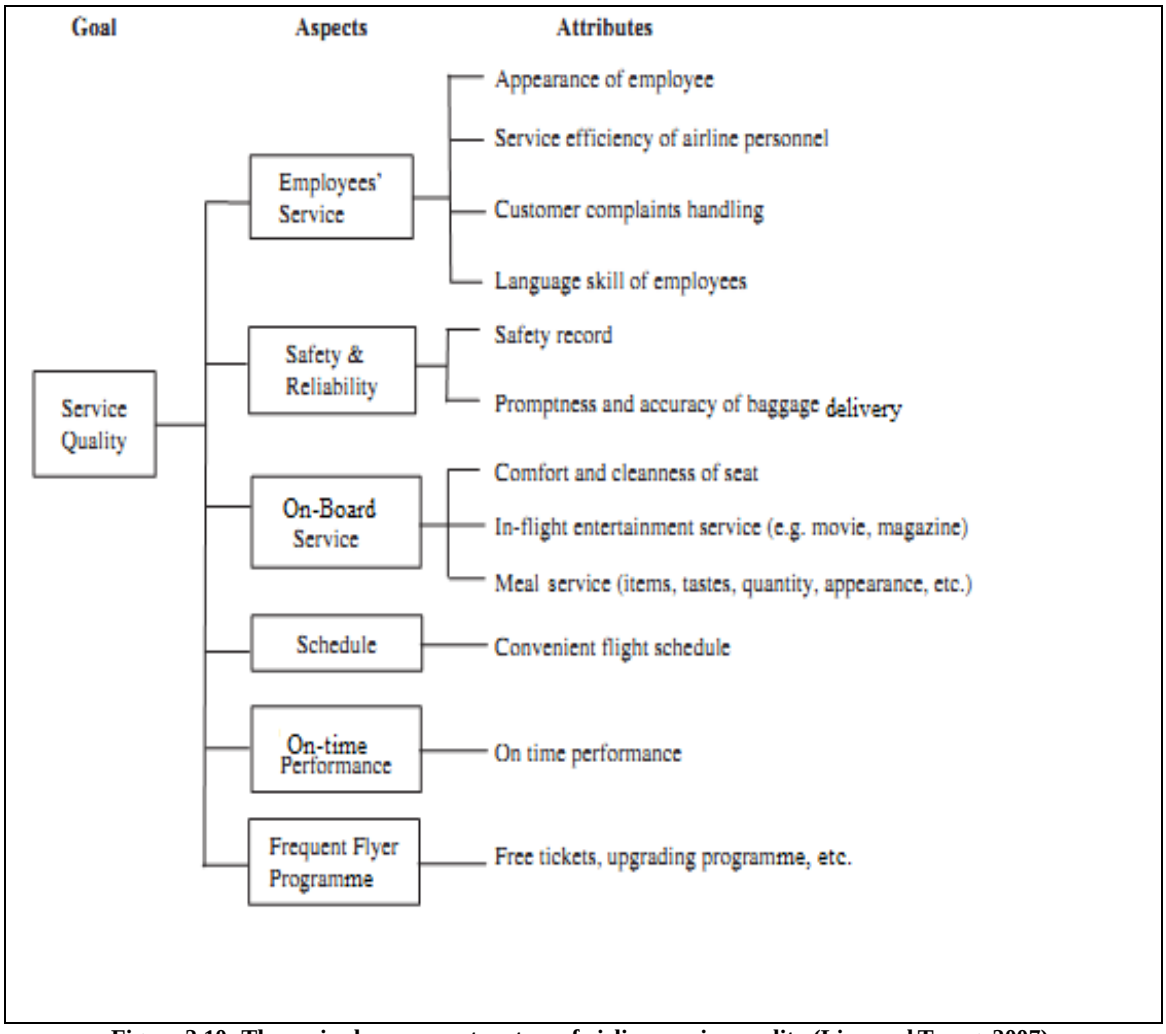


Figure 2.10: The revised assessment system of airline service quality (Liou and Tzeng, 2007)

Through non-additive results, model's suggestions are proposed in the looking for clean and comfortable seats as the initial elements of the on-board services' issues that might represent an effective method. For this reason, non-additive results are considered a means by which airlines can identify their competitive advantages in relation to other airlines.

2.6.5. The Model of Data Envelopment Analysis (DEA)

Adler et al. (2001) developed a data envelopment analysis (DEA) model to determine the relative quality and efficiency of airports. According to the authors, for airlines, hub selection is considered a very important factor. The researchers mentioned that previous studies have used subjective data to indicate passengers' evaluations of airport quality. However, in this study, they aimed to define airport quality from the viewpoint of

different airlines. Accordingly, they used questionnaires to solicit evaluations of airlines from a number of non-European and European airports. Their statistical analysis showed that there was great variation in the evaluations of airports quality factors. They also used DEA as a key methodology in determining the relative level of airport quality. This methodology was adapted through using principle component analysis (PCA). Of the West-European airports considered, Geneva, Munich, and Milan scored uniformly highly and were found to be relative efficient. In contrast, Athens, Manchester, and Charles de Gaulle were ranked much lower.

Adler et al. (2001) concluded that the results obtained from PCA-DEA were similar, and could be considered stable. They recommended that any further research in the field should include a connection between the airlines' choice of hub networks and airport quality. They also recommended that the quality levels of airports should also measure the problem of selecting hub connections. It is worth noting that Schaar and Sherry (2008) also used the DEA model in a subsequent study for comparing methods of data envelopment in airport benchmarking .

2.6.6. Slacks-Based Measure Network Data Envelopment Analysis Model

Yu (2009) introduced a slacks-based measure network data envelopment analysis (SBM-NDEA) model to measure the performance of quasi-fixed inputs for series productions, aprons, runways' and terminal areas, in addition to free capacity linking provisions. The SBM-NDEA model was developed in order to allow interactions between multi-processes, link sub-process activities, and identify each sub-process's possible inefficiencies. It also considered quasi-fixed inputs including the apron area, terminal, and runway. The researchers derived a set of efficiency measures, excesses of input, shortfalls in outputs, and adjustments in capacities. In addition to a set of proficient references for benchmarks to offer alternative structures by which to assess airport performance through achieving both by assuming controllable minimization for input (variable) and maximization of final outputs under restrictions of free involving on capacity necessities.

The separate measures of process efficiency obtained using this unified SBM-NDEA model allowed Yu (2009) to analyse and measure the general operational efficiencies of

airports, depending on various elements. The researchers based their model on data from 15 domestic Taiwanese airports. The findings showed that improvements to service efficiency were more crucial than those to production efficiency. The researchers observed the average landside and airside service efficiency to be 0.482 and 0.636, respectively, after separating the efficiency of service. The analysis showed that airside performance was better than landside performance. The implications of this were that improving landside service efficiency was more important for the airport managers in Taiwan.

Yu's (2009) result indicates that there were substantial differences in general operational performance and its divisions, and that a highly informative demonstration could be generated by the method. The researchers also highlighted the fact that there are numerous variants of the SBM-NDEA model, which did not appear within the research. For example, their research considered the free-connected constraints, rather than the unchanging constraints. That small variation might have yielded significant and unwanted results if the adjustments made to linking activities did not make them simple enough.

2.6.7. Weighted Service Quality Model

The weighted service quality (SERVQUAL) model is considered very efficient for different purposes and a range of research. The SERVQUAL methodology is mainly used to measure degrees of discrepancy within research, as well as customers' perceptions towards certain changes in a system, or the service quality level itself. SERVQUAL model have been firstly designed by Parshuraman et al. (1985). After that, some adapted versions of the SERVQUAL methodology have appeared which are presented in Table 2. 4 (Al-Jaza'eri et al., 2008). It is worth to note here that the mentioned references in the table are cited in Al-Jaza'eri et al. (2008) study.

Table 2.2: Adapted versions of the SERVQUAL methodology (Al-Jaza'eri et al., 2008)

Author	Year	Model	Main Characteristics	Application
Gronroos	**1984**	Non-mathematical	Quality is a function that is related to expectation, and is the outcome of a mental image.	Any kind of service.
Parasuraman et al.	**1985, 1988**	SERVQUAL: $Q_i=P_i-E_i$; ***i.e. (Quality = Perceptions – Expectations)***	Uses the measurements of 22 variables and 5 dimensions.	Any kind of service.
Brown and Swartz	**1989**	SERVQUAL: $Q_i=P_i-E_i$ ***i.e. (Quality = Perceptions – Expectations)***	Uses 10 dimensions for quality of services.	Medical or surgery services.
Bolton and Drew	**1991**	Represents service quality and significance, in addition to including many mathematical equations.	Uses 4 dimensions for quality of services.	Telephone services.
Cronin and Taylor	**1992**	SERVQUAL: $Q_i=P_i$ ***i.e. (Quality = Perceptions)***	Uses 5 dimensions for quality of services.	Any kind of service.
Teas	**1993**	Imaginary model of ideal performance: $Q_i=\sum_{i=1}^{m} W_i/(P_i - L_i)$	Uses 5 dimensions for quality of services.	Retail store services.

Chou et al. (2010) also used the SERVQUAL model. In Chou et al.'s (2010) study, it was found that passengers face some difficulties in expressing their satisfaction under the SERVQUAL method, and that the evaluation criteria for the quality of airline services using an exact value result in judgments that are often vague, and thus do not yield any accurate or reliable results. The researchers suggested that linguistic terms could be used instead in order to explain the perception value, expectation value and the evaluation criteria's weight. Hence, a weighted, fuzzy SERVQUAL method was formulated to evaluate the quality of airline services. Figure 2.11 shows the subtraction operations conducted using the fuzzy numbers.

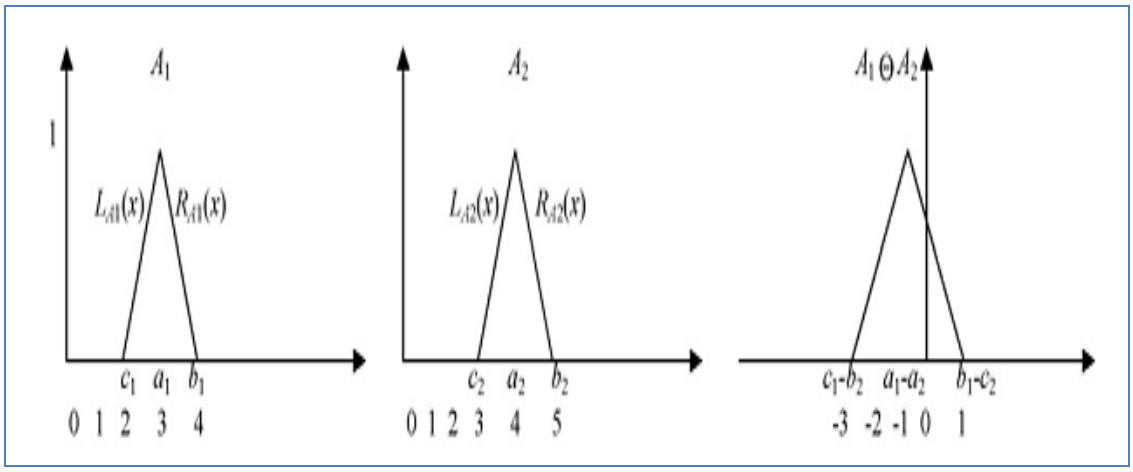


Figure 2.11: The subtraction operations used by Chou et al. (2010)

Chou et al. (2010) tested their proposed method using Taiwanese airlines as case studies. Furthermore, they provided interesting suggestions with regards to improving the quality of airport services. One finding of their research was that there is a large gap between passengers' perceptions and these expectations regarding service quality. In addition, airlines should improve the cleanliness and comfort of seats, the quality of beverages and food, and passengers' safety, as well as responding quickly to passengers' complaints, increasing the size of aeroplanes, ensuring flight schedules are convenient and arrivals and departures are on-time, improving programmes and facilities on offer during the flight, and ensuring the crew are trained to deal with unexpected matters. By improving these aspects, it will increase customers' perceptions of the overall quality that the airport provides. Although the weighted SERVQUAL model was effective in evaluating the quality of airline services, it did contain some disadvantages; for example, it made it difficult to accurately measure passengers' expectations and perceptions.

The SERVQUAL model measures customers' satisfaction based on five dimensions: tangibility, empathy, service quality, reliability, and responsiveness. The types of services that are offered to customers differ according to the supplier in question and the amount of variety provided. Customers are always concerned about the quality of the products, as well as the cleanliness of the product environment, how quickly services are offered by staff, and the accuracy of transactions at cash counters. Implementation of the SERVQUAL model can increase customer loyalty, as it makes it possible to analyse

customers' expectations regarding the services provided, and measure the level of satisfaction with the service (Daniel and Berinyuy, 2010).

In line with the implementation of the SERVQUAL model, there are many ways in which to enhance services, such as:

- improving communications between staff members,
- using recent technologies to ease dealing with customer complaints,
- preventing errors during transactions with customers,
- providing training programmes for staff so that they are better able to help clients,
- offering precise information about products,
- conducting staff meetings to improve their interpersonal skills and the ways in which they deal with customer complaints.

Future plans are designed to achieve higher levels of customers' satisfactions on the desired projects and facilities such as establishing promotional islands, courts, play stations for kids and families, car parks, ATM facilities, and free shopping areas for customers and clients (Naik et al., 2010).

The SERVQUAL model must be maintained at a high level in order for companies to be competitive both locally and globally, reach the highest level of customers' satisfaction, and maintain both technical and functional aspects involved in providing services. Developing thorough product and marketing strategies will enable companies to increase their sales every year. SERVQUAL model and quality of the products are the most important points in the overview of the customers, clients, and the features of the product (Daniel and Berinyuy, 2010).

Service quality contains three implement defining area : first, operations, instructions and physical equipment; second, the ways in which staff understand customers' requirements; and third, the ways in which staff offer to the customers the desired services in different

situations. By addressing all three of these areas, companies can get balanced satisfaction from customers (Tahmour et al., 2012).

The overall aim of these studies (Naik et al., 2010; Daniel and Berinyuy, 2010; Tahmouri et al., 2012) is to test the SERVQUAL model's integration, and the impact of customers' satisfaction on the company's effectiveness and competitiveness in the industry (Rahaman et al., 2011).

According to Oliveira and Ferreira (2009), because the SERVQUAL model aims to test customers' satisfaction about services, it is suitable for use within institutions that particularly strive for client satisfaction. SERVQUAL focuses on five main aspects (reliability, tangibility, responsibility, security, and empathy, as outlined above), and these five aspects are measured according to two conditions: expectation and perception. The statistical difference between the results in those two conditions forms the "gap" variable, which is measured for each side alone. The gap score may be negative or positive, where each value indicates certain concepts about the level of service offered throughout the institution (Naik et al., 2010). The aviation industry is a sensitive environment that is mainly focused on customers' satisfaction; therefore, the SERVQUAL model is highly suited to measuring the quality level of services offered within airports (Atilgan et al., 2008).

2.7. Passenger Flow Management in Airports

Appelt et al. (2007) conducted a full discussion regarding the check-in systems used in airports; they argued that delays in check-in systems can vary according to the time of day and day of the week, and that the check-in modes offered should be specific to customers' preferences. They identified a need to build a simulation model to predict delays in check-in systems, and outlined a specific process for data collection. By analysing exact scenarios, they aimed to introduce ways in which to identify delays arising during check-in procedures, which in turn would make it possible to improve passenger flow through check-in systems. The authors used Buffalo Niagara International Airport (BNIA) as a case study, and used the simulation results to analyse the airport's check-in systems on different days throughout the week. They also applied the simulation to a scenario addressing passengers' arrival rate. The results of the scenario could be

modified according to any change in variables, such as changes to staffing schedules or check-in times, which includes bag weighing and tag printing times, and primarily depends on the number of employees currently working. The results showed that in order to obtain the necessary data regarding passengers' experience, a link should be drawn between the check-in process and other processes, such as parking and going through security checkpoints. A time window analysis method was used to analyse the departure time of the passengers' flight, and their waiting times, and so estimating future flows and times.

Brunetta et al. (2004) discussed the lack of a flexible and user-friendly landside operational model, and thus created a new simulation model to estimate the baggage handling time and passengers' behaviour during this time. The elements considered, the generic airport terminal, and the simulation model can be adapted to various airport configurations. The authors validated the model using the results of previous research about the future behaviour of Athens airport. Interesting dynamic results were provided through the proposed model, and the researchers proposed a useful simulation model for airport terminals which was intended to determine, monitor, and foresee all interactions in the sub-system in order to avoid inefficiencies and/or delays, or to diminish the system's sensitivity to random accidents. Their model is described as a generalized flexible model that can be used for all common airport structures; the model is designed to be employed across different operating conditions and airports. The model was intended to address all operations that are affected by passengers and baggage; the researchers took into consideration passengers' arrival, departure, and movements during transit within the terminal according to the difference between domestic and international passengers; and the arrival, departure and transit of baggage. Flight arrivals and departures follow planned schedules in accordance with the flight type, where each passenger from each flight usually follows a previously recognized time distribution. The program Micro Saint 3.2 was used to implement the proposed model on a personal computer; this program offers both friendliness and attraction for users. A total of 51 tasks were included in the proposed model, with each task corresponding to a specific operation.

The network of the main model, with three sub-networks, for an actual airport. The model contains information about (a) adding passengers' queues in consistence with the related rules; (b) beginning conditions and effects; (c) operational performance time; (d) ending effects; (e) outgoing entry decisions, which may be either probabilistic, multiple or tactical. The outputs of the model include: last passenger check-in time, last passenger leaving time, delays in departure, maximum queue length, distribution of queue length, and every facility, flight by flight (Brunetta et al., 2004). The researchers concluded that under normal conditions, the model can be used in relation to 508 aircraft movements per day. The researchers compared the average simulation results with those reported by Andreatta et al. (2001) for validation purposes, and supplied by Simple Landside Aggregate Model (SLAM) deterministic aggregate model described by Brunetta et al. (1999). The results of the model revealed that any airport can be considered as functioning well, as delays in departure, or deviations from the high values of service recommended by IATA, are rare and last a very short time. On the other hand, some small changes were suggested in terms of the number of open check-in offices during the day at predefined intervals, which would reduce passenger queuing time and departures delays.

Popovic et al. (2007) suggested that airports can be considered one of the most complex and largest systems in modern society. They conducted observational studies to investigate passengers' interactions and experiences within an international airport. These studies have been used as a basis for the present research. For example, Popovic et al. (2007) considered the process of moving through security screening from the perspectives of both passengers and staff. Research rigor was ensured by applying a coding scheme. Passengers' activities were illustrated as shared and complex and the authors only found partial support for the current design of the terminal in question.

Hence, research regarding specific airports can potentially influence the airport's design with respect to passenger flow facilities. Popovic et al. (2007) suggested that their research was significant because it provided new knowledge about the experiences of airport personnel and passengers, and explained how those experiences are affected by

the system's overall operation. They suggested that their research could also be applied to other airports.

Popovic et al. (2007) also developed maps that illustrate the relationship between people, technologies and processes, activities, and subsequent observations, which demonstrate the complex interrelations and interplay at the interaction's micro-domain level. The most significant findings presented within Popovic et al.'s (2007) research concerned the differences in interactions in the domain of security checks. The research also has implications for the design of future airports. The researchers recommended that future research should test the findings demonstrated in their research by the process model, and suggested that the findings can be applied to specific planning and design models (Popovic et al., 2007).

Kaashoek et al. (2009) discussed the redesign program of passenger's management process with the essence of IATA's main purpose of "Simplifying the Business program". This programme emphasizes the use of technology in reducing costs and complexity (for example, inefficiency-related costs or transaction costs), and aims to manage groups of passengers and improve customer service. These improvements have an impact on the streamlining and automation of processes within various aspects of the business.

The programme highlights ways in which the business can be simplified via the standardization and development of electronic freight handling, electronic ticketing, processes utilizing bar-coded boarding, freight message improvements, baggage management improvements, radio frequency identification, and self-service check-in kiosks. These automated check-in kiosks have partially replaced traditional check-in desks, as passengers can check in and select their seats by themselves through these kiosks, without direct intervention from staff. Kaashoek et al. (2009) stated that dozens of kiosks were installed between 2003 and 2006 in airport departure halls around the world. The next step in the automated passenger process is to implement self-service drop-off points for baggage. For business process reengineering (BPR), the user's perspective is important, and the main objective of the programme is to improve the passenger service process. This process includes security procedures, federal inspection, seat assignment,

baggage claim, baggage check-in, and ticketing. Also, both of flight and access interfaces are other significant utilities of the passenger terminal ones (Kaashoek et al., 2009).

2.8. Recent Studies about Service Quality in Saudi Airports

Many recent studies have been conducted with a specific focus on airports in Saudi Arabia, with the aim of evaluating the LOS within these airports. For example, Sohail and Al-Gahtani (2005) studied King Fahd International Airport (KFIA) in Dammam, which started its operations in 1999. They reviewed the development of the airport, as well as the challenges encountered in maintaining the different service standards. Moreover, they undertook an evaluation of the airport's services, and the related quality of these. Their research was empirical in nature, in that it collected data from 188 respondents in order to determine the factors influencing the process of evaluation regarding the quality of the services in question. The satisfaction level of the traveller surveyed was evaluated using different 25 dimensions, and the implications of the results were discussed in depth. The empirical research indicated that the travellers were satisfied with the quality of services provided by KFIA in general. The results showed that the frequent travellers were more satisfied than the less frequent travellers for all dimensions. It should be noted that the results contained scored values, which revealed that some services fell below expectations; such services included flight information, cleanliness, check-in facilities, parking spaces and guidance and help in the airport. Hence, it was suggested that all of these issues be considered by the airport's management. The authors also stated that their findings required further verification by means of conducting further studies incorporating larger samples, in order to provide a more rigorous and thorough analysis.

In another study, Kloosterziel et al. (2009) discussed passenger flow in KKIA. Passenger flow within this specific airport starts at passengers' entry to the building through the elevated departure road after parking in the basement car park of the airport. The departure level can be reached through the elevator which takes the passengers from the airport basement via the arrival level. Hold baggage is then checked through security; this is based on an X-ray machine. The baggage is placed onto a conveyor belt at the check-in desk to be transported to a designated area in the basement. When check-in is complete,

the passengers must undergo ticket checks, followed by security checks on the passengers themselves, and their hand baggage, again using X-ray machines. Passengers can then enter the airside departure lounge. After going through boarding pass control, the passengers are finally able to board the aircraft.

The passenger flow for international departures follows basically the same procedure as that for domestic passengers, with a single exception: passengers must pass through an immigration office prior to undergoing the security check, in order for their foreign passport to be checked.

The other type of passenger flow is the international arrival flow. To begin with, passengers follow loading bridges, which lead to the terminal. They then pass through the immigration check, and on to passport control and baggage reclaim. They must then go through customs control, prior to entering the welcome hall. At this point, passengers can go directly to the arrival curb outside of the airport, or can go to the parking area in the basement, which is accessed via a corridor. Through the port, the transferring flows of entry procedures should be followed; hence, passengers with connecting flights must collect their baggage, re-check it, and wait for their next flight. These passengers follow the same procedures discussed above during their departure and arrival. International-to-international passengers pass through separate security and passport checks within KKIA. They ascend to the departures level to board directly after going through the relevant controls and security checks. Domestic-to-domestic passengers, on the other hand, do not need to go through additional security checks, and hence can flow directly to the departure hall. It is worth to note here that the Transit passengers must also remain at the airside, or on board the same aircraft, depending on the arrangements of the flight and the airport. Transit passengers are not supposed to collect baggage, but they are supposed to check their hand baggage, while they are able in some cases to change their way of travelling. Figure 2.12 represents the types of passenger flow in KKIA.

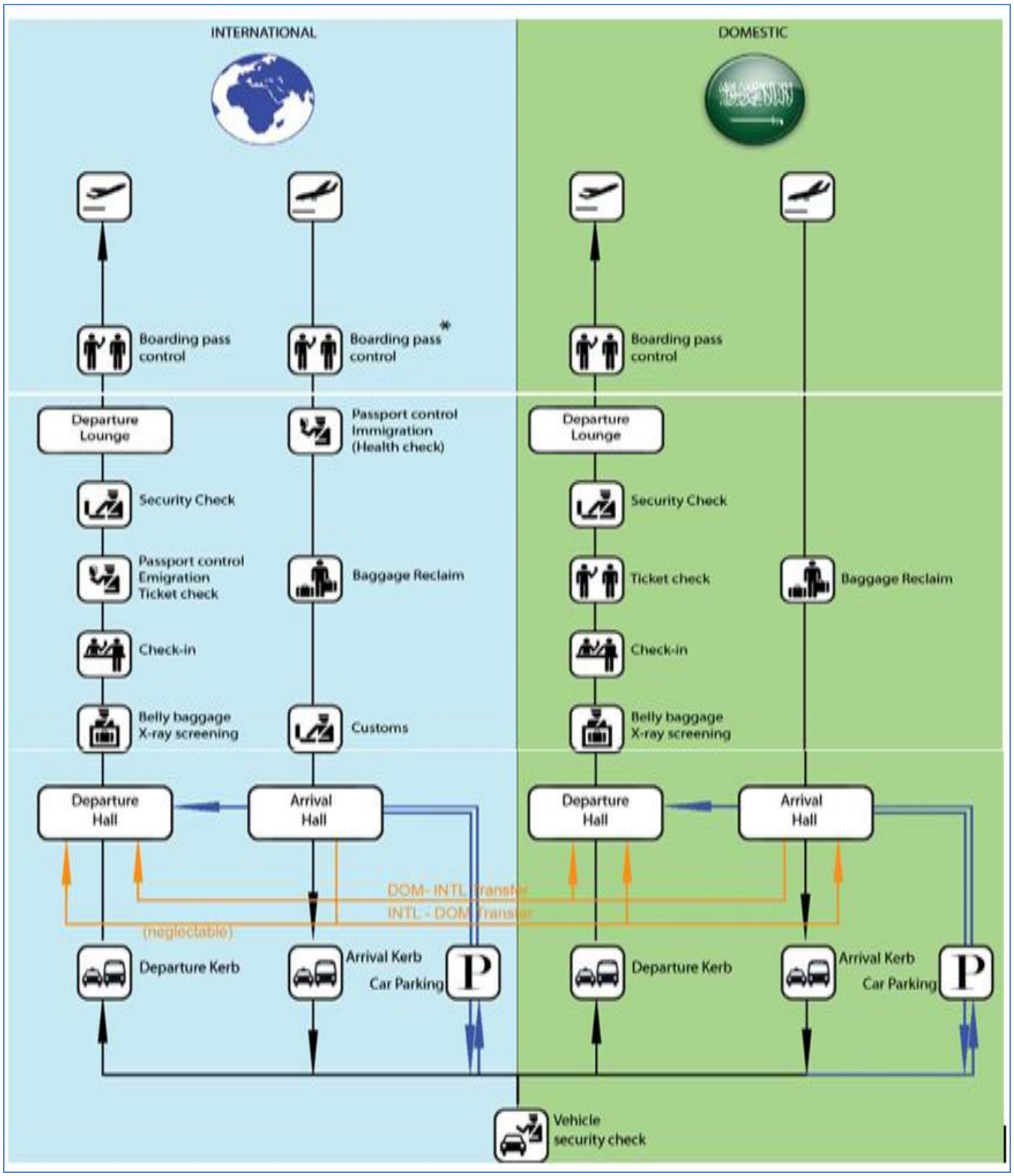


Figure 2.12: Passenger flow scheme through the terminals at KKIA (Kloosterziel et al., 2009)

2.9. Summary of Literature Review

The sensitive environment of the aviation industry requires a great deal of attention in order to increase the level of services and raise customers' satisfaction regarding these services. Therefore, management within the aviation industry follows very complicated approaches in order to cover all aspects of this field. One of the management approaches that can be applied to the aviation industry is the lean management approach. Lean is a very effective approach that aims to increase the productivity of an institution via the use of the organization's available resources, in a short manner of time. Moreover, lean aims to eliminate the various forms of waste, which include over-processing, transportation, motion, inventory, wait time, defects, over-production, and unused human resources. In addition, lean thinking follows five principles: define value, map value stream, create flow, establish pull, and pursue perfection. Lean Six Sigma is another management procedure, which differs from lean thinking since it follows the DMAIC strategy. The lean Six Sigma procedure of management is implemented in many international airports worldwide, since mixing these two approaches together makes it possible to benefit from the advantages of both, where Six Sigma focuses on minimizing process variations and enhancing control, and lean eliminates waste and promotes the flow and standardization of work. The main processes of lean and Six Sigma can also be applied in organizations separately. The main aim of both is to improve quality in order to increase customer satisfaction.

There are many obstacles and challenges faced within the implementation of lean in organizations (see chapter 3). These include shortages in terms of obtaining high-level evaluations, arising from a lack of visibility and integrity of performance; a failure to plan the lean program in an organized manner; the unavailability of lean experts throughout the implementation of the program; and the lack of honest communication between the parties in the organizations that are part of the lean program application. Despite these obstacles and challenges, lean thinking is considered to be highly effective, and clear managerial thinking can help to deliver the desired lean aims within organizations.

Service quality in airports is usually measured by testing the LOS by measuring certain variables relating to services within the airport, and then giving that airport a rating level (A, B, C, D, E, or F). The lean Six Sigma procedure of management contributes to enhancing the LOS within airports that implement this managerial procedure in the correct way. However, passengers determine the quality of services in airports according to different aspects; therefore, the quality of those aspects has to be measured exactly by the LOS measurement. The facilities on offer to customers of the airport have to be presented according to the passenger flow, which must also be effectively managed. From this perspective, many models have appeared from different researchers to measure the quality of services according to passengers' perceptions and expectations, such as the fuzzy MA model, the non-additive model, the DEA model, the weighted SERVQUAL model, and many others as is mentioned in the previous sections through this chapter.

Managers of airports care not only about the level of service, but also about the passenger flow. In fact, from recent research it appears that passenger flow also can affect the LOS in airports. Therefore, airport managers have to follow procedures that are able to cover all the required perspectives within their airports. However, it appears that the passengers flowing through the departure side of the airport are primarily affected by points such as parking facilities, check-in procedures, security checkpoints, and ticket checkpoints. The rapidity and accuracy with which the various processes are achieved and passengers' requirements met at these points will affect their satisfaction regarding service quality within the airport.

Other focused studies have also sought to measure the LOS and passengers' satisfaction. In order to extend these studies, the present study will focus on the departure area of KKIA, with the aim of assessing its LOS and ultimately provide suggestions by which the airport can increase the quality of its services.

The SERVQUAL model (Parasuraman et al., 1988) has been selected for this study. SERVQUAL measures products based on five dimensions; namely, tangibility, empathy, service quality, reliability, and responsiveness, in order to assess customer satisfaction and ultimately increase customers' loyalty and repeat purchase intention. The model focuses on the quality of products, and considers this as the most important factor in

relation to customers' overall perceptions. In order to increase customer satisfaction, some companies have started to institute some profitable projects in the airports areas such as promotional islands, courts, play stations for kids and families, car parking's, ATM facilities, and free shopping areas for customers and clients.

The SERVQUAL model seems to be the most suitable model to apply to the present study, since it focuses mainly on customer satisfaction and LOS quality with reference to the five main areas outlined above. The SERVQUAL model makes it possible to analyse customers' expectations and perceptions, and then compare these by calculating the "gap variable" between them. Thus, SERVQUAL is highly suited to this study, and more so than other existing models, since it can assign a numeric value to estimates and describe customers' perceptions. In addition, this study is mainly concerned with customer satisfaction; therefore, the SERVQUAL model will make it possible to address this variable in the most accurate way possible, before and after applying lean and Six Sigma management processes within KKIA. The selection of this model has been made according to a full understanding of the various perspectives that have been presented throughout this chapter.

Most of the literature studies showed reasonable level of research in the field of evaluating the level of services and the performance measurement at different areas in the airport, mostly the passengers' terminal. Different methods were discussed which were proposed and used for the evaluation process. The gap found in the research literature is that few studies discuss lean implementation the airports. The research literature will be extended in the next chapter in order to include more effective and valuable studies.

Chapter Three: Cultural and Managerial Procedures in KKIA

3.1. Introduction

At present, institutions are dealing with dynamic environmental conditions and a rapid speed of change. Therefore, the managers of organizations are adopting strategies to address environmental threats and to maintain their competitiveness and development. Perhaps one of the most important sources of competitive advantage is providing quality services to customers; this requires supervisors to adopt people-centred management of quality entries. The partial amendment of processes may not bring about the desired results. Competitive industries necessitate radical rethinking of the various processes that are in the organizations, especially those associated with quality. Such processes need to be redesigned by relying on a strategy of change based on modern techniques like management re-engineering and total quality management (Appelbaum and Fewster, 2004).

Change is widespread today and occurs continuously and often quickly. A change may be made in order to maintain an organization's risks and allow it to provide the best quality of services. Change in organizations, particularly in the Arab world, needs a long-term viewpoint by owners who resist changes as a result of a fear and dread of change and development. Those who resist change, whether explicitly or in a hidden way, do so due to the fear of the effects of change and prefer keeping the situation as it is in terms of interests, relationships and privileges. They may also not believe in the new ideas and do not want a period of renewal, so they express unjustified stubborn refusal to change their option (intransigence) (Kandt, 2002).

Negative resistance may also arise on the pretext of a lack of clarity in the objectives or because they are deemed to be unrealistic. Those who resist change may also argue that the time is not appropriate for change or that there is a lack of experience. Others may not wish to carry the banner of change. Truly understanding change starts with awareness of the different resistant patterns that arise at each stage. If the resistance to change and reform is strengthened, this resistance can succeed in disrupting and obstructing real change (Pierce et al., 2002).

The fear of change and development is a complex issue facing the management teams of contemporary organizations. The process of change is in constant motion. The resistance of employees has been identified as a key factor in the failure of many important change efforts. The issue of resistance to change is an important issue that should be considered in an organization's policies. Staff members who offer negative resistance are usually recognized by managers as disobedient and obstructing the organization. Overcoming such resistance and considering it via organizational policy are necessary to achieve new goals and in some cases may play a positive role in staff resistance and beneficial change in the organization (Kandt, 2002).

This study applies change management to King Khalid International Airport in Saudi Arabia in parallel with lean management. This chapter clarifies the meaning of leading change, a culture of understanding and change management. It then discusses the forms of change. And the concept of change management, it studies and explains the services in the departure hall at King Khalid International Airport. The aims of the study will be achieved after finishing the process of applying changes at the airport.

3.2. Leading Change

Researchers in the 20th century combined the concept of leading change with various managerial aspects such as planning, analysis, and decision making. They built different hierarchical models that were explanatory in nature for leading change and its combination with managerial aspects (Bangura, 2011).

Yurkl (2002) defined leading change as a process in which an individual of a group or team influences events' interpretations, work activities, the motivation of people, strategies and objectives, cooperative relations, the confidence of members and the overall development of skills and working abilities.

Jogulu (2010) discussed leading change and considered it as an inborn aptitude. Furthermore, in his research, the leader's influence on the overall control of the performance of team members was discussed. The styles of leading change were developed in order to help leaders to understand the importance of leading change and to apply the proper practices based on the behaviour of the team or group. It was stated by

Adair (2009) that, for effective leading change, it is necessary to reflect on what is actually expected of team members. It was argued by Gilley (2000) that the enhancement of productivity is done through the motivation, allowances and satisfaction of team members, but it is better done by creating a value of them that makes them feel comfortable and satisfied. Moreover, leading change was described by Kotter (1995) as the engine or motor that drives changes in the workplace or anywhere else. There are different situations for leading change that have actually resulted in different definitions for it; however, specifically, leading change is a process whereby leaders set examples by performing well in order for employees to follow these examples and accomplish main goals.

3.2.1. Leading Change Theories

A theory discussing situation adaption, style and behaviour in leading change was presented by McGregor (2005). McGregor stated that the nature of the personnel in the organization is significant in identifying the type of leading change that the leader/manager must follow to achieve the leading goals and objectives. It is considered through his research that the human behaviour theory of the manager results in different management actions within the organization. McGregor's (2005) paper presented two main theories for leading change that are opposite in concept to each other. The first theory considers that the management of the leader should use punishment as a threat for the team members, since such managers believe that this is the better way to achieve goals and accomplish objectives. In the other theory, employees are motivated and encouraged to perform better; these managers believe in the effectiveness of physical efforts and the importance of making team members comfortable in order to get better efficiency and productivity from them.

Since the 1960s, theories of leading change for different situations and circumstances have developed and have been significant in instructing leaders in the best leadership behaviour. Situational and contingency theories are the major recognized theories in this area. Leading a team requires special behaviour in different situations to be effective in changing the behaviours of the team members according to the concerns and needs of the leader/manager. Also, it is important for the leader to consider the task requirements and

the social emotions of the group members. Moreover, situational theory involves Hersey and Blanchard's theory, which deals with task and relationship behaviours.

Hersey and Blanchard (1976), as cited in Jira et al. (2004) defined maturity as "the capacity to set high but attainable goals (achievement-motivation), willingness and ability to take responsibility, and education and/or experience of an individual or a group" see section 3.6.2.

3.2.2. Managing Change

In the previous sections, the role of managers in any organization was explained briefly. It appears that managers aim to enhance their organizations in an effective way, since the main concern of the management is controlling the systems within the institution. Actually, one of the most important management procedures is managing change, which means controlling change within the institution in order for this change to achieve positive effects, as stated by Harding (2007). Managing change in any organization has four main key factors to achieve success: changing pressure, a shared and clear vision, changing capacity and performing change.

Starting with changing pressure, it can simply be explained as the activation of the leader role by making employees comfortable in their roles and jobs in order to increase the efficiency of the whole institution. The pressure of change appears obvious when the manager puts the right person in the right job, since this is the most significant factor that leads to creating an effective employee with a high performance (Harding, 2007; Lunenburg, 2010; Fernandez and Rainey, 2006).

The second factor of managing change is the shared and clear vision. The shared and clear vision can control employees' behaviours, if they have full information about their new roles, the main aims of the institution and the procedures to achieving the new aims of the institution. This factor assumes that employees will control their behaviours in the most effective way to achieve the organization's main aims by performing their duties in the best way possible. This factor also assumes that employees will perform in an effective manner even in the absence of the manager of the institution.

The third factor is also an important one: changing capacity. In terms of the factor of changing capacity, the manager has to focus on the capacity of the institution to change, such as its time and money capacities. The time that is needed for successful change is a significant part in the whole process because it has to suit the institution's abilities. From the other side, the financial status of the institution (beside other factors) also has to be suitable for the change, in order to ensure its success. It appears that the capacity of the institution has to suit the change process (Pierce et al., 2002; Harding, 2007; Lunenburg, 2010).

The fourth and last factor to ensure the success of the change process is performing change. In terms of this factor, the implementation procedures of change are used in order to ensure the change process is followed up by a manager. This factor considers that the communication between managers and employees within an institution has to be always open in order to enhance the change process and correct any errors.

All the above factors are used to ensure the success of the change process in any institution generally, but the most important factor is a wise and good manager who can lead the process and manage the change with the best methods (Bovey and Hede, 2001; Kandt, 2002; Harding, 2007; Lunenburg, 2010).

3.2.2.1. Properties of Change Management

Change management is characterized by several important properties. Knowledge of the various aspects is necessary to achieve the goals set for the change. The properties are:

- Targeting: Change of intelligent interaction's flow does not occur randomly and imprudently; the movement of an organization must be geared towards information and positions.
- Realism: Change management must be associated with the practices of the organization and its potential, resources and circumstances.
- Interoperability: There must be an appropriate degree of compatibility between the change process and the wishes, needs and aspirations of the different powers involved in the change process.

- Effectiveness: For change management to be effective, the personnel that have the ability to move freely to influence others and direct the forces already in the target systems and administrative units should do so.

- Participation: There is a need to manage change through positive interactions, and the only way to achieve this is to inform the forces and parties that are affected by the change and to interact with the leaders of change.

- Legal change: A change must be made within the framework of legality and morality.

- Fix: For change management to succeed, it requires reform, meaning that it must strive towards a reform of existing defects and addressing existing imbalances in the organization.

- Development and innovation: Change that works on developmental capabilities is better than change that works on existing or currently used capabilities, as such change works towards upgrades and progress, not dealing with existing content.

- Ability to adapt quickly to change management: Leaders should not react to events but should be consistent and adapt themselves (Weimar, 2011).

3.2.2.2. Reasons for Change Management

The process of change does not occur spontaneously or automatically; there are reasons for a change to be made. The following are the most important reasons for change:

- Keep vital factors : Changes may be made to ensure vitality within organizations. Such changes lead to recovery hopes, optimism and individual and collective initiatives. These changes remove the spirit of apathy and negativity and promote stability for a long period of time.

- Development of innovation capacity: Change always needs to deal with both positive and negative adaptation. Both types of adaptation require tools and innovative ways for changes to be made.

- Promote development, improvement and change: Changes may be made to eliminate demands and to provoke desires and the motivation to upgrade.
- Compatibility with life: Changes may be made to increase adaptability and compatibility with variables due to the different conditions faced by organizations.
- Level of performance and quality of service: Changes are made to reach the highest degree of operational performance and practice through the operational discovery of weaknesses that lead to low performance and the strengths that lead to high performance (Fernandez and Rainey, 2006).

3.2.2.3. Difficulties of Organizations' Change

According to the significance of the previous illustrations for the procedures of change management, most of organizations should follow them to achieve a successful change within their institutions. Nevertheless, organizational change has some difficulties that face organizations and hinder applying it effectively; those difficulties are explained in the followings:

Fear of financial loss or gain of material: This belief places most burdens on middle-level managers and employees and may result in strong resistance to change. According to this perspective, there is doubt that the change means more time-consuming work for a possible reduction of remuneration; According to Americans for Democratic Action (ADA) leaders should lead the change process by outlining the benefits for everyone participating (Lunenburg, 2010).

Feelings of insecurity or fear: A good situation, for example, may require new job descriptions for personnel in line with quality standards. This may drive some employees to doubt their abilities to comply with these standards and causes them to worry they will lose their positions. This may also result in resistance to change and efforts to maintain the status quo; in return, the foundation leaders should enable staff to meet the needs of the public through informing staff of the importance of every job in making the change (Lunenburg, 2010).

Social phobia or social support: An organizational change may be implemented that separates an individual on a team due to their distinctive traits and may even impose working in isolation. This had to keep up the situation, especially when the change happens in leaders who played a positive role. Persuaded to the targeted organizational change will increase the chances of social affiliation for wider interactions and transactions (Lunenburg, 2010).

Degree of confidence with a change in the organization: The full trust of leaders in the change and an absence of negative sensitivity make an individual accept the tasks assigned under a change, without believing that the management is prejudiced against them. In order to earn this confidence and command, the goals and objectives of the desired organizational change should be explained at each organizational level (Lunenburg, 2010).

Individual culture: Some topics may conflict with the culture of individual and cultural dimensions. Organizational change should take into account these dimensions and cultural mix management carefully. As the reactions of people to the changes around them vary, ranging from acceptance to rejection and resistance, leaders should know the reasons for the change and the sources of the resistance, including how to deal with it (see section 3.6.1).

People accept that change is normal in life, but people may still reject going through change, the methods used and the circumstances surrounding the change. Some of the most important impediments to change are: fear of failure, lack of knowledge, lack of vision and mission, fear of consequences, uncertainty, lack of coordination, lack of follow-up, lack of cooperation, interest in material elements and neglect of behavioural factors (Lunenburg, 2010).

3.2.2.4. Managing Change in Airports

As every flying field is a component of a bigger transportation network, flying field managers have legitimate issues concerning the correct operation of different airports and therefore the sleek functioning of the traffic system. As an extreme example, if all the airports in the world closed apart from one, it would not have any sensible utility.

Declared otherwise, each closed flying field decreases the utility of the native airport; each traffic delay will do the same (though some have more significance than others). In addition to national considerations, each flying field manager has to advocate and promote the native considerations of their facility. Several dilemmas are focused around the tension between national policy problems (e.g. flying field noise) and also the native need to retain the ability to manage community development. Given the manner in which the global shipping network is built, this tension is constructed into the system, and flying field managers should learn to influence it instead of thing to avoid it (Hoerter, 2011).

From a business perspective, airport managers realize that they are intermediaries between the consumers and the sellers of aviation merchandise and services. The native airport provides a marketplace wherever sellers (airlines, mounted base operators, flight instructors, etc.) meet their customers (travellers, craftspeople, homeowners, student pilots, etc.). Like several smart market operators, an airport manager should perpetually track current changes in each team to work out how the airport can best serve this perpetually evolving marketplace (Hoerter, 2011).

An aerodrome can be considered as an area where federal airspace and native roadways meet; this can also be considered as an area where public infrastructure and personal investment meet. Furthermore, an aerodrome is an area where consumers and sellers meet in an open and dynamic marketplace. In other words, it can be viewed as an area forever caught between totally different worlds. Consequently, aerodrome management needs an eternal effort to find a balance among several competitive forces.

Airport executives need to coordinate the activities of assorted teams with conflicting interests. Consequently, many people who relish long-term success in this trade value people who are strong minded and broad minded at the same time. These two traits could sound contradictory, but their combination in a single temperament is a driving dynamic in several aerodrome leaders who systematically deliver good results. However, maintaining the human element is also necessary in this network-based trade (Hoerter, 2011).

3.2.2.5. Managing Change in the Aviation Industry

The aviation industry is a very sensitive environment; therefore, applying any change within its institutions needs a full and clear image to estimate the size of the change and its suitability to the whole institution. On this point, the managers of aviation institutions appear to be the most pivotal, as they are responsible for managing and controlling change in the aviation industry. In fact, achieving successful change in the aviation industry requires wise change management strategies in order to minimise of any possible risks. According to Appelbaum and Fewster (2004), there are two main drivers that affect change management within an airline institution: the growing concern about safety in the aviation industry and the increasing expectations from consumers regarding service excellence and service choice. The first driver (the growing concern about safety) is a global concern that affects consumers' acceptance; therefore, any change in the aviation strategies has to enhance this aspect in order to gain more customers. The other factor (the increasing expectations from consumers) has encouraged aviation institutions to enhance their services, which is considered as a change in strategies since it affects the incomes and the outcomes of the institutions' systems. These strategies are included in human resource management (HRM) strategies, under change management strategies (Appelbaum and Fewster, 2004; Ropp, 2008).

It appears that the good management of change in the aviation industry is one of the most significant factors to success at all levels. The sensitive nature of the aviation industry requires a wise and calm manager who can control the process of change successfully by removing all the expected risks, in addition to keeping personnel informed of the positive points up. The aviation environment contains many variables that can affect the change process, including the employees, the customers, the airline instruments, the weather and many other variables. A manager in the aviation industry has to respect all these variables while planning any change, since the sensitive nature of the industry requires a lot of concentration on all the parts of the aviation environment. Applying any change in the aviation industry also requires a lot of attention in order to avoid any possible risks through the change process (Lock et al., 2010; Appelbaum and Fewster, 2004).

3.2.2.6. Airport Managers

In addition to acting as an associate mediator between the board and its staff, an airport manager additionally stands astraddle two completely different worlds. On the one hand, the manager is the plant manager of an industrial facility. This is often the role that the staffs consider the manager as having. If the manager developed their career by rising through the ranks of flying field management, it should be the role in which they are most comfortable. Separately, the manager is additionally a community leader who oversees a primary economic quality and potential development tool for the native population. This is often the role in which native business and political leaders relate to the manager (Armenakis, 1999).

Since every community's economic and political landscape is completely different, this is also an area in which very little coaching can be provided to a newcomer. The smaller the airport, the more the flying field manager's time is going to be occupied with facility management problems, as they will not have employees to whom they can delegate this work. At very large airports, the manager might delegate much of the facility management to employees and might consider community and economic development problems (Armenakis, 1999).

In general terms, if the board appeals to the airport manager primarily for the technical experience associated with airports, the flying field manager ought to be able to look to the board for steering and recommendations regarding the native community's aspirations. The most effective board–staff relationships occur once each assists the other with their distinctive knowledge and perspectives (Armenakis, 1999).

3.2.2.7. Comparison of Leading Change and Management

Management and leading change do not have the same meanings and responsibilities, but it is important to realize that different management functions contribute to providing the leading change ability while leading change activities support the management of the group/organization. Hence, it can be generalized that both leading change and management have different approaches but overlap each other (Bass, 1990).

It was presented by Bennis (2009) that both management and leading change are significant but with extreme distinctions. Management is characterized by the ability to have responsibility, take charge, conduct tasks and accomplish goals. By contrast, leading change is characterized by the ability to guide, influence, take action and give opinions. Bennis (2009) stated that managers are those who perform things right while leaders are those who perform the right things. Furthermore, Bennis (2009) defined managers and leaders and the intersection between them in the following manner:

- Innovation is done by leaders while direction is done by managers.
- Leaders mostly focus on people while managers mostly focus on systems.
- The reality is investigated by leaders while managers accept it.
- Leaders encourage trust while managers depend on control.
- Expansion is done by leaders while managers maintain the current situation.
- Leaders have a large range of views while managers have a short-range perspective.

For King Khalid International Airport (KKIA), it is essential to understand the importance of leaders and managers but also to understand the main differences between and the characteristics of both. By having the correct manager and the correct leader in their proper places, the management of the airport will be improved in terms of the innovation, creative ideas and focus on values that customers expect.

Leading change and management were also defined and compared by Bennis, (2009). It is worth mentioning that an individual could be a leader, a manager or even both at once, but it is necessary to distinguish between the proficiencies, skills and competencies of each in order to obtain a competent and comfortable environment. The comparison between leading change and management is shown in Table 3.1.

Table 3. 1 Comparison of Management and Leading Change (Bennis, 2009)

Leading Change	Management
Change and movement generator	Consistency and order generator
Produce a vision	Plan and budget control
Set policies	Allocate resources
Create direction	Create agendas
Align people	Organize staff
Inspire and energize	Establish rules and procedures
Motivate	Control and problem solve
Satisfy unmet requirements	Find creative ideas and solutions
Communicate goals and objectives	Provide corrective procedures and actions

The most essential leading change principles were stated by Nauman and Khan (2006) to be the following:

- Meet the organization's goals and objectives.
- Define roles and responsibilities, encourage team members, and ensure control and teamwork.
- Guide and direct the team in solving complicated tasks by dividing the problem into smaller parts.
- Encourage team participation in making decisions and creative thinking.
- Improve the performance and behaviour of team members (whereas a manager is responsible for coaching them).

- A leader should be an advocator and an empowering, encouraging and supportive person.

- Encourage communication skills and the ease of access to information.

3.3. Leading and Managing Change in KKIA

The "Project management in the age of Complexity and Change in Saudi Arabian" were investigated by Al-Jaafari (2003). It was found through their investigation that the religious orientation, economic environment and cultural thoughts of Saudi Arabian managers have resulted in a link between their need for Machiavellianism and their leading change styles. Thus, managers understand the need for change but there approach is Machiavellian, in that they gave "high priority to money, power, and competition and relatively low priority to community building, self-love, and family concerns. Where they focus on unmitigated achievement and winning at any cost (Jones & Delroy 2009).

The effects of unity and diversity on the leading change styles of Arabic managerial culture were discussed by Smith. (1995). Variations in leading change styles are better understood as the way in which managers handle ordinary events. Smith (1995) study involved a survey of senior and middle managers in four Arab countries. The managers in Saudi Arabia showed the personality traits and traditional patterns of strong reliance on unwritten and formal rules, while the responses and results were different for the respondents from Qatar, Lebanon and Oman (who relied on the theories of modernity). Moreover, women have reflected significant successes in leading change in Saudi Arabia and in many other countries around the world but the successes are different from one region to another. Women have had successes in different leading roles in Saudi Arabia and have shown novel and great ideas in leading change (Jaafari, 2003).

Accordingly, leading and managing change in KKIA is a plan that depends on: leadership, balance, growth, and review the strategy every three years to ensure KKIA strategic direction alignment to the market conditions and client needs. In 2012, the Leadership and administrative practices evolved within KKIA with Balance and Growth strategies that continued to evolve with the leaders and managers in order to sharpened the focus on key areas of leading change in KKIA. This strategic ambition is to further

build and strengthen change management and leadership positions in each of KKIA business lines. This study, aims to clarify the future plan and proposed models for the implementation of desired change in the departure hall at KKIA. Beyond these goals, leading and Managing Change in KKIA ambition also includes:

- Quality, innovation and operational excellence: The leaders and managers at KKIA are recognized for the quality of the services and the innovative solutions provided. This means being at the forefront of developments and aiming for excellence in design, technical capabilities, and operational skills. Focus on high added value services and positive outcomes for travellers. Leadership implies being active at the high end of the value chain, where can truly contribute to Change Management Command success by creating positive outcomes and where can command an equitable return for contribution. Managers and leaders in the KKIA look for opportunities to outsource or divest activities that offer lower added value.

- Employer of choice: To realize leadership in KKIA ambition focus aim to attract and retain the best people. Management in KKIA offers staff an international, inspiring, safe and healthy workplace that provides ample opportunities for personal growth.

- Balance as key differentiator: Balance is part of our mission and an integral part of the way the managers in KKIA to do business. Integrating sustainability in everything does helps travellers achieve their missions, strengthens services KKIA position and helps attract and retain the best people (Annual Report from KKIA, 2012).

3.3.1. Questions Arising From Leading and Managing Change in KKIA

This chapter has showed agreement on that the leading and Management Change is a key factor for the change in administrative policies adopted within the departure hall at KKIA but the questions arising from this proven and well documented opinion by seeing a researcher , and the reality in the departure hall at KKIA , are:

- What is the current reality of managing the flow of passengers inside the departure hall at KKIA?
- What are the lessons learned from previous studies in the field events change in Lean management at the KKIA?
- What are the principles of lean management strategies prevailing in the departure hall at KKIA?
- What degree of satisfaction do travellers have about the level of services (LOS) in the departure hall at KKIA?
- What is the effect of the application of a new strategy in the lean management in the KKIA?
- What is the proposed model to measure the change in lean management practices commensurate with the Saudi culture? And how is this form suitable for application in other airports?

3.3.2. Managing Change in KKIA

Change is the key to enhancement since it increases the efficiency of performance in all aspects, if it is done wisely. These days, there is rapid development in all sectors; therefore, any institution has to change its strategies and policies to keep pace with these developments, in addition to enhancing its performance. The staff at KKIA realize that the aviation industry is developing every day and that each aviation institution has to keep up with the global developments by changing its policies and strategies. Actually, implementing a change in the airport environment is not a simple process because of the sensitive and multiple variables in the aviation industry. Therefore, any change in the aviation industry requires good management in order to ensure its success. The managers at KKIA have realized the importance of managing change; therefore, many procedures have been planned in order to keep pace with the developments throughout the world.

KKIA has decided to make an overall change to its policies and strategies in all aspects in order to keep pace with the developments in other international airports; therefore, the first step has been agreed to be the planning of the management methods for this huge

change because of the significant role of the managers in ensuring the success of the change process, especially in such a sensitive environment. Therefore, the KKIA managers selected the fields that require changes or maintenance in the airport and then started building the required plans according to the available variables that have been determined by studies and researches into other international airports and airlines, such as Scandinavian Airlines (Lynes, 2004). The KKIA managers understand that this overall change is not a simple process, but this does not mean that this change is impossible. Consequently, deep studies, appropriate research and reports have been analysed in order to determine all the successful methods in managing this big change.

3.3.3. Technology and Innovation in KKIA

Technology has become significant in every field, including the aviation field. In KKIA, technology is involved in all the departments; therefore, changing the used technologies means an overall change in all the departments. The field of technology is extending every day, and each technological institution or organization has to consider the newest technologies and implement them within their systems to keep pace with global developments.

In the aviation industry, implementing the latest technological developments cannot be done simply because the most important point in the aviation industry is the safety of new technology. Therefore, installing new technology in the aviation industry requires testing of the safety level of the new technology before installation (Hvass, 2008). Testing new technologies before installing them will ensure that these technologies are suitable to the aviation environment; in addition, this will detect the possible risks of the new technologies, so they can be avoided.

The aviation industry is a very sensitive environment, so there is no space for any mistakes in implementing any plan. This can be achieved by good managers who can behave appropriately in any situation. In KKIA, the implementation of any technology must be done in a very cautious way in order to avoid any mistakes. In addition, a very watchful and wise management should control the whole process of implementing new technologies.

It appears that changes in the technologies in KKIA must pass through several steps before they are implemented: selecting technologies, testing them, defining the positive and negative points of them, deciding to implement the new technologies and then controlling the implementations of them. Actually, there is another important step that should happen after all of the previously mentioned steps. The final step of successful management requires concentration on customers' requirements, in addition to ensuring improvements in the aviation environment.

Moreover, as part of the technological transformation process initiated by GACA (General Authority of Civil Aviation), a new reporting system was introduced with effect from January 2012. Currently a number of predetermined Key Performance Indicators (KPI's) are being reported on a monthly basis in KKIA. However, these show an urgent need for additional fine-tuning of the parameters to be reported, in order to more closely follow and describe the status of the business, and provide management with a better tool to take educated decisions in a transparent environment inside KKIA. This is currently in progress, and as a next step, monthly reporting on departmental goals will be implemented, soon to be followed by project reporting to complete the envisaged new Reporting Technology System (Annual Report from KKIA, 2012).

It is also responsibly of the current Permanent Command Post (PCP) available at KKIA to handle crisis and emergency situations. The current Mobile Command Post (MCP) was found to be outdated both in concept as well as in the technical equipment available. Therefore, the administration has provided KKIA an expert to analyze in-depth the current situation, and to propose suitable conceptual solutions according to the current and future technology requirements of the KKIA. A report was submitted to GACA in December 2011. To complete the design and requirements of the necessary update of the existing PCP/MCP, further input from specialized experts will be required. Freeport has therefore submitted a PSR for the provision of those services through non-resident experts, which was accepted in the latter half of June 2012 (Annual Report from KKIA, 2012).

An attempt to develop the technology used in the KKIA has been the introduction of a new system FIDS / AODB (Flight Information Display System/ Airport Operational

Database) system to replace the current outdated system in use at KKIA. Currently, and after an initial operational testing phase, the new system is not yet in use, and the old system continues to be used. New FIDS monitors have been installed throughout the Terminals and in the Airport Operations Centre AOC, however, problems with LAN and electrical connectivity are still preventing the full scale implementation of the new system (Annual Report from KKIA, 2012).

3.3.4. Managing/Understanding Quality Expectation in KKIA

One of the most significant roles of a manager in the aviation industry is the understanding of customer attitudes, since they are the most influential factor in the whole industry. Therefore, each manager analyses the customer attitudes in order to anticipate the quality of the used technologies from customers' perceptions. In terms of change management, it is important to understand the customers in order to analyse the quality of new technologies as a way of avoiding any possible risks that might happen in the future. In this way, the managers can make a safe change from the perspectives of customers, since they are influenced by change as well as other variables within the aviation environment. In other words, a safe change here means that the customers will be influenced in a positive way by the change process, which will lead to enhance the quality of the industry and the aviation institution's outputs in general (Ramakrishnan, 2008; Bangura, 2011).

Understanding the attitudes of the customers in KKIA is considered a very significant role of management, especially in change processes as the main aim of change is the satisfaction of customers. However, this does not mean that this is the only aim of change, but it is the most important one. The managers of KKIA have realized that the customers are the most influential factor in the quality of the outputs, since they decide the level of services quality from their perspectives.

Concentrating on lean management, customers are one of the factors that are considered to be the causes of exaggerated themes. Therefore, an understanding of customers' attitudes will contribute significantly in determining exaggerated and unneeded items, and then deciding what to do with them before their appearance, which can be considered

part of successful management. In KKIA, implementing lean management would require wise change management, since this is a new method in the airport environment.

3.4 Organisational culture

In manufacturing sector, Toyota production system (TPS) is very popular due to use of the best strategic practices. There are various tools and techniques in TPS that are used in manufacturing and service sectors without considering size and activity. Most of the managers are also interested to follow and execute this system in their organization because of its effectiveness and efficiency to achieve success in the competitive market (Emiliani, 2006). In the views of Herron and Hicks (2008), before the rising success of the Japanese production system, culture value was not considered by the firms in their business strategies and approaches.

Various researchers and scholars found that the behaviour of people is significant for the Japanese culture to reflect their values and priorities in the organization (Jabnoun, 2001). Many researchers and authors identified that it is difficult for the organizations to imitate lean thinking. Therefore, these philosophes are used in different companies across the world, but without any imitation. It is necessary for the firms and managers to focus on the factors that can influence the effectiveness of lean thinking and consequently decrease in the organizational effectiveness and performance.

Cultural aspect of an organization is the most important factor that can affect the lean process of the organisation. Concerning to this, the leadership plays an important role in the successful implementation of lean within the organization. For this, it is crucial for the managers to adopt a substantial leadership that can enable them to understand the system and how they can get advantages from it. According to Bhasin (2012), managers can execute the lean process effectively and incorporate the changes in business operations successfully by developing comprehensive understanding about the organizational culture.

At the same time, Atkinson (2010) stated that it is imperative for the firms to develop appropriate culture, conditions and circumstances in order to implement lean process efficiently because all these perspectives are significant for implementing the change

within the organization. Boyer and Sovilla (2003) confirmed the views of Atkinson (2010) by depicting that cultural issue can create difficulty for the organizations to implement lean and cause its failure.

Most lean articles and researchers are based on the concepts and theories related to leadership, organizational people, organizational culture, management support and commitment. But, there is lack of articles and researches, which have discussed leadership types that is required for successful implementation of lean. In the views of Dahlgaard and Dahlgaard-Park (2006) several research studies have emphasized on the training needs in lean process to develop the understanding and knowledge of people to implement tools and techniques. But at the same time, researchers have less focused on the requirements such as human aspects and development of appropriate culture in implementing lean approach.

The middle level management and leaders play a significant role in the development of lean culture within the organization. Mokhtar and Yosof (2010) proposed that management involvement and buy-in are significant for the development of favorable working environment. For starting the lean implementation process, senior management should be committed and supportive in providing all required resources and budget to train the employees. Apart from this, management should adopt scientific labour division by providing particular authority and responsibility to specific leader and manager according to their capabilities and efficiency (Mokhtar and Yusof, 2010).

Moreover, Mullins (1999) suggested that before the evaluation of the organizational culture, firms need to focus on factors that can have a significant influence on the organizational culture. Such as:

- organizational history,
- mission & vision,
- goals & objectives,
- size & location,

- management structure and workforce and organizational environment,

In addition, Taleghani (2010) depicted that 90% of UK firms have not succeeded to successfully execute lean implementation due to presence of cultural and management issues. Mejabi (2003) has similar views by stating that it is compulsory for the organizations to solve these issues to successfully run the lean production at workplace.

At the same time, Al-Swidi and Mahmood (2011) stated that the firms need to consider the cultural values and aspects to implement business techniques such as lean in prescribed way. A dynamic and supportive organizational culture can be effective to develop a long-term strategy that leads the effective implementation of these techniques.

The lean culture is originated from Japanese culture, but due to globalization, it has been adopted by different countries of the world such as Middle East countries, Latin America, Eastern Europe and Asian regions (Lacksonen et al., 2010). All these regions have differences in their national culture and organizational culture, so it is important for the organizations to adopt suitable ways to implement lean with the consideration of organizational culture and Japanese corporate culture. Firms need to use a proper combination of Japanese corporate culture and their societal and organizational culture for executing the lean process successfully (Lacksonen et al., 2010).

Rodner et al. (2006) focused on the continuous improvement (CI) in culture by suggesting that each employee within the organization should be prepared to accept the initiatives and approaches for the execution of lean process. It is because organizational people play an important role in incorporating changes related to CI in organizational culture. Along with this, it is also crucial for the organizations to ensure employee engagement and commitment in the processes from initial stage to develop a new culture of CI (Radnor et al., 2006).

A participative culture is also significant in successful execution of lean within the organization. It is because through participative culture, company can generate employee commitment by considering their views and opinions in decision making and convince them to accept the implemented changes and change their perceptions towards organizational and cultural factors of CI (Wan and Chen, 2008).

In the views of Ghobadian and Gallear (1997), there are various aspects such as employee participation programs, education, training activities, communication development programs, modification of performance appraisal and reward system, behavior of top management, reconsideration of policies and procedures, etc. that can be significant to develop an organizational culture to effectively execute lean.

Apart from this, it is also necessary for the organizations to change the passive and defensive corporate culture into open and proactive culture that is based on employee participation, customer satisfaction and implementation of CI in all departments on daily basis (Wan and Frank Chen, 2008)

The main focus of Toyota culture is on the customer satisfaction as it adopts organization approach of outside-in by giving more priority to the customers' needs and preferences and making them feel that they are the most valuable part of the organization (Takeuchi et al., 2008). Firms need to consider the common practices for creating CI such as flat organization with fewer conflicts between management and employees, people empowerment, time management, allotment of right tasks and activities. But at the same time, these practices are not suitable in each situation. The critical success factor in lean implementation is cultural adoption by the employees (Wong, 2007).

In order to build a successful lean enterprise, it is crucial for the organization to generate an appropriate organizational culture that is supportive for people empowerment, stakeholders' involvement and participative decision making. With the help of this, managers and leaders can generate high customer satisfaction that can lead the achievement of more benefits in terms of revenue and profit from lean. According to Schein (2004), organizational culture can be defined as a pattern of shared basic assumptions, which are learned by the people, while solving the problems and considered authentic due to their applicability and further learning by new members for determining the appropriate ways to think and address those problems.

3.5 National culture

Cultural of a nation plays an important role in the formation of overall environment of the organization. The differences of organizational cultures arise as a result of perceived

individual inconsistencies in the national culture (Adler, 1986; O'Connor, 1995). National Culture can have direct impact on managers that can influence the productivity of the organization. Abdalla and Al-Homoud (2001) identify that national culture shapes employee attitude and behaviour rather than the organizational culture. It has a significant influence on both managers and the employees in the organization.

Hofstede has defined national culture as the collective programming of the mind acquired through growing up in a particular country. It has become an un-separable part of its inhabitants since it is acquired from childhood and evolved over the years (Hofstede, 1997 & 1998). further described organizational culture as a collective programming of minds that has been developed from the working experience in a particular organization, which distinguishes the members of one organization from another.

The national culture can be defined as the shared values and assumptions of a culture that have been formed by common experience and history of events (Jabnoun and Al Khafaji, 2005). National culture plays an important role in the success or failure of lean implementation.

National culture is an important determinant to identify the behaviour of managers in an organization (Michael and College, 1997). And consequently, it also reflects the organizational structure and its working culture. National culture also plays a significant role in designing, production, and improvements in the products to meet ultimate goal of the company related to the customer satisfaction. This type of culture carries the features of empowerment at workplace, and the Continuous improvement to meet the aim of customer satisfaction (Angelis, et.al, 2011).

An organization has two types of customers namely internal and the external customers (Juran, 1989). In order to achieve the satisfaction of internal customers (i.e. People within the organization), organization must facilitate a teamwork culture and empowered the employees. The empowerment is positively correlated with employee pleasure, which can result in the satisfaction of internal customers of the organization (Parker and Price, 1994). On the other hand, to satisfy the external customers, management needs a vibrant

culture and a conductive organizational structure by offering the quality products to customers at the right time, at the right place (Jabnoun, 2001).

Implementation of lean activities shall have an impact on the culture of the organization, because it requires changeable strategies and alterable ways of working to meet lean objectives like empowering people, promoting involvement, providing training etc (Abrahamsson and Isaksson, 2012). Lean is also influenced by several other factors like geographical location, organizational size, type of product, culture of the organization etc. Implementation of lean also relies on other factors of the organization like leadership, knowledge and awareness of quality management, corporate culture of the organization and its structure (Jabnoun and Al Khafaji, 2005).

3.6. Culture Review in KSA

Hofsted categorised all Arab countries together, as he assumed that most Arab countries share same values, principles and religion, which in turn form the national culture. This is an over-simplification of the many differences that are very visible, as are the cultural differences between the North and South of the UK. In order to understand how national culture can influence the organizational practices and culture, it is necessary to understand the dimensions developed by Hofsted (1980) see section 3.6.1.

This section will consider the society and culture in Saudi Arabia. Islam is the dominant religion in Saudi Arabia and it also governs the people's political, legal, personal and economic lives. Thursday and Friday are the two governmental weekend days in Saudi Arabia and hence almost all companies are closed on these two days. Prayers are offered five times a day according to the exact times listed daily in the newspaper. Furthermore, during Ramadan (the holy month) all Muslims in Saudi Arabia fast from dawn until dusk, while the permitted number of working hours is six hours per day. In general, friends, relatives and families gather on different days of the week to celebrate various moments, especially in Ramadan, in which the festivities continue into the night (Atiyyah, 1993).

Family values are given a lot of consideration in Saudi culture since they form the basis of the social relations and structures within Saudi Arabia. Therefore, family values are related to any social activity or interaction within Saudi Arabia and between its people. In

Saudi Arabia, families are related with the conventions of naming, the social cultures and traditions, and even the social relations between nuclear and extended families. Moreover, people in Saudis Arabia respect their families and take on responsibilities towards their families. In addition, families in Saudi Arabia seem mostly to be large and extended more than nuclear families, since there are strong relations in families. These strong relations lead to cooperation and solidarity between the individuals in a family. It is worth mentioning that nepotism has appeared in Saudi culture in an obvious way because of the strong relations in families (see section 3.6.3) . This has come about due to the significant trust between family members where this trust has extended to the work environment (Jaafari, 2003).

The previous explanation about the family culture in Saudi Arabia is just an example to compare the different cultures, which vary from one society to another, even if those societies are from the same country. These differences in cultures and traditions are one of the major aspects of humanity that has to be taken into account in any economical or industrial investment, even if the investor is from the same country. To explain further, the differences between cultures create multicultural phenomena, like the phenomena that are established in villagers when they migrate to urban areas (Atiyyah, 1993).

In the aviation industry, various cultures appear within any working group or team; this happens as a result of the admixture of different people from different cultures. Moreover, the aviation industry has become attractive recently as it offers well-salaried jobs in most societies, making many people want to work in aviation, regardless of their culture. All these reasons have led to the mixing of multiple languages and cultures within the aviation industry.

3.6.1. Culture in Saudi Arabia

In a Saudi culture where confrontation and conflict are to be avoided, the concept of nepotism and prestige is a fundamental issue of daily life. Dignity and respect are key elements in Saudi Arabian culture and saving prestige, through the use of compromise, patience and self-control is a means to maintain these qualities. Arabian culture utilities the concept of face to solve conflicts and avoid embarrassing or discomforting others. In a Saudi business context, preventing loss of face is equally important (Atiyyah, 1993).

In order to comprehend fully the culture of Saudi Arabia one needs to understand the extensive influence of Islamic religion on society. The overwhelming majority of the populations of Saudi Arabia are Arabs who adhere to the Wahhabi sect of Islam. Islam, which governs every aspect of a Muslim's life, also permeates every aspect of the Saudi state.(see section 3.6.3) As a result, Saudi culture is often described as detail orientated, whereby emphasis is placed on ethics and expected social behaviour such as generosity, respect and solidarity. These are customs and social duties that also infiltrate the Saudi Arabian business world and affect the way Arabs handle organizations management (Jaafari, 2003).

Saudi Arabia is considered a very high context culture. This means that the message people are trying to convey often relies heavily on other communicative cues such as body language and eye-contact rather than direct words. In this respect, people make assumptions about what is not said. In Saudi Arabian culture particular emphasis is placed on tone of voice, the use of silence, facial expressions, and body language. It is vital to be aware of these non-verbal aspects of communication in any business setting in order to avoid misunderstandings (Jaafari, 2003).

In order to determine the national culture, Hofstede culture dimension model (1980) is used that includes four dimensions, namely Power Distance Index (PDI), Individualism (IDV), Masculinity (MAS), Uncertainty Avoidance Index (UAI) See figure 3.1. Later an additional dimension was added: Long-Term Orientation (LTO) by Hofstede and Bound (1988). These five dimensions where used to measure national culture in 66 countries from 1967-1973, resulted in 116,000 responses. It is crucial to develop understanding about this model to analyse the impact of national culture on business practices and organizational culture. The description about different dimensions of Hofstede model in context of Saudi Arabia is as follow:

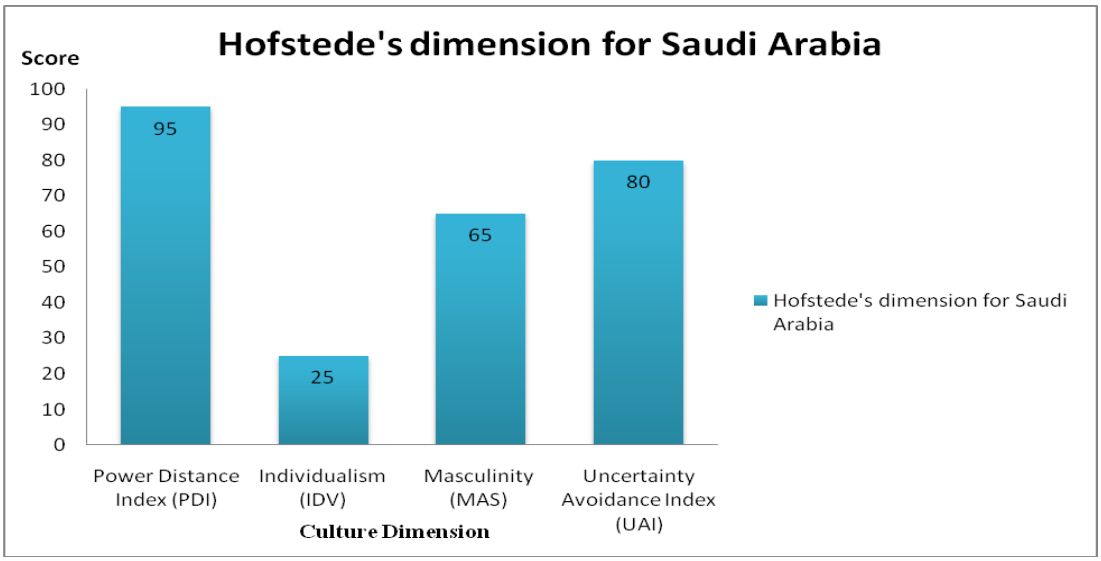


Figure 3. 13 : Hofsted's Dimensions for Saudi Arabia

1. Power Distance Index (PDI)

PDI represents the degree to which less empowered organizational members consider that there are inequalities amongst them due to unequal distribution of the power (Hofstede, 1997). It can be categorized into high PDI and low PDI that helps to determine the culture aspects of organizations in a country. The countries with low PDI prefer to adopt a participative decision making style, simple organizational structure with less hierarchy, proper discussion between managers and employees in decision making. On the other side, in the countries with high PDI, organizational culture is based on hierarchical organizational structure, autocratic managerial style, no disagreement among employees with managers, lack of consultation between managers and employees. (Hofstede, 1997).

In high PDI countries, employees are more dependent on managers and consider that managers are always right. These countries are attributed to centralized decision making and less employee empowerment with high power to top people. It is expected from employees that they will follow the instructions and directions given by managers and leaders due to lack of education and qualifications. In addition, there is huge dissimilarity in salary structure of top and bottom levels employees that shows a big distance between the power of management and employees (Hofstede, 1997).

On the other hand, in the countries with low PDI, there is a good relationship between managers and employees based on praises and compliments. There is low dependency of employees on managers due to having more power, freedom and authority to disagree with the management. Moreover, the top and bottom level employees are equally treated by the management. Simple organizational structure with less hierarchy allows the management to include changes and modifications according to the situations. Managers follow decentralized structure due to highly qualified workers. There are no huge differences between the salary of top and bottom level employees in low PDI organizations (Hofstede, 1997).

Concerning to this dimension, see figure 3.1 Saudi Arabia got a score of 95 that means very high power distance. It indicates that there is preference of a hierarchical order in the organization including centralized structure, autocratic managerial style, inherent inequalities in compensation and power. Firms in Saudi Arabia adopt the top-down management style, in which, workers are obligated to follow the instructions and job responsibilities, which are given by the fully empowered managers without the consultation and participation of employees (At-Twaijri and Al-Muhaiza, 1996). In respective to this, high PDI score is not favourable for the effective implementation of lean because there is need of employee empowerment, participation and consultation of workers and delegation of authority to successfully execute the lean process in the organization.

In UK and USA, power distance is lower in organizational hierarchy. In contrast to this, in Japan, power distance is high. In UK, PDI score is 35 and of USA 40. It reflects that in USA and UK, position and power play a limited role in determining the dominance in business organizations. In contrast to this, in Japan, position and power determine the hierarchy and dominance. Hence, it can be stated that, promotion decisions are taken as per the span of employees in Japan also as in Saudi Arabia. Contrary to this, in UK and USA, promotion decisions are not taken on the basis of life span of employees, as their capabilities are considered while making their promotional decisions (Cullen et al., 2004). In UK and USA, people due to low PDI score, it is easy for the people to convey their perceptions about their performance appraisal and promotion. Contrary to this, in

Japan, PDI scores are high that is 54, but despite of this score, there is lean culture in the business organizations of Japan.

2. **Individualism (IDV):**

This dimension categorizes the national culture on the basis of individualism and collectivism. Individualism presents the expectations of people to care themselves and their family members, while collectivism focuses on the attitudes of individuals towards other people to protect them lifetime in exchange for unthinking loyalty. Overall, it shows the degree of integration of people into groups (Hofstede, 1997). Societies or organizations with high IDV show that people are more focused on themselves and perform their duties with consideration of their own perceptions and interests. People in these societies keep the personal and professional life separate for avoiding any bias or favouritism, which can cause disturbance and conflicts in their life.

High IDV favors the achievements at workplace rather than relationship development, therefore recruitment and promotion are based on employee's capabilities and individual performance. On the other hand, in societies with low IDV, people are more oriented towards the relationship development. Hiring is based on personal relations and references. Promotion and incentives are provided on the basis of group performance. It is not necessary that assigned work match with the interests and perceptions of the employee (Hofstede, 1997).

Saudi Arabia scored 25 for individualism dimension (see figure 3.1) that shows low IDV or collectivist society, in which people are more relationship oriented and loyal to the managers rather than organizational goals and objectives. Saudi Arabia is the Islamic country, in which people focus on unity and support to each other extensively. According to Abdalla and Al-Homoud (2001), people in Saudi Arabia are more close to each other to handle the external threats that can be faced by them due to living in a rich and small country. At the same time, At-Twaijri and Al-Muhaiza (1996) stated that in Saudi Arabia, promotion decisions are taken on the basis of life span of employees in the same organization with the preference of their loyalty rather than their capabilities at work. Therefore, it can be stated that low IDV or collectivism is required for implementing lean

efficiently, but it should be applied with low PDI to provide the people with opportunity to convey their perceptions and opinions.

3. **Masculinity (MAS):**

This culture dimension indicates the degree of dominance of particular gender in the society. High masculine culture is based on the values such as assertiveness, insolence, aspiration and power, ignorance of others, carelessness, money-oriented, materialism, etc. (Hofstede, 1980). Organizations with masculine culture focus on task achievements and outcomes and performance based reward system. Managers are aggressive and decisive in nature and take decisions at own level without considering others' opinions. They resolve the conflicts by fighting and arguing and prefer competition, equity and performance to achieve personal targets and gain personal benefits.

On the other side, low masculine culture i.e. feminine culture makes the managers more intuitive and less decisive and relationship oriented. Managers with feminine culture emphasize on harmony, equality and group cohesion to accomplish the work. They resolve the conflicts and issues by considering the views of others and following the negotiation and compromise. Apart from this, masculine countries believe that they prefer to invest in manufacturing sector to improve economy growth due to having nature to do things quickly and more effectively, while feminine countries are more interested to invest in service sector because of good dealing with customers (Hofstede, 1997).

Saudi Arabia has a score of 60 out of 100 on this dimension indicating that it has masculine society. Islamic religion and tribal society contribute in dominance of male gender in the families. Due to having masculine culture, people prefer to live in order to work rather than working to live (Hofstede, 1997).

It is observed that in UK and USA, masculine scores are high. In UK, MAS score is 66 and in USA, it is 62. It reflects that in these nations, people use to work for longer hours, as it is central to their lives. In contrast to this, in Japan, MAS score is low. So, in these kinds of countries, people tend to work less and take longer leaves. MAS score is favourable for the effective implementation of lean, as it determines the working ability of people (Cullen et al., 2004). It means, in USA and UK, due to high MAS score, it is

possible to implement lean effectively. In Japan, MAS score is 95. Despite of this high score, lean culture is effectively followed at Japan.

The author has observed that in the UK a sales based company is mostly masculine, where a University is feminine in dimension. These differences are evident in Saudi Culture where the Airport is mostly more Feminine

4. **Uncertainty Avoidance Index (UAI):**

This culture dimension refers to the extent at which people in the country feel endangered due to ambiguous and uncertain conditions (Hofstede, 1997). In the countries with high UAI, people are threatened to future uncertain things and happenings due to changes and try to avoid these conditions. In this culture, people can be motivated by focusing on needs related to belongingness, security and self-esteem. People follow rules and regulations and behave in a prescribed way due to high anxiety under high UAI. On the other hand, in the organizations with low UAI, rules and regulations are implemented only on serious necessity or compulsion. People are more relaxed and do not think about future uncertainties and can be motivated through achievements and responsibilities (Hofstede, 1997).

The score of Saudi Arabia in this index is 80 that show its preference for uncertainty avoidance. Due to high UAI, managers in Saudi Arabia do not take risks because they afraid of implementing new ideas and approaches at workplace and losing status and money (Welsh and Raven, 2004). In addition, the government in Saudi Arabia also focuses on lifetime job security of people without considering their performance. According to Adler (1986), lifetime employment can be said supportive for the implementation of lean process because in lean thinking it is given only to the people, who are the best and regular performers and contribute in the success of organization.
As per the views of Ali (1989b, 1990) & Welsh and Raven (2004), lack of innovation, risk taking ability and avoidance of responsibility among Gulf Cooperation Council employees and neighbourhood of Islamic such as Iraq and Iran contribute in the high UAI score for Saudi Arabia. High UAI and PDI are not supportive for lean implementation because there is distance between management and employees, vertical communication,

low employee involvement, absence of consultation between low level and top level management, hierarchical organizational structure in the organizations (Adler, 1986 & At-Twaijri and Al-Muhaiza, 1996).

In contrast to Saudi Arabia, UAI scores are low in UK and USA. In UK, UAI score is 35 and in USA it is 46. So, in these countries, lean implementation is supportive due to the comfortable position of management and employee during change of rules and policies. In contrast to this, in Japan, higher uncertainty avoidance score is 92 (Cullen et al., 2004). It is so, as in these kinds of countries, people show stress or anxiety when changes are made in the rules. Despite of this high score, lean culture is effectively followed in Japan.

5. **Long-Term Orientation (LTO):**

This dimension refers to the degree at which people believe in long-term commitments and traditional values. The nations with high LTO have a better approach for the future by determining the goals and objectives and framing a clear planning to achieve these goals and objectives (Jabnoun and Al Khafaji, 2005). These countries are more oriented towards long-term investments and concerned for future outcomes (Waarts and Van Everdingen, 2005). In the views of Obeidat *et al.* (2012), countries with low LTO are more focused on short-term planning to achieve quick results. Hofstede's study does not include Arabian countries in this dimension, but according to Obeidat *et al.* (2012), Saudi Arabia can be considered in high LTO category.

According to the study of Abrahamsson and Isaksson (2012), based on 14 lean principles of Liker's (2004) definition and the Hofsted national culture model, high PDI and MAS cultures have a negative impact on lean, whereas strong UAI and LTO have a positive impact on implementation of lean and IDV has no influence on implementation of lean . The Japanese culture is based on low PDI, low MAS, high UAI and high LTO that create better conditions for lean implementation. Jabnoun and Al Khafaji (2005) identified that some aspects such as total quality management (TQM), customer satisfaction, etc. depend on continuous improvement and employee empowerment, which need an organizational culture of low PDI, low UAI and low MAS (Jabnoun and Al Khafaji, 2005). In support of this, Jung *et al.* (2008) found that in order to implement quality management, low PDI

and low IDV are required due to more commitment of employees towards change, teamwork and standardization.

Several countries across the world are focusing on the Middle East marketplace due to its faster growth and availability of business opportunities. This region possesses diversified and unique culture as there is need for Western businesses to develop understanding about the region's cultural and religious issues and concerns prior to start business (Welsh and Raven, 2006). According to Abbasi and Hollman in 1993, stated that Western countries consider this region as oil-rich, but they have not fully attempted to grab business opportunities in this region. This has changed, as the middle east has grown where other parts of the world are in recession. The Middle East region got a status of lucrative economy along with ethnic variation due to the oil discovery in 1930s (Welsh and Raven, 2006). Consequently, it has become favourable destination for job seekers from Arabic, Asian (Welsh and Raven, 2004) and now European countries due to abundance of job possibilities

3.6.2. Culture Differences in KKIA

An understanding of cultural differences in KKIA is one of the main requirements needed to achieve safety and efficiency in the aviation industry, which is especially important as safety and efficiency have become two of the major requirements in international industries. An understanding of different cultures for travellers on the one hand, and for managers and leaders and workers in the KKIA on the other hand is required in order to select the most suitable managerial approaches for different societies and cultures in KKIA. The aviation industry is an international industry that contains multicultural environments; therefore, the selection of a managerial approach, which suits the KKIA, has to fit all the cultures included, since a certain approach could be considered appropriate for one culture but unacceptable in another. The selected approaches in the aviation industry have to take into account many parameters in cultural differences in order to achieve proportionality between the context of the approach and the included cultures. The most important parameters include customs, behaviours, languages, beliefs, attitudes and values in the business community in the KKIA. Moreover, these parameters have to be measured in regard to different perspectives, such as individualism-

collectivism, power distance, uncertainty avoidance and masculinity-femininity; these cultural parameters are most influential in driving change management within at KKIA.

3.6.3. Impact of Culture Gaps in KKIA

Management style used in Middle East is quite different from other regions of the world as it is linked to people background and their roots of the culture.

For example in a tribal society, people prefer a consultative approach of management, whereas it is authoritarian in other regions (Ali and Al-Shakhis, 1986). In most of Islamic countries, the management style of the organizations is influenced by the values and principles of Islamic and Arabic cultures (Ali, 1990).

Most of the Middle East organizations predominantly follow the authoritarian approach of management. Welsh and Raven (2006) says that Islam encourages the respect for elder family members and gives weight to father's authority in a family, same way this was applied through-out the Arabic organizations. Although the companies operating in the Saudi Arabia follow the consultative approach of management; however final decisions are made by the top management.

Obeidat, et al, (2012) identify the real reason behind manager's resistance towards creativity and acceptance of the bureaucratic system. According to him, managers in Saudi Arabia are not up to date with modern management systems and are happy with their current system of managing the organizations, because they are afraid of the unknown that what new systems could bring to their business. That's why they do not prefer any another approach of managing the business.

There are different short-comings in managerial approach of the KKIA operating in Saudi Arabia such as lack of performance evaluation, unclear objectives of the organization, shortage of plans and policies for human resources (Al-Rasheed, 2001).

Those reasons along with the superior-subordinate relationship structure in KKIA leads to poor coordination among different tasks and activities, which divert the organization from success path.

Other problems at Saudi Arabia and KKIA are the problems of centralization, lack of empowerment, and employee involvement, and lack of appropriate training programs at the workplace (Al-Rasheed, 2001; Obeidat, et al, 2012). Arabic organizations do not give importance to training programs as they see it as waste of time and money.

The training programs at Saudi Arabia do not have any link with other activities of the organization and different systems of the management, which make it ineffective at the workplace (Abdalla and Al-Homoud, 1995). Ali, et al (1989) has propounded that the management approach at Saudi Arabia is consultative and participative, whereas in the views of Ali and Kazemi (2002), it is pseudo-consultative, which means that the manager and the leader in the organization has the full power of decision-making and implementation, which make it again an authoritarian approach. Relationship of workers with management at Saudi Arabia is based on fear and admiration; they are not allowed to interrupt the activities and decisions of management.

The competencies, willingness and qualifications of employees are always overwhelmed and decisions of the boss are always given importance. This type of work culture and attitude of management generate a negative impact on the performance of workers and the productivity of organization (Abdalla and Al-Homoud, 2001). The obstacle in the success of organization at Saudi Arabia is that the Arabian managers do not focus on the performance and qualification of the candidates, while hiring or promoting the workers they follow the tribal culture and its norms, which promotes the policies of nepotism and favouritism (Abdalla and Al-Homoud, 2001). For this reason, managers at Arabic organizations fail to develop the team work, empowerment and the engagement of the employees at work-place, which results in the decline of growth of their organizations.

The Cultural managerial issue at KKIA comes from many different situations. This includes prioritising the personal relations over the organizational or the professional relations; lack of delegation and empowerment; subjectivity in promotions and evaluation of employees; outdated administrative systems and policies; rigidity and the anti-innovation approach of the organization (Al-Kazemi and Ali, 2002). These problems leads to frustration among workers and affects the growth and success of an organization significantly. Government policies and regulations of Saudi Arabia along with the

implementation of traditional norms and practices are main reasons behind these problems.

The work of Abdalla and Al-Homoud (1995) has highlighted different reasons behind the bureaucratic systems in the organizations at Saudi Arabia. According to them, most expatriates in Saudi Arabia have brought their own culture, traditions, and bureaucratic and power practices, which have significantly affected Arabic organizations. There is lack of evaluation tactics to assess the usefulness of different training programs, and there is also lack of planning and clear strategies of organizations. This type of systems along with the absence of a proper governing structure of the government leads to the emergence of bureaucratic culture in the country and in different organization.

There are some evidences that the Arabic organizations have tried to attract and retain the residents of Saudi Arabia with the creation of different planning tools and strategies, but failed to retain them because of increase in the salaries in the government sector (Switzerland Global Enterprise, 2012). Other reasons behind the managerial and human problems in Gulf Cooperation Council regions are rapid demographic changes, fluctuations in oil prices, in-adequate education system, ineffective government policies, inequalities in relation to wealth etc (Harry, 2007).

Recent researches in the human factors of the aviation industry have mostly focused on the aviation institutions within Western Europe and North America. Many variables have been analysed in order to measure the human factors, such as knowledge, behaviours, computer skills and decision-making abilities. It has been noticed by Sherif (2010) that cultural differences create many differences in attitudes, behaviours and knowledge between team members. Moreover, the responsibilities and roles of aviation personnel are also influenced by cultural differences, such as the differences between Western and non-Western staff members in workplaces.

In accordance with the huge growth of international air traffic in KKIA between almost all countries, the interactions between different cultures have increased in an obvious manner. This is especially the case between air traffic controllers, pilots, managers, leaders, and travellers alike since this area is considered the most favourable contact area

between different cultures. In order to face this contact with radical solutions, preparing the KKIA staff is required. They should be given many training courses in aviation safety and communication with respect to the various cultures. These training courses give aviation staff in the KKIA the opportunity to have a multicultural understanding that qualifies them to deal with people regardless of cultural differences, as well as to respect them. This means that the training courses enhance communication between different cultures in an effective way. Moreover, the training courses also give aviation staff the ability to understand the perspectives and attitudes of other cultures in KKIA, in order to decrease misunderstandings. In addition, KKIA staff can use this training to make correct decisions that suit the different cultures, further decreasing misunderstandings.

3.6.4. Impacts of Social Structure on Leading Change

The importance of the family and personal relationships that are common in Saudi Arabia are also felt in business. It is common and accepted for managers to show favouritism to subordinates with whom they have developed close relationships. Favours that are supported by mutual profit and trust enhance these social values. Family takes precedence over different governing factors in the business environment. Social control choices are typically determined by the needs of the family (Atiyyah, 1993).

The social system dictates the level of obedience towards superiors. Saudis are actuated by standing and position. It is of great importance for subordinates to show respect to managers and to not question their authority. Saudi managers are authoritarian leaders. They supply clear expectations regarding what has to be done and the way to do it. This can be problematic for the organization as it stifles creative thinking and dictates that staff have to wait to be told what to do, instead of making choices on their own. This affects the challenges that manager's face when making an attempt to boost productive behaviours. Another impact that the social system has on leadership is in the hiring and firing of friends or family. It is common for managers to hire friends and family. However, this can be problematic when these staff are not productive (Ali and Schaupp, 1992).

Honour and name also play an enormous role in business. It is necessary for managers who are collaborating in cluster group to follow certain guidelines. To encourage team

participation, it is first necessary for the manager to establish a non-threatening atmosphere. The manager then ought to honour the oldest subordinate by permitting them to start the collaboration. Obedient staff may embrace the giving of gifts and the recognition of the anniversary of their individual hire date (Bell, 1986).

3.6.5. Overcoming the Barriers of Culture Difference in KKIA

In order to overcome the barriers that come from the differences between cultural backgrounds in KKIA, many procedures have been put in place. All these procedures give aviation staff the opportunity to understand the other person in a correct way without misunderstanding. For example, the language difference is one of the significant cultural differences between people in the aviation environment in KKIA and the solution to this barrier is to standardize the language. However, any staff member in the aviation environment in KKIA has to be mindful and understanding of the barriers of cultural differences related to religion, customs and traditions, and personal freedoms. Finally, it appears that training courses are the most effective way to face the cultural difference barriers, since they can create a multicultural understanding in the aviation especially the departure hall at KKIA and create an atmosphere of understanding between the KKIA staff members and various people. Also, they decrease misunderstandings as they create open-minded staff that can understand different cultures.

3.6.6 Impacts of Relations on KKIA organizing

Religious and the cultural values of a country also influence the management of an organization significantly and its approach to deal with employees and workers. The cultures of Islamic countries like Gulf Cooperation Council, Saudi Arabia have developed their own frame of rules and principles to treat people, including certain aspects like employee reward systems, employee relations, customer services, business transactions, different financial aspects etc (Welsh and Raven, 2006). Despite of guidance from Islam, there are differences between the rules and cultures among the Arab and Islamic countries as Islamic principles are not fully implemented.

Principles of Islam emphasize on certain values like Loyalty, honesty, flexibility and trust that motivates people to be more committed towards their work (Ali and Al-Kazemi, 2006). Ali (2005) describes the importance of four concepts i.e. effort, competition,

transparency and the morally responsible conduct on which Islamic work ethics are based.

The practices of Arabic managers have ignored religious values in certain managerial aspects like creativity and involvement of employees, empowerment, equal opportunity to all at the workplace etc even after having the influence of Islamic culture (Rehman and Askari, 2010; Al-Shaikh, 2003). According to Abdalla and Al-Homoud (2001), the work environment of the Arab world can be improved with the implementation of Islamic values at workplace by managers. Its implementation can result in the emergence of a consultative leadership approach, which is required for work environment improvement

In Saudi Arabia, Islam teaches the importance of family relationships, loyalty and showing respect to elders. Faith forms the premise of company structures. And in KKIA power is established at the top and dramatically decreases down the chain of command. Introducing praise systems to the structure with promotions based on verifiable talent, accomplishments and productivity instead of social connections would be seen as a disgrace to the culture, history and faith. In KKIA Islam is prevailing in relations business, so decisions created in the chain of command are not questioned; it is considered that if nothing happens, it is not the desire of Allah. It is vital for managers in KKIA to bear in mind relationship building both up and down the chain of command. It is not uncommon for subordinates to be promoted to higher social control positions, substituting their current manager, due to close relationships with higher management. This sort of business practice has some negative and positive aspects. It can function as a catalyst for building sturdy relationships with staff up and down the chain of command in KKIA. However, it may also diminish the worth of performance. Staff in this kind of setting might believe that achieving personal goals requires organizational politics, rather than working harder. This decreases the efficiency of the organization and may cause worker discontentedness (Atiyyah, 1991)

3.7 Lean Management in KKIA

Lean management is a very important part of lean thinking. The normal method of management does not guarantee the right focus nor facilitate sustaining lean initiatives. If no action is taken to vary the management method, this could facilitate the failure of lean

implementations (see chapter 2 section 2.2.6). Many managers fail to use lean management in a very holistic manner. They typically begin by applying tools, but without correct steerage and leadership, the corporation cannot move to subsequent levels. Therefore, a management system that specifically meets the needs of the reworked organization is essential (AL-Najem et al., 2013; Radnor, 2012).

One of the most common characteristics of traditional management is that it is results oriented. However, when individuals stop caring about the way to achieve goals and solely concentrate on conclusions, this leads to malpractices like expediting orders, over production and excess inventories. Any production organization can particularly relate to these drawbacks (Radnor, 2012).

Lean management is all about client focus. Worth is outlined by the client and processes are developed and maintained to supply this worth. Support and correct leadership and steerage can drive a team of individuals to improve the processes that add worth to the client. The management system that helps managers to realize this is often lean management. A lean management system uses numerous tools to achieve the aim (providing worth to customers). A number of lean management tools are usually used, including customary leadership work, visual management boards and daily answerable targets. The tools themselves are not effective unless used with the right mentalities. Plenty of input is needed at the individual level for managers in order for than to become lean managers (Weimar, 2011).

Lean Management in KKIA is right now based in the Finance and Human Resource Department and it has created a number of work packages combined with a structure which defines the scope of work for the departments. In addition it has been decided by GACA and KKIA to hire an outside consultant to support the corporatization and for this reason the general Scope of Work has been defined (Annual Report from KKIA, 2012).

And clearly shows the PMO's (Project Management Office) role in the transformation process is to support the fast track character of the transition project in KKIA. A management office with a lean project organization, equipped with the necessary authorities and decision rights to implement the change is hence mandatory. The project

management organization shall be managed by KKIA and supported by the MSP office (Managing Successful Programmes) and external advisors and report to a steering committee with selected members from GACA and its Supervisory Committee as well as KKIA. KKIA will need to set up a PMO to manage the program and consultants as well as the change process. The PMO should also finalize the design of a new organization under the supervision of the managing KKIA director in cooperation with the Director HR (MSP) and develop suitable corporate governance (Annual Report from KKIA, 2012).

3.7.1. Lean Process Management

Lean method management may be used a strategy for business method improvement. It is usually structured around worth streams and utilises a superimposed approach. The primary focus of this is to ensure that the business was a method that supports worth stream management. This will prevent cross-functional conflict and improve communication. Such management is also used to confirm on a regular basis that the assembly operators have the support they need to satisfy the day's targets. This is completely different to traditional business hierarchies. A standard hierarchy involves a manager, with division managers reporting to them. Every division manager has a team working for them specialising in one task. Thus, there are departments in quality control, production engineering, sales, finance, human resources, IT, procurement, etc. (Weimar, 2011).

The problem this results in is that every department tends to run in a solo manner. They have their own objectives that cannot complement the objectives of alternative departments. For example, the procurement department could be trying to achieve a half-price reduction in supply prices. To realize this, they may try to procure supplies from low-value economies like Asian nations. While meeting their division objectives, this could be utterly at odds with the goals of the supply department. They may be aiming to reduce the time interval for incoming supplies; thus moving to suppliers in the Far East may be a devastating blow to this department.

A value stream appears as a result of the flow of materials and knowledge and involves all the methods from acquisition of the materials to delivery to the client. A cross-purpose

team is usually assembled to report back to the worth stream manager. This may embody representation from every department. For example, the team may have the shared, common objective of reducing delivery times for clients. To try and do this, they will need to figure out how to get rid of waste from the value stream (Weimar, 2011).

3.7.2. Implementation of Lean Management in KKIA

A change to lean management in an airport requires the management to focus on many critical aspects that can influence the implementation process. These critical aspects are explained in the following points:

- Check-in facilities: The check-in facilities are an important point that has to be taken into account when managing the change to lean management, since these facilities influence the attitudes of the airport's customers and thus the final incomes from customers. Therefore, such facilities can affect this kind of implementation and should be considered in managing such a change.

- Baggage safety, access and carriage facilities: As explained previously, it appears that safety is a very important point in the aviation environment; therefore, the change to lean management has to consider the safety of the customers' baggage, their access and their carriage within the airport. In other words, lean management has to be applied while ensuring customers' safety is maintained in order to keep up their satisfaction.

- Customs and immigration facilities: The customs and immigration facilities that appear in any airport, including KKIA, also have to be taken into account while managing the change to lean management. These facilities influence customers' attitudes because they affect their comfort in dealing with the employees of the airport; therefore, the change to lean management has to enhance or keep these facilities without having any negative influences on them.

- Airport cost: The cost of the airport is another important aspect, not in terms of the customers' acceptance but in terms of the sustainability of the airport, since the cost of implementing lean management has to be suitable to the airport's budget. Airport cost is just like other aspects that the management has to take into account

when implementing lean strategies, which should enhance the financial state of the airport instead of being a burden on the airport's budget.

- Access mode*:* The access mode of the airport influences the airport safety, as well as customers' satisfaction. Therefore, this aspect has to be considered when changing any strategy, such as the implementation of lean management, in KKIA. The mode of access should be influenced positively by the implementation of lean management in order to ensure that the management of this change is successful.

- Parking facilities*:* The parking facilities might not be influenced as much by the implementation of lean management, but this does not mean their importance in affecting customers' satisfaction with airport facilities should be neglected. Hence, it is necessary to ensure that these facilities are not influenced negatively by the implementation of lean management, and this is one of the roles of change management.

- Airport tax or passenger charges*:* The airport taxes have to be suitable to the financial statuses of airport customers and the requirements of the airport; therefore, they should not be increased by other factors such as compensating for the financial status of the airport as a result of other negative factors. Lean management's implementation should not increase the taxes and charges for customers; in other words, the management of such a change has to satisfy customers, not increase their burdens.

- There are many more aspects that must also be taken into account while managing change in the implementation of lean management in KKIA, such as restaurant and shopping facilities, transfer facilities and the lounge area. This is because the implementation of lean management in the airport has to meet customers' needs, improve the available facilities within the airport environment and improve the airport in general.

3.7.3. Effects of Using Lean Management in KKIA

Achieving higher level of applying lean principles successfully at KKIA will lead to increase the human resources that affect quantity of service changes, and decrease the

unneeded innovative activities. Since the innovation activities need more development and have higher levels of risk. They are typically eliminated from the task list at an early stage. However, decreasing and identifying the unneeded innovative activities can be done through applying some lean ideas. This is because of the trade-offs that the institution achieves from lean practices and the general innovation in sustaining a competitive advantage in its merchandise style. It has been determined that going "too lean" can be harmful to the company's system; thus, a system should be developed to standardize the company's lean processes while not sacrificing the capability of lean management (Radnor, 2010).

Observations of KKIA's production system illustrated a number of the negative effects of the lean method in product innovation. First, since the main target of lean production is eliminating all kinds of waste, KKIA has been forced to outsource some of its new products from different corporations, instead of supporting technological innovations inside the corporation. The KKIA system additionally promotes the concept of "benchmarking" merchandise and exploiting this data to improve solely upon pre-existing product styles at a particular price level. Instead of permitting open concepts and brainstorming, the system needs engineers to follow strict flows of style. Thanks to this product style approach that heavily supports benchmarking and standardization, internal innovations appear to not be possible (Hill, 2009).

As mentioned in (Section 2.2.6 &.3.6.1), lean culture has Japanese origins and was imported to the rest of the world. Japanese culture is the main culture of this strategy is so different compared to Saudi culture. This is considered a very big barrier to implement lean into a Saudi airport (KKIA) The different between Japanese and Saudi culture will mainly affect the chance of implementation success (Lacksonen et al., 2010). Therefore, the culture has to be improved and treated before implementing lean strategy in the Saudi Arabian airport. Cultural difficulties include: interpersonal relationships between staff and senior management as detailed in sections 3.6.3&3.6.6.

3.8. Summary

This chapter has introduced the social variables and practical obstacles to change management in KKIA. It has also described the obstacles encountered in the

implementation of the study. The different management approaches in KKIA in Saudi Arabia are related to cultural background of employees.

The implementation of lean management in KKIA is an important issue that needs wise change management in order to gain all the positive points from this change, in addition to avoiding negative points. From the previous explanations, it appears that managing change in the aviation industry requires the testing of new strategies before they are implemented in order to avoid any possible negative risks, since the aviation industry is a very sensitive environment. Many aspects have to be taken into account when implementing lean management in KKIA in order to ensure the success of this change. With lean management, KKIA aims to enhance the environment of the airport in general without any risks. Hence, the management of this change should focus on maintaining many critical aspects, such as check-in facilities, safety facilities, airport costs and others, in order to achieve the main aim of this change. Finally, the main aims of this implementation of lean management are to meet customers' needs, enhance the available facilities within the airport environment and improve the airport in general.

In the sixth chapter, the researcher will show the consequences of the application of the current study and will explore the reality in KKIA before and after the changes have been made.

Chapter Four: Research Methodology

4.1. Introduction

The active participation aspect of this thesis involved observation of the quality of services and the use of lean principles in the implementation of lean management in the departure area of King Khalid International Airport (KKIA). DMAIC (Weimar, 2011), (define, measure, analyse, improve and control) methodology was used as lean management tools. The improvement of services and customers' satisfaction were the main concerns in the collection of data through the questionnaires administered using the SERVQUAL (service quality) model. Parasuraman, Zeithaml and Berry (1988).

This chapter illustrated the research philosophy, purpose, approach, sample and population, model, variables, and methods; which are used to achieve the objectives of the study in the departure area at King Khalid International Airport (KKIA). This aim was achieved by the use of different lean and six-sigma tools and techniques within the departure area at King Khalid International Airport (KKIA). The methods of measuring the level of services provided at the departure area in King Khalid International Airport (KKIA) will also be included in this chapter, which are a Survey Questionnaire and SERVQUAL Model, in addition to measuring the validity and reliability of study tools. In addition, this chapter will clarify the System Thinking in the interpretation of both Lean and Six-Sigma Approaches, also shed light on the Impact of Cultural Variables in the KSA, and Statistical Analysis Tools, and finally came the Framework of Study and summary.

4.2. Research Methods Review

Research philosophy can be determined as the assumptions and beliefs that influence our views about the world (Saunders et al., 2007). There are mainly two types of philosophical views namely positivism and phenomenological perspectives, which are used by the researchers. Positivism philosophical mainly deals with the situations in which knowledge of world is determined as independent from the perspective of individuals and to discover the knowledge of world, different objective techniques are used in scientifically (Sullivan, 2001 p.47). For the generalization of the hypothesis,

logical, objective scientific and quantitative methods are used under the positivism perspective.

On the other hand, phenomenology, also called as interpretive, philosophy determines that the reality of world is influenced by the perception and views of individuals. It is because the world is described by individuals on the basis of creation and exchange of meaning during the social interaction process (Sullivan, 2001). In confront to positivism, phenomenological philosophy is based on the inductive and holistic use of quantitative and naturalistic approaches to determine the subjectivity of thoughts for the purpose of understanding human experience in specific settings (Amaratunga,Baldry, Sarshar & Newton, 2002).

For this research study, the positivism philosophy was selected over the phenomenological perspective and used as existed theoretical frameworks to examine the service quality and satisfaction of travelers in KSA's aviation industry. At the same time, structured instruments could also be used to assess and analyze the objectivity, which would enable to generalize the findings.

Research purpose can be defined as the aim or a broader statement, which is achieved throughout the research study. As per the research purpose, research could be divided in three broader categories namely descriptive, analytical or explanatory and exploratory (Saunders et al., 2000, 2007; Cooper and Schindler 2006). The descriptive research study is used to analyze the actual meaning or profile of a person, situation or event (Robson 2002:59 in Saunders et al., 2007). It validates the study by presenting the facts about a phenomenon in real or perceived manner with the use of definite structures. On the other hand, an explanatory, also known as analytical, is used for establishing an existing relationship between different variables.

An additional approach of this study was to determine the impact variable on another by providing an empirical explanation associated with the causality. It will also identify the nature of relation between the research variables based on cause-effect analysis model between one or more variables. This type of research also purposes to answer 'why' in a given context.

Lastly, exploratory research study is used to investigate and identify the current happenings and to gain new insights about a particular phenomenon in a different view (Robson, 2002).

Mainly, this research study was useful to gain an in-depth understanding about a situation or problem. It was also useful to examine the unknown variables that have a significant influence on this particular phenomenon. For this purpose, library material search, obtaining expert opinion, interviews were some of the methods used in this study.

A study purposed for both qualitative and quantitative results and for this, mixed methodology has been proposed that can be appropriate in some cases. This study was combination of all three descriptive, analytical or explanatory and exploratory purposes. In the descriptive manner, this study described the extent of traveler satisfaction and service quality at KKIA in detail. This would be effective in enhances the understanding about the reality of passenger satisfaction due to its service quality in the departure area at KKIA, along with the importance of service quality to satisfy the passengers.

In the analytical or explanatory manner, this research was effective in identifying the impact of organizational service quality and passenger demographics on the customer satisfaction. The relationship between passenger satisfaction and lean management implementation was also explored through explanatory study. The research was also exploratory in nature as since the satisfaction level of passengers was unknown in relation to lean management in the departure area landside at KKIA. At the same time, the perception of passengers about the service quality of KKIA was also unknown. This will be explored through this research study.

In this context, research can be either deductive or inductive. The deductive research approach directs the research from general to specific. It is because under this approach, the researcher first develops a theory or hypothesis and then a strategy is developed for testing the established theory or hypothesis in order to either verify or reject its claims.

On the other hand, inductive the approach directs the research from specific to general as it starts with the observation of the environment or a particular phenomenon. Data is collected for developing a theory to generalize the observation from the phenomenon.

This research study was based on deductive research approach as there was a careful selection of the existing theories and models by the researcher to apply and test them for assessing the impact of service quality in passenger satisfaction in context of KKIA.

4.3. Population and Sample of the Study

4.3.1. Population of the Study

Hines (2006) describes a sample as "the collection or set of individual objectives or Measurement tools whose properties are to be analysed". It could further be stressed that a population is a complete collection of individual objects in which a study is interested. Therefore, concerning this research, the population consisted of all passengers in KKIA: more than 15 million people a year. Also the population compresses the employees, mangers, and any workers within the departure area at KKIA. This population will be affected by this study and its results, and the samples of participants were selected from them.

4.3.2. Sample of the Study

A sample is defined by Becken (2002) as "a subject of a population". In this research, the researcher use of simple stratified random sampling for the pre- and post-implementation data collection processes. It is worth noting here that the selected samples in the two data collection processes included passengers from the departure area at KKIA. The following table shows the detailed distribution of the questionnaires for the pre- and post-implementation data collection processes.

Table 4. 1: Sample Sizes for Pre- and Post-implementation Data Collection

	Pre -implementation Data Collection			**Post- implementation Data Collection**		
	Distributed Questionnaires	Approved Questionnaires	Questionnaires approved (%)	Distributed Questionnaires	Approved Questionnaires	Questionnaires approved (%)
Passengers	550	500	90.9%	545	461	84.5%

The first data collection was the pre-implementation data collection, which took place before implementing the lean six-sigma approach in the departure area at KKIA in (01/2011); the number of questionnaires distributed in this stage was 550, and only 500

questionnaires were error free, suitable and returned fully answered, these were accepted. The second data collection was the post-implementation data collection, which was held after implementing the lean six-sigma procedure in the departure area at KKIA in (11/2012); the number of distributed questionnaires in this stage was 545, and only 461 questionnaires were error free, suitable and returned fully answered, then 461 questionnaires were accepted.

4.3.3. Survey Questionnaire: SERVQUAL Model

The SERVQUAL- model (Parasuraman et al., 1988) was used in this study to construct the questionnaire for the pre- and post-implementation data collection from the sample. The questionnaire features an easy to collect data that were useful for achieving the objectives of the study, there was intended to make the respondent answer the questionnaire with more concentration, leading to the answers being more reliable. The amount of questions within the questionnaire was fit for the purposes of the present study's analysis The questionnaire was selected as a study tool as it is suitable for all respondents. The design of the questionnaire and the questions make it easier for the researcher to gather information and manage their time better. It also facilitates the interpretation of the sample's answers and is conducive to drawing conclusions at a specific time.

In this study, the questionnaire measured the perceived quality of service at KKIA using the SERVQUAL model. The researcher wanted to identify the gaps between expectations and perceptions from passengers' points of view. The specific questions that were researched in the SERVQUAL model were: What expectations do passengers have of KKIA's service quality? What perceptions do passengers have of the service quality at KKIA? What are the differences between the expectations and perceptions?

Then, the researcher adopted the amendments of the arbitrators to test the sincerity and consistency of the questionnaire scientifically using Pearson's correlation coefficients. Nature of the paragraphs variables and study variables contributed to the high rate of reliability, honesty and stability of the study tool.

The questionnaire was translated into Arabic, since it was selected to be distributed in an Arabic country (Saudi Arabia). Therefore, the translated questionnaire was evaluated by a committee of arbitrators to ensure its suitability for the research purposes. The questionnaire was distributed on paper in two languages (Arabic and English) at different times and on different days to different individuals randomly selected from the target population. The description of the contents of the questionnaire were Part one: relates to nationality, age and gender, Part two: 22 different statements in seven-point Likert-scale with anchors from 1= "strongly disagree" to 7= "strongly agree". Those statements were also divided into five different dimensions (tangibles, reliability, assurance, responsiveness and empathy). The questionnaire is divided into two different parts, one part is related to passenger expectations of service quality and one part is related to passenger perceptions about service quality. In part three the general variables were included in a question that asked the participant to divide 100 points among the variables based on each variable's significance from their viewpoint.

Those statements were also divided into five different dimensions:

1. **TANGIBLES**: This variable consists of four questions (1-4), related to the physical facilities in the airport
2. **RELIABLITY**: This variable consists of five questions (5-9), related to time and accuracy of passengers' flow through the airport.
3. **RESPONSIVENESS**: This variable consists of four questions (10-13), paragraphs dealing with related issues, related to employees' knowledge of their work prompt services
4. **ASSURANCE**: This variable consists of four questions (14-17), paragraphs on the relevant issues, related to employees' behaviours with passengers that make them feel trustful
5. **EMPATHY**: This variable consists of five questions from (18-22), paragraphs dealing with related issues, related to employees' personal attention towards passengers

   The SERVQUAL- model (Parasuraman et al., 1988) was used two times in this study (before implementing lean six-sigma principles and after implementing

them) in order to find the exact effect of changing the departure area at KKIA. At each time, the SERVQUAL questionnaire measured the participants' attitudes in two aspects: perceptions (what the participants actually found) and expectations (what the participants expected to find).

4.3.3.1. Validity

The researcher evaluated the validity of study instrument using the following methods:

4.3.3.1.1. Arbitrators

To learn about the veracity of the tool in measuring the sample, the researcher contacted a number of specialists in airport management and shared the questionnaire with them. They recommended amending the wording of some statements, after that the questionnaire was presented to three arbitrators to make the necessary change, based on this; the researcher prepared a finalized questionnaire (see Appendix A).

4.3.3.1.2. Participants' Limitations

The limitations that appear from the participants usually affect the validity of the study instrument as it directly influences the quality of the collected data. Through this study, the researcher faced mainly some limitations raised from the participants:

- The time limitations that rose from the environment of the aviation area where all the passengers are judged by their aircraft times. Therefore, some passengers cannot participate in the survey, as they cannot give almost 15 minutes to fill the questionnaire because they will be late.

- Culture limitation appears from the participants who were 97 % Saudi and 97% male, (see chapter 3) which prevented the male researcher from dealing directly with the female passengers to make them participated in the survey. Therefore, the males' majority would overtly influence the participants' responses.

- Of the twenty-five managers in different sectors only 10 (40%) agree and completed the interview. This is another instance where Saudi Arabia culture overtly negatively influenced results (see chapter 3).

4.3.3.1.3. Internal Consistency of Questionnaire Themes

The questionnaire was given to a test sample from outside the study community consisting of four of travellers in KKIA. Pearson's correlation coefficients were calculated to the ensure the internal validity of the variables and to calculate the correlation coefficients between the test sample's answers to the paragraphs of each variables and for the sample answers on all paragraphs of the variables, as well as a hub for the college class of the questionnaire. This is demonstrated in Table 4.2.

Table 4. 2: Internal Consistency of the Questionnaire Themes

TANGIBLES total (0.85)		**RELIABLITY total (0.80)**		**RESPONSIVENES total (0.78)**		**ASSURANCE total (0.77)**		**EMPATHY total (0.82)**	
No	**r**	**No**	**r**	**No**	**r**	**No**	**r**	**No**	**r**
1	0.65*	**5**	0.62*	**10**	0.56*	**14**	0.58*	**18**	0.74*
2	0.60*	**6**	0.69*	**11**	0.77*	**15**	0.66*	**19**	0.71*
3	0.67*	**7**	0.58*	**12**	0.74*	**16**	0.74*	**20**	0.88*
4	0.68*	**8**	0.66*	**13**	0.77*	**17**	0.77*	**21**	0.70*
		9	0.74*					**22**	0.65*
* Pearson's coefficient values between +1 and -1 show variables have achieved their purpose									

The results of the previous table show the values of the correlation coefficients between paragraphs of each variable, and also between the paragraphs combined variables to be statistically important. This explains the relationship between paragraphs of the study variables, and their suitability for achieving the goals set for it.

4.3.3.2. Reliability

For the purposes of measuring the stability of the study tool, the researcher calculated Pearson's correlation coefficients. Table 4.3 demonstrates this stability.

Table 4. 3: Stability of the Tool Dimensions: Pearson's Correlation Coefficients

Variable	Number of paragraphs	R
Tangibles	4	0.89
Reliability	5	0.77
Responsiveness	4	0.90
Assurance	4	0.88
Empathy	5	0.82
Total level of reliability coefficient= 0.91		

Table 4.3 shows the results of the reliability coefficients for the questionnaire themes. The high coefficient of stability suggests that the paragraphs of the questionnaire gave stable variables and consistent results that do not change if the questionnaire is applied again. This confirms the validity and ability of the questionnaire to achieve the goals set for this study.

The SERVQUAL- model explains four key internal gaps relating to managerial perception of service quality, and tasks, which connect the service delivery to customers. SERVQUAL (Parasuraman et al., 1988)

Those variables were used (Tangibles, Reliability, Responsiveness, Empathy, Assurance) for defining the gaps identified by the SERVQUAL model that describe the level of service quality. Those gaps are as the following:

- **Gap 1**: This gap was between passengers' expectations and the management's perception of these expectations.
- **Gap 2**: This gap was between the management's perception of passengers' expectations and the planned level of services in the airport.
- **Gap 3**: This gap was between service quality specifications and service delivery. Rules and guidelines are not translated into practice by employees.

- **Gap 4**: This gap was between service delivery and communications with passengers.
- **Gap 5**: This gap was between passengers' expectations and perceptions of services in the airport.

4.4 Research Hypotheses

The main hypotheses that were suggested through this study are as follows: lean management has a positive benefit for customer service quality at King Khalid International Airport; the implementation strategies for KKIA can be applied to other airports. Moreover, the activities of surveys, discussions and management feedback normally would improve service quality for customers. However Saudi Arabia airport management culture is different. How much this changed to the expected response when compared to UK or similar management culture.

Therefore, the hypotheses of this study were:

H_0: There is no statistically significant effect (at $\alpha \leq 0.05$) of lean management practices on the quality of service / customer satisfaction (including tangibles, reliability, responsiveness, empathy and assurance).

$H1_0$: There is no statistically significant effect (at $\alpha \leq 0.05$) of lean management practices on the quality of service / customer satisfaction on tangibles.

$H2_0$: There is no statistically significant effect (at $\alpha \leq 0.05$) of lean management practices on the quality of service / customer satisfaction on reliability.

$H3_0$: There is no statistically significant effect (at $\alpha \leq 0.05$) of lean management practices on the quality of service / customer satisfaction on responsiveness.

$H4_0$: There is no statistically significant effect (at $\alpha \leq 0.05$) of lean management practices on the quality of service / customer satisfaction on empathy.

$H5_0$: There is no statistically significant effect (at $\alpha \leq 0.05$) of lean management practices on the quality of service / customer satisfaction on assurance.

4.5 Quantitative and Qualitative Methods

The researcher used mixed methods, the quantitative and qualitative methods of this research. The quantitative method that was used in this study was based on the SERVQUAL model, and the SERVQUAL questionnaire was distributed to travelers in the departure area at KKIA. The aim of the study required a quantitative approach since huge amounts of data were required, which required a large number of participants. In addition numerical data, analysis, and testing of hypotheses were required for measuring the required values for this study (Bryman and Bell, 2005). The quantitative method focused on numbers and frequencies rather than on meaning and experience and had a more deductive approach (Sullivan, 2001).

The analysis of the collected quantitative data was done through SPSS software version 19 (Sullivan, 2001) in order to find the means and standard deviations of the collected data and then calculate the "gaps". The gaps are the differences between perceptions and expectations: a positive value means that perceptions are higher than expectations from the participants' viewpoints, and this reflects satisfied responses. On the other hand, a negative gap value means that expectations are higher than perceptions from the participants' viewpoints, and this reflects unsatisfied responses. If the gaps become positive after implementing changes in the departure area at KKIA, this indicates that the changes were effective and have achieved the required aim. On the other hand, if the gaps are negative, this means that the airport still needs more modifications

The qualitative method described the phenomenon and showed its properties also. This went to the heart of the problem, focused on meaning and experience rather than on numbers and frequencies and had an inductive approach (Robson, 2002). The researcher used the multiple data collection sources, because the purpose of research was descriptive, Analytical or explanatory and exploratory research that seeked to find out 'why', 'what' and 'how' issues in the case context. Yin (2003 in Saunders et al)

The qualitative method that was used in this study was based on structure interviews (Appendix B) using the approach in the case study by Umoquit et al. (2011). For structured interviews, there were ten participated managers in the departure area, where

eight of them in the data collection through the tool of SWOT analysis, and the rest were for the data collection.

The researcher targeted audience (the people who were going to participate in this survey) were all managers. The researcher was aware of their experience, their reliability and how much contact they have on a daily basis with customers and consequently being sensitive about the issue of service quality, passengers satisfaction and the management improvement. The questions were therefore targeted to bring very subjective responses. It was very much about addressing their personal opinions, their honest views and their expertise, to have, as a result, a suitable collection of consistent data to sustain my primary premise of applying lean. The questions gave the subjects the reassurance that the questionnaire should be considered as a means to voice their concerns and share their proposals.

The structured interviews were done in a face-to-face format using a standard set of Open-ended questions to obtain data that can be aggregated since identical questions have been asked of each manager. The structured interviews was defined as a data collection tool to collect qualitative data that were related to the research questions and problem statement of the study (Caruth, 2013). The structured interviews was used to measure the responses of managers in the interviews with the researcher, find relationships, themes and patterns of the responses, summarize the results, and derive the main points correlated to the quality of services in the departure area at KKIA.

The case study is another qualitative method of data collection. This involves the study of a particular situation and its impact an obtaining accurate and in-depth detail and knowledge about a particular phenomenon related to a specific environment. This method was quite useful here, where the main purpose of the researcher was to gain an in-depth understanding of the research context and the ways in which processes were being enacted (Morris and Wood, 1991 in Saunders et al., 2007). Therefore, it used multiple sources of the data collection for obtaining in-depth and rich understanding of the phenomenon. The case study method is usually related to explanatory and exploratory research studies, which seek to find out the answer of ‘why’, ‘what’ and ‘how’ aspects in context of a case. Yin (2003 in Saunders et al) described that case studies can be in

different forms such as multiple, holistic or embedded. The reason for choosing KKIA for the case study was that this international airport is important as a gateway to KSA, serving 16 million passengers per year. Additionally, the author is currently employed at the airport as a duty maintenance manager and has access to data, passengers, and managers. Additionally, it was felt the airport would benefit from this research.

As mentioned in the previous sections, mixed quantitative and qualitative approaches were selected as the appropriate research methodology. These approach were used through the description of lean-six-sigma implementation at the departure area in KKIA in order to measure the actual status of the model success. In addition it was used also to collect some applied specific tools from the model. Descriptive data was collected through measuring or describing the implementation of lean-six-sigma tools at the departure area in KKIA.

4.6 Survey

The Survey was the data collection method that was used by the researcher for obtaining the opinions of the sample representatives of the whole population with the help of an objective research instrument such as structured questionnaire. The survey method of data collection is the deductive research approach usually used for the purpose of business and management research studies in order to prove or reject certain assumptions and hypothesis. It was helpful to collect huge amount of data from a wide population in an economical manner. Research questions related to who, how many, what, how much involved in a research problem are generally answered by conducting the surveys.

The author had to deal with travelers first and foremost and with managers, the work of the staff also affected implementing lean. Therefore the need of gathering evidence of their views on this matter was essential. To enable the survey to take place in an efficient and practical way, the author had devised a SERVQUAL questionnaire.

The choice of using the structured interviews for mangers, rather than other kinds of interviews, was based on factors of reliability, homogeneity, accuracy and evidence. A structured interview was more reliable, because it gave more time to the ‘audience‘ to understand the nature and the meaning of the questions and to elaborate an appropriate

answer. Homogeneity was ensured by having the same set of questions for everyone. Therefore the results were more objective. The accuracy of the replies given was guaranteed by the subject‘s handwriting as opposed to the interviewer‘s notes, which could present omissions, editing and errors.

Finally, having a number of answers at hand represents consistent material both for data analysis and tangible evidence of facts to sustain the basis of my final statement and recommendations.

4.7. SWOT Analysis

Eight managers from the departure area, under took a SWOT analysis. SWOT analysis is used in several strategic areas such as business management, marketing, human development, and others. Eight managers participated in this analysis defined as follows: (see chapter 5)

- *Strengths*: the elements in the project that distinguish it from other projects are strengths.
- *Weaknesses*: the weak elements in the project are weaknesses.
- *Opportunities:* the elements that come from outside the project and that may lead to increased sales and profits are opportunities.
- *Threats:* the elements that come from outside the project and that threaten the project are threats.

The SWOT model is a broad application and planning model that is used in operational planning but it is not good for strategic planning. Often, one-year operational strategy plans differ depending on the number of individuals or the organization's potential. (Tenge, 2012)

4.8 Research Model

The methodological model implemented in this study was based on two main aspects: lean thinking and six-sigma managerial procedures. As is clear from the descriptions in the literature review chapter (Chapter 2), these two tools can be used separately or

together, depending on the nature of the research (as Chen (2008) states). Therefore, this study's model was based on merging the two tools together, which can be described as 'following a six-sigma model with lean thinking'. In other words, the main implementation model was based on the DMAIC procedure of six sigma, and the implementation of the tools was based on lean thinking (Al Muhareb T and Graham-Jones, J. 2012). This means that the six-sigma tools were mainly applied with the aim of reducing waste, as well as decreasing the possibility of errors.

This study followed a number methodological approaches and used them to implement the lean six-sigma managerial approaches in the departure area at KKIA. The research design in this study followed the DMAIC procedure. Through implementing this design, the researcher used a number of tools which where descriptive, analytical, and explanatory/exploratory purposes, including quantitative and qualitative processes.

As a new approach, the lean six-sigma procedure could not be applied in the departure area at KKIA without preparing the team to understand its main principles and philosophies. Therefore, the airport managers started training courses for a group of employees so that the employees could get started with the implementation of lean six sigma.

The researcher's role in this implementation was in the decision-making through the implementation of lean six sigma, in addition to applying some tools as a third party in the project. Therefore, this study is mainly considered to be descriptive, analytical, and explanatory/exploratory.

As this study was descriptive and analytical in relation to the changes implemented at KKIA, a clear description of each step in the implementation of the DMAIC procedure (six sigma) in the departure area at KKIA is required.

The following steps explain the model of this study:

1. Defining the Problem at the Departure Area in KKIA:

'Define' was the first step of the DMAIC approach that was applied. This included defining and studying the current status of KKIA to outline the most significant

highlights for the study. The ‘define’ step typically includes the identification of the research’s significance, its scope, and the population affected by the study (Brassard et al., 2002). In order to achieve the aims of this step, the following tools will be explained and used in chapter 5.

- Observations
- Voice of Customer (VOC)
- Critical-To-Quality Tree (CTQ tree)
- Value Stream Mapping (VSM)
- Strengthens, Weaknesses, Opportunities and Threats (SWOT) analysis
- Suppliers, Input, Output, Process and Customers (SIPOC) process map:
- Problem and Goal Statement

2. Measuring the Service Quality in KKIA:

The ‘measure’ step has its own tools that continued the study’s work to achieve the required aims in the departure area at KKIA. In this step, the following tools were used (Chapter 5 explains these tools):

- Value Stream Mapping (VSM)
- Critical-To-Quality (CTQ) (by the use of SERVQUAL questionnaires)
- Conducting Interviews

3. Analysing Departure Area Problems at KKIA:

As mentioned before, the main aim of this step was to analyse the measured problems that had appeared in the previous steps and suggest some solutions to resolve them. To achieve this, the following tools were used (5 explains these tools):

- Sort, Set in order, Shine, Standardise and Sustain (5S) strategy

- Statistical Analysis
- Interview Analysis
- Cause and Effect Diagram

4. Improving Quality at the Departure Area in KKIA:

In this step, some solutions to the problems found in the previous steps were applied in the departure area; the efficiency and effectiveness of these solutions were then measured. The following tools were used to improve the quality level in the departure area at KKIA (Chapter 6 explains these tools):

- Changing the Architecture of the Departure Area
- Queuing Theory
- Increasing the Number of Electronic Services in the Departure Area
- 5S
- SERVQUAL and statistical analysis
- VSM after Modifying the Departure Area at KKIA

5. Control Improvements in the Departure Area at KKIA:

Controlling the change and development was achieved by undertaking continuous reviews of the changes applied in the departure area at KKIA. A mind diagram was required to understand and review the practices carried out, alongside regular audits of the actions taken, the standards being followed, and continuous monitoring and assessment (Brassard et al., 2002).

Moreover, control was achieved by making the organisational culture understand the importance of the changes in terms of working to develop the processes in order to control and sustain the developments. This was achieved by ensuring the staff had a

proper understanding of the organisational culture and its needs and the successful management of change.

Three tools were used in this thesis in reference to the ‘control’ phase, which were (Chapter 6 explains these tools):

- Kaizen theory
- Failure Mode and Effects Analysis (FMEA)
- Suggesting a Control Plan

4.9. Lean Thinking

According to Dibia (2012), the research system is the theory and the thinking style that are followed through research. Through any research, the researcher utilizes different methodologies and approaches in order to achieve the main aims and objectives of the study. Actually, the system thinking is built on the epistemological approach of the study. In this study, the researcher selected different approaches and methodologies to follow in order to achieve the main aim of the study and to address the research questions. The following sub-sections explain each methodology used and the system thinking that was followed throughout.

4.9.1. Lean and Six-Sigma Approaches

According to Radnor (2010), there are many goals and aims of applying lean management in any institution, such as producing needed amounts of products and services, continuous improvement for the whole institution and time management of process flows. These aims were very significant in KKIA since the long waiting times cause very big problems that face every individual in the airport. The waiting times in the departure area landside were relatively long for passengers. It was expected that these times would be decreased after applying the lean six-sigma management procedures, the data were recorded and measured by the researcher at check-in area, Immigration area and security area at different times and on different days.

The DMAIC methodology (see section 2.2.5 in chapter 2) refers to the most significant processes in lean six-sigma management (Arbor, 2012). These processes were implemented at KKIA as explained below:

- ***Define***: The present researcher achieved the "define" process by measuring the status of services and managerial approaches in the airport before applying the lean six-sigma approach; the researcher used the SERVQUAL model with its five dimensions (tangibles, reliability, responsiveness, assurance and empathy). This step highlighted the main problems that are faced in the departure area at KKIA.

- ***Measure***: Through this step, many changes were applied in the departure area at KKIA in parallel with many novel managerial procedures.

- ***Analyse***: The present researcher measured the effect of changes on customers' satisfaction with services by the use of the same tool as in the "define" process, which is the SERVQUAL survey. Then, the researcher analysed the collected data and compared them with the previous data.

- ***Improve***: The present researcher depended on the results of the previous step in order to see whether the implemented changes needed to be improved or not. If improvements are needed, the researcher must make the improvements required and then return to step 2 ("measure").

- ***Control***: In the present research, this process could not be achieved completely by the researcher since the management of the departure area at KKIA was responsible for this. However, the researcher gave some recommendations to the KKIA managers in addition to a three-year plan to apply in the departure area in order to ensure the achievement of the "control" process.

Applying the lean six-sigma management strategy in the departure area at KKIA was carried out to achieve the main goals of wise management. Starting with the first aim of the lean six-sigma approach (producing only the needed amounts of products and services), this goal involves waste management. This aim could aid in decreasing the

required waiting times at the different stages in KKIA, since wasting time influences customers' attitudes and satisfaction.

The next aim of lean management is continuous improvement. From a managerial perspective, continuous improvement is an important process that ensures the success of any kind of management procedure. Continuous improvement requires continuous observation of plans after the implementation of managerial views, in order to modify any problems and to encourage successful aspects. Continuous improvement is a necessary process that ensures the success of the lean six-sigma managerial procedure (Radnor, 2010; Peters, 2010). In KKIA, this aim of continuous improvement could be achieved after applying the required changes through the airport areas, in order to maintain the success of this managerial process. (Al Muhareb T and Graham-Jones, J. 2011).

The final aim of lean six-sigma management, as mentioned by Radnor (2010), is the time management of process flows. This aim is very significant in KKIA since the long waiting times cause very big problems to all individual in the airport.

4.10. Impact of Cultural Variables in the KSA

Culture in its basic essence may be outlined as a system of values and norms that are jointly shared between groups of individuals. These shared ideas form a foundation for the lifestyles of specific groups. For international companies, two or more cultures require focus at the national and structural levels. Culture influences all aspects of a manager's job, including social control design and management choices. Culture also affects negotiations (Hill, 2009).

The functions of managers (as the functions are people oriented) are influenced by culture. As an example, if a culture places stress on individuals being unequal in physical and intellectual capabilities, then (in line with Hofstede (1980)) see chapter 3. There is a large power gap. In essence, a large gap in power between superiors and their subordinates can be expected in the present study's context of the KSA. Another necessary facet of how culture affects business management is the degree to which people have collective ties with one another. Business in the KSA is littered with

collectivist thinking, which dictates that relationships are more important and necessary than business dealings (Lundgren, 1998).

For international companies, it is typically understood that national culture may be a significant obstacle to increasing overall structural performance (see chapter 3 section 3.4 &3.5) creating structural enhancements typically needs internal cultural amendments. In the KSA, where faith influences most (if not all) areas of life, it is difficult for managers to change certain aspects of the structural culture. The Saudis' preference for a social control positions is reflected by standings and position (within the remit of national culture) (Clancy, 2001). While there are several sides of culture that affect management effectiveness in the KSA, faith may have the most influence. (see chapter 3)

During the research about the Airport itself, the author encountered several inconveniences, which led to a delay in the retrieval of all the data required. Before devising the questionnaire for the survey, the author repeatedly tried to gather information such as the financial matters, the number of staff working directly (face-to face) with customers and other relevant information needed for the research. Most of these figures, which were necessary for this research, are affected by Data Protection and security procedures (such as statistics on immigration, which are held at the Police Station within the Airport). Consequently, the author was not able to look at most classified records and had to use every other resource available, which is related to the Saudi culture issue (see chapter 3 and section 4.3.3.1.2) Professional discussions with colleagues and superiors proved to be very valuable to gather consistent and real-time data.

Once the questionnaire for travellers was completed it is clear that the gender variable was influenced by Saudi culture, which urges the prevention of males and females dealing directly with one another for whatever reason (see chapter 3 section 3.6.1). The researcher is male and this is reflected clearly in the sample's concentration of males, as only 15 participants were females (see chapter 3 in section 3 .6.1 &3.6.6). The researcher spent time with a lot of passengers as guideline for questionnaire to made sure the participants understood the questionnaire. Also, to made sure the participants understand the nature, and the meaning of the questions and to elaborate an appropriate answer.

When the structured interviews for managers were ready, the author contacted with twenty-five managers in different sectors (Operations, Security and Business). Some refused to do it, some didn‘t reply, only 10 (40%) agree and completed it The focus of the work thus was not being concerned with quantitative results, but more with the quality of the answers. These structured interviews were essential to support the need of implementing lean at KKIA

The author gathered flight data and statistics on past and current passenger trends. Most importantly, the author compiled an exhaustive amount of forecast data, on which the final recommendations and conclusions are based. Each statistical graph was analysed and evaluated in terms of each variable's potential effects on the current situation. The researcher also looked at flight timetables and a good number of photos to evaluate passenger flow at different times of the day and week.

4.11. Summary

This research encountered many problems in the application of lean-six-sigma procedures and reach the objectives of the study; so it has been working to build tools to study and model before and after amendment into the departure area at King Khalid International Airport (KKIA).The literature review revealed that no previous studies had been conducted on departing travellers. The researcher's area of work and previous experience, the supervisor of the study and the input from all the contributing groups helped to shape the study design, while research objectivity was carefully maintained.

This chapter discussed the research methods and procedures applied during this study, including the SERVQUAL questionnaire, structured interviews, quantitative and qualitative methodologies, case study analysis, the lean six-sigma approach, and the DMAIC approach. To apply the changes required, case study analysis was performed as part of the strategic planning process to identify strengths, weaknesses, opportunities, and threats before embarking on the formulation of a strategy for change management at KKIA. This chapter explained all the steps that were implemented in the study, the validity and reliability of the tools, and the capacity of the tools to achieve the study's goals. Chapters 5 and 6 present and analyse the results. This information was used to apply the required changes.

Chapter Five: Implementation of Lean Six-Sigma Management in the Departure Area at KKIA

5.1. Introduction

This chapter and the following chapter explain and discuss the detailed implementation of each methodological approach applied in this study. As mentioned in the previous chapter, this study followed many methodological approaches and used them to implement the lean six-sigma managerial approach in the departure area at KKIA as a form of quality management. The research design in this study followed the five steps of the DMAIC methodology: define, measure, analyse, improve and control. In implementing this design, the researcher used many tools that follow one of the following methodology types: descriptive, analytical, quantitative or qualitative. Each tool used is explained in this chapter, including the identification of its root methodology.

Lean thinking was also applied through implementing the six-sigma approach in order to manage quality by eliminating waste and utilizing possible resources. In this chapter, all the procedures used to implement lean six-sigma management in the departure area at KKIA are explained by defining, measuring and analysing the status before the modifications were applied in different places and situations at the airport. This chapter details the data collected before implementing the lean six-sigma approach.

In general, quality improvement studies use different approaches based on the desired quality level. The six-sigma approach is one of the most accurate quality improvements procedures that might be applied in organizations. The minimum level of accepted quality in the six-sigma approach is 3.4 defects per million, which is considered a very high level of quality. In this study, the six-sigma approach was selected to improve quality in the departure area by using the included tools within this approach and following the DMAIC methodology, in order to improve customer satisfaction in KKIA and to increase KKIA's market share without ignoring customer satisfaction. The six-sigma approach has customer satisfaction at its core; therefore, it could be considered very suitable to the aviation industry. The main aim of using the six-sigma approach in this study was to improve the level of quality in the departure area at KKIA by following

lean principles; therefore, the main methodology was the lean six-sigma approach. (Al Muhareb, T. Graham-Jones, J. 2014).

As a new approach, lean six-sigma procedures could not be applied in the departure area at KKIA without preparing the team to understand the main principles and philosophies of lean six-sigma procedures. Therefore, the airport managers started training courses for a group of employees. This indicates that the implementation of lean six-sigma procedures in the departure area at KKIA was done by a team of individuals who were knowledgeable in these procedures. Next, the DMAIC steps were implemented by the team. The researcher's role in this implementation was to make decisions on the implementation of lean six-sigma procedures, in addition to applying certain tools. (Al Muhareb, T. Graham-Jones, J. 2014).

As this study was descriptive and analytical, a clear description of each step in the implementation of the DMAIC steps is necessary. The first three steps of the implementation (defining, measuring and analysing the previous status of the departure area at KKIA) are explained in this chapter.

5.2. Defining the Problem

The 'define' aspect is the first step in the DMAIC approach. In this study, this included defining and studying the status of the departure area at KKIA to define the most significant considerations for the study. The 'define' aspect also includes identifying the significance and scope of the research and identifying the population who will be affected by the study. In order to achieve the aims of this step, the following tools were used:

1. Observations
2. Voice of the customer (VOC)
3. Critical-to-quality tree (CTQ tree)
4. Value stream mapping (VSM)Strengthens, weaknesses, opportunities and threats (SWOT) analysis
5. Suppliers, inputs, process, outputs and customers (SIPOC) process mapping
6. Problem and goal statement

The researcher conducted a literature review to gain a full understanding of the background of this study. Additionally, the researcher analysed the state of the departure area at KKIA before and after the implementation of the lean six-sigma approach, in order to analyse the effects of culture on change management (Chapter 2 and Chapter 3). There are a few studies discuss and describe lean management implementation in airports; therefore, the researcher considered the investigation of this to be one of the main aims of the study.

The IATA LOS scale was used to define the problem in this study. As shown in the following tables (5.1 and 5.2) the number of passengers in KKIA is increasing yearly: between 2006 and 2007, there was an increase of 6.95% (KKIA yearly report, 2008) and between 2008 and 2013.

Table 5.1: Passenger Numbers in KKIA from 1998 to 2007 (KKIA Yearly Report, 2009)

Year	Scheduled & Non Scheduled			General	Grand Totals	Transit
	Domestic	International	Totals	Aviation		Passenger
1998	5,060	2,961	8,021	34	8,055	287
1999	5,154	3,046	8,200	34	8,234	310
2000	5,194	3,185	8,379	32	8,411	323
2001	5,428	3,274	8,702	35	8,737	382
2002	5,578	3,443	9,021	33	9,054	405
2003	5,657	3,481	9,138	30	9,168	390
2004	6,082	3,799	9,881	30	9,911	365
2005	6,542	3,991	10,533	40	10,573	398
2006	6,670	4,292	10,962	55	11,017	366
2007	7,064	4,645	11,709	74	11,783	425
% chg 2006-2007	5.91	8.22	6.81	34.55	6.95	16.12

In the following table 5.2, shows the number of passengers in KKIA between 2008 and 2013

Table 5. 2: Passenger Numbers in KKIA from 2008 to 2013 (general authority of civil aviation, King Khalid International Airport, airport operations)

Years	Passengers(in thousands)	Year-over-year change
2008	12162	5.8%
2009	12774	4.8%
2010	13261	4.1%
2011	13816	6.6%
2012	14743	8.2%
2013	15974	8.4%

Based on the previous data, the following figure 5.1 shows the forecast number of passengers for the coming years (KKIA Yearly Report, 2009).

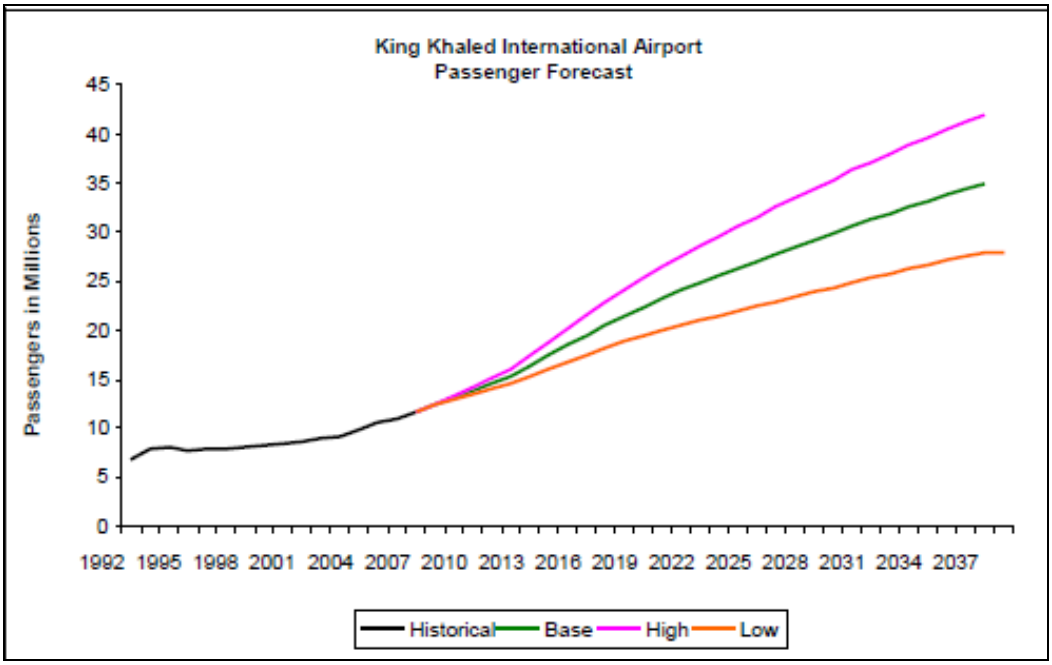


Figure 5.1: Expected Passenger Numbers in KKIA until 2037 (KKIA Yearly Report, 2009)

According to the IATA LOS scale, the level of service in an airport not only depends on the number of passengers but also the area available for each passenger and his/her cargo. The following table shows these statistics for KKIA's different areas at present and predicted statistics for the coming years (Statistics of KKIA, 2008; KKIA Yearly Report, 2009).

Table 5. 3:: Available Area for Each Passenger in KKIA in Different Areas (KKIA Yearly Report, 2009)

			Year:	2008	2013	2018	2023	2028	2033	2038
	Traffic Data									
	Passengers	(Mio pax/yr)		13,1	18,4	25,7	31,7	37,1	42,2	46,5
	Cargo	(Mio tons/yr)		0,2	0,4	0,6	0,7	0,9	1,0	1,2
	ACM's	(x 1000/yr)		128,6	186,0	265,4	323,5	370,8	412,0	447,4
	ACM's GA	(x 1000/yr)		16,6	21,5	36,2	46,7	52,5	56,8	60,6
	FACILITY DESCRIPTION	**PLANNING PARAMETERS Unit**	**KKIA - Value**	**AREA (ha)**	**AREA (ha)**	**AREA (ha)**	**AREA (ha)**	**AREA (ha)**	**AREA (ha)**	**AREA (ha)**
1	PASSENGER FACILITIES - Airside (aprons, apron taxilanes, staging) - Landside (terminal bldg, roads, parking)	ha/MAP ha/MAP	3,5 2,0	46 26 total : 72	64 37 total : 101	90 51 total : 141	111 63 total : 174	130 74 total : 204	148 84 total : 232	163 93 total : 256
2	CARGO TERMINAL - Airside (aprons, apron taxilanes, staging) - Landside (buildings, roads, parking)	ha/Mio tons ha/Mio tons	40 25	10 6 total : 16	16 10 total : 26	23 15 total : 38	30 19 total : 48	36 22 total : 58	42 26 total : 68	48 30 total : 77
3	FORWARDERS FACILITIES - Plotsize / Plotsize Cargo (landside)	factor	1,00	total : 6	total : 10	total : 15	total : 19	total : 22	total : 26	total : 30
4	GENERAL AVIATION - Apron - Facilities	ha / 1000 acm	2,7	45	58	98	126	142	153	164
5	COMMERCIAL DEVELOPMENT - Airport hotel - Offices	sqm/acm	1,0	13	19	27	32	37	41	45
6	AIRPORT SUPPORT FACILITIES - Air Catering - GSE Maintenance - Fuel Storage - Rescue & Fire Fighting - Airport Maintenance	ha/MAP	2,0	26	37	51	63	74	84	93

Based on these statistics, KKIA can be classified on the IATA LOS scale as lying between D and E but closer to the E level, which is considered an unacceptable level. Although the information and collected data are measurements, the researcher considered them in the problem-defining step as all of them are found by previous studies and reports.

5.2.1. Observations

The researcher visited the airport before the implementation of the lean six-sigma approach, in order to observe the actual state of the departure area. For ease of reference, the researcher took photos at different times and on different days to help explain the status of the airport, such as the following figure.

Figure 5.2: The Departure Area at KKIA before the Implementation (photo taken by the researcher)

The crowded hall is very clear in the figure 5.2 above; the next figure gives further explanation of the reason behind the crowd.

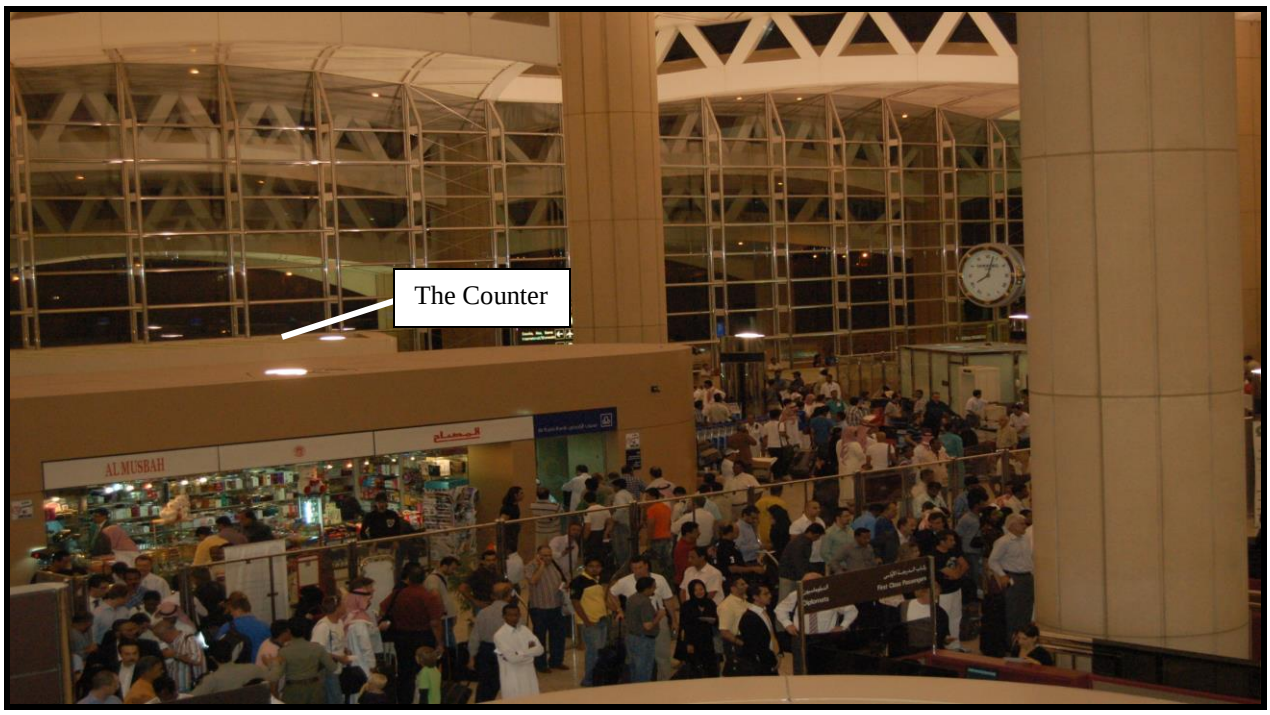


Figure 5.3: The Counter in the Entrance Area in the Departure Hall at KKIA (photo taken by the researcher)

The crowded passengers are obvious in Figure 5.3. This hall contains both passengers and visitors; as such, the crowd is not limited to the airport's customers at this point. The centrally located counter in this hall contains a market selling products for both passengers and visitors. The problem appears from the observation of the entrance area: the crowding makes people nervous and uncomfortable.

The researcher went further into the departure area into the passport check-in area. The following figure 5.4 shows that the passengers' distribution is not organized, which might cause significant problems, especially at peak times. (see figure 5.14).

Figure 5.4: Crowded Check-in Terminals in the Departure Hall at KKIA (photo taken by the researcher)

The following figures (figures 5.5 and 5.6) show the boarding area, where the passengers and their bags and belongings are also not organized and look disordered.

Figure 5.5: The Crowds between X-ray Inspection and the Boarding Bus in the Boarding Area in the Departure Hall at KKIA (photo taken by the researcher)

Figure 5.6: The Crowds between X-ray Inspection and the Boarding Bus in the Boarding Area in the Departure Hall at KKIA – Another View (photo taken by the researcher)

As per the figures above, the problem can be seen in three main areas in the departure hall: the entrance area, the boarding area and the passport check-in area. The researcher used tools to define the problem further and to highlight the main considerations for the next steps in the procedure to implement the lean six-sigma approach.

It is worth noting here that defining a research problem is not limited to reviewing previous literature and similar case studies, as these kinds of studies vary from case to case due to cultural, political, economic and other differences. For this reason, the problem definition should stem from the research context. In the present study, the airport's annual reports, statistics and internal circumstances were reviewed, as well as similar data. In addition, the departure hall's status before the implementation was analysed.

5.2.2. Voice of Customers (VOC)

One of the main aims of using the DMAIC approach is to improve customer satisfaction. Achieving customer satisfaction is linked with considering customers' requirements in the organization and providing them with services that are as expected or better. Nevertheless, the improvement of services in the departure area at KKIA requires an understanding of each requirement of the customers.

5.2.3. Critical to Quality Tree (CTQ)

A Critical to Quality (CTQ) tree, in general, is used within the lean six-sigma methodology to define the most significant features of quality that should be available to achieve customer satisfaction by transforming the VOC into measurable features and specifications. For this reason, this method was used in the present study. Setting up a CTQ tree is done by conducting the following three steps:

- Identifying customers' requirements
- Defining the factors that influence customers and their requirements
- Transforming the influential factors into CTQ standards

Figure 5.7 explains these three steps, as per Brassard et al. (2002).

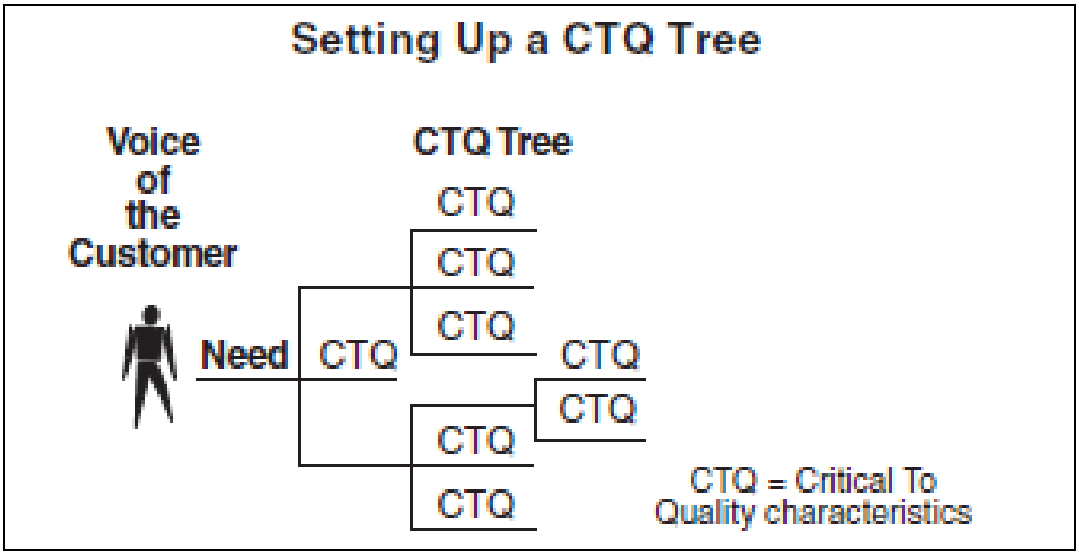


Figure 5.7: Setting up a CTQ Tree (Brassard et al., 2002)

A CTQ tree was applied to specify the requirements of KKIA's customers, as shown in Figure 5.7. It is worth noting that the CTQ tree was used in the 'define' and 'measure' steps of the DMAIC methodology. The tool that best suited the identified variables was the SERVQUAL questionnaire, which was distributed to passengers within the departure area at KKIA to find the status before the implementation of the lean six-sigma approach. The SERVQUAL questionnaire measures the differences between the expectations and the perceptions of customers from five dimensions: tangibles, reliability, responsiveness, assurance and empathy. The SERVQUAL questionnaire can be seen in Appendix A.

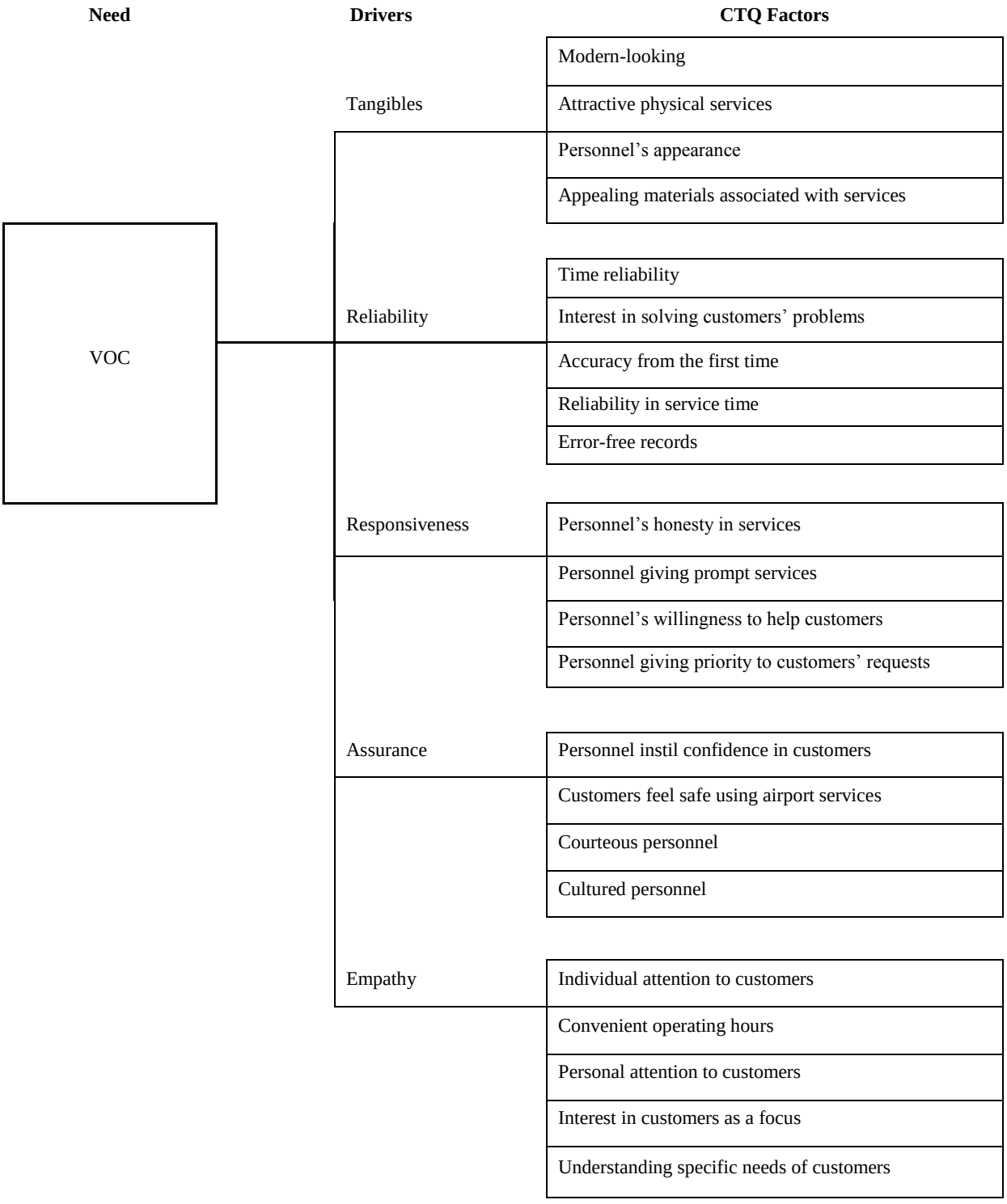


Figure 5.8: CTQ Tree for KKIA

As shown in Figure 5.8, the basic CTQ factors were defined. These were then measured in the next step of the DMAIC methodology.

5.2.4. Value Stream Mapping (VSM)

Value stream mapping (VSM) was used in this step in order to map all the processes that face a passenger from their first step into the airport until they reach their plane. This mapping aided this study in defining all the processes and determining their values. Based on this analysis, all the processes were divided into two categories: value-added processes and non-value-added processes.

The aim of using this tool was to focus on utilizing the value-added processes and removing the non-value-added ones by considering them as a waste of available resources. All the processes were analysed according to the predetermined CTQ factors in the CTQ tree for the achievement of customer satisfaction.

The following figure shows the most important areas and terminals in the departure and arrival areas at KKIA for international and domestic passengers.

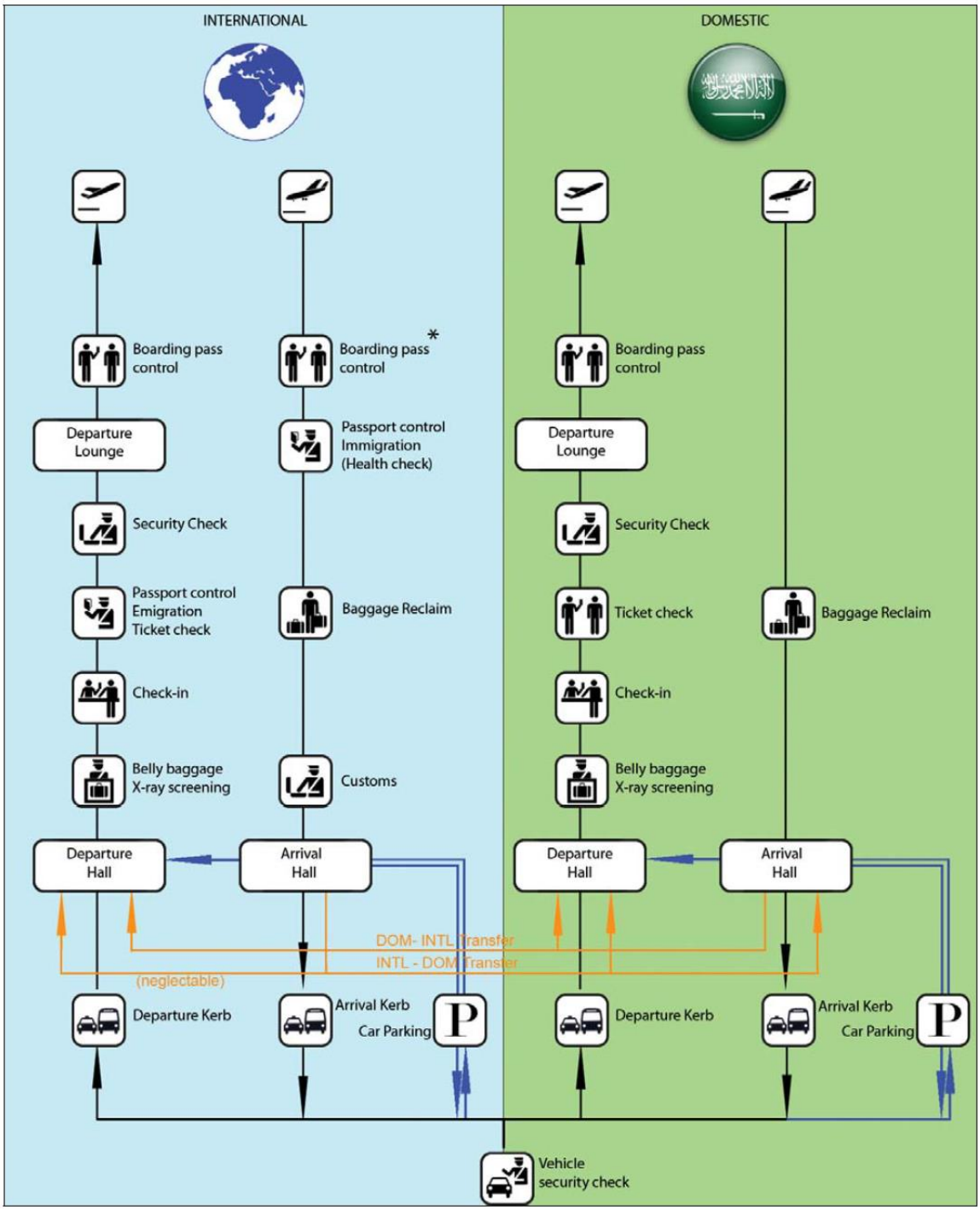


Figure 5.9: The Most Important Areas and Terminals in the Departure and Arrival Areas at KKIA for International and Domestic Passengers (Kloosterziel et al., 2009)

It is worth noting here that VSM is used in two steps of the DMAIC methodology (the 'define' and 'measure' steps); therefore, it was not finished completely in this step. The first step in VSM is stream mapping of the departure area at KKIA. The following figure

is an AutoCAD drawing of the passenger flow within the departure area, from the area's entrance to the airside (see figure 5.10).

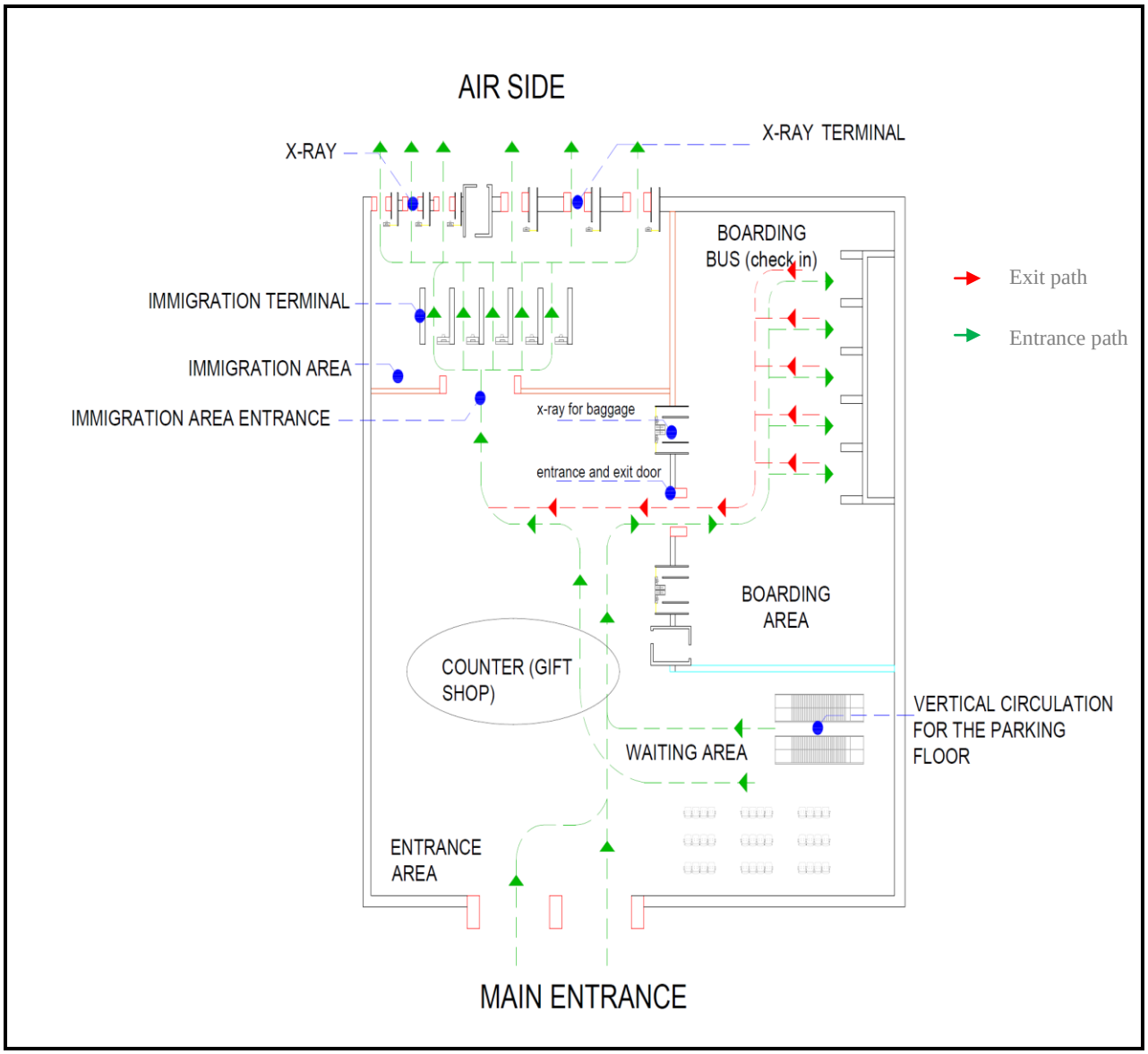


Figure 5.10: An AutoCAD Drawing of the Passenger Flow in the Departure Area at KKIA (researcher's illustration)

The passenger flow can be transformed into a flow chart to determine the main processes that face the passengers in the departure area. The following figure 5.11 shows the flow mapping of the processes in the departure area at KKIA.

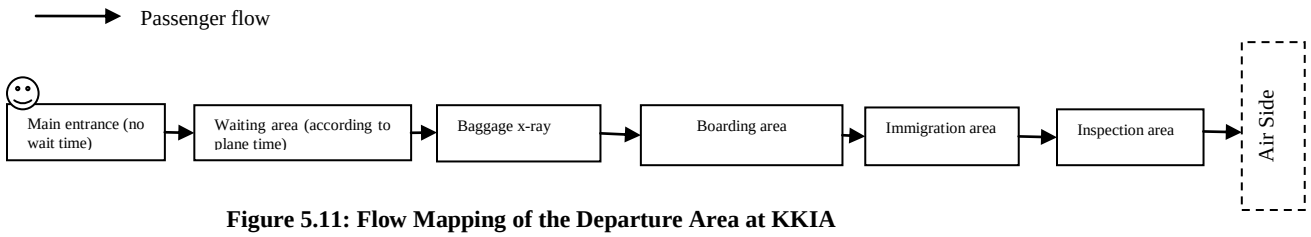


Figure 5.11: Flow Mapping of the Departure Area at KKIA

For the value-added and non-value-added processes, the airport considers a certain area as a value-added area if it influences customers. For example, the waiting area is not a value-added area from a time perspective, as the passengers are not concerned with waiting time in the waiting area. By contrast, the passengers may be bothered by long waiting times at x-ray checkpoints. The following figure shows the value-added processes in the passenger flow.

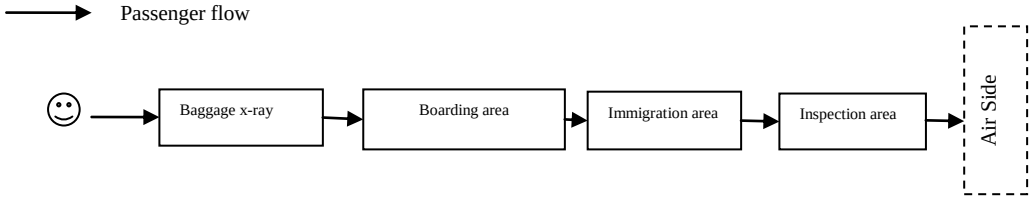


Figure 5.12: The Passenger Flow through Value-added Areas in the Departure Area at KKIA

The time value of each area in the previous figure 5.12 was evaluated in the next step of the DMAIC methodology, which is the 'measure' step. The detailed VSM chart was constructed in that step.

5.2.5. Strengths, Weaknesses, Opportunities, and Threats Analysis

SWOT analysis was used to define the problem in the departure area at KKIA. The SWOT analysis for KKIA is summarized in the following table 5.4. KKIA has a high population base, is an iconic inbound tourism destination and has a strategic geographic location (i.e. it has hub potential). The following table shows the strengths, weaknesses, opportunities and threats for KKIA in reference to achieving the target level of service. All of the SWOT analysis points were concluded from interviews with the managers and leaders of the departure area at KKIA.

Table 5. 4:: SWOT Analysis in Reference to Achieving the Target Level of Service in the Departure Area at KKIA

Strengths	Weaknesses
• Located in a high-growth region. • Proximity to a destination with high awareness and appeal. • High-volume tourism potential. • Ground component infrastructure. • Proven track record for international services now established. • Very focused on the community and local stakeholders – ability to work together to support new routes and build airline confidence.	• High portion of lower-yield leisure passengers. • Cannot stimulate growth beyond a ceiling – due to the size of the population base. • Higher cost of other airport service providers. • Limited cargo potential. • Highly seasonal. • Higher costs for airlines based on low economies of scale. • Peak hour infrastructure pressure – inability to grow. • Consumer expectations of international passenger experience. • More limited ground transport options / public transport. • Unsatisfactory level of services for travellers.
Opportunities	**Threats**
• Ability to incentivize new airlines and services with flexible pricing agreements. • Build on 'hubbing' to translate into feeder traffic. • Potential for tourism and industry partners to align to work co-operatively on a long-term marketing plan, with funding in place to support the growth of the route in the future. The plan and the funding should be tailored to the airline's model and should be matched to the profile and frequency of services. • There are shops and a variety of successful services; the management could encourage the establishment of small businesses and investment in the airport.	• Economies of scale at capital city ports. • Competition from other international cities, declinational cities and destinations that are proven markets. • Regional ports seen as higher risk in times of global economic pressure, particularly for foreign carriers. • Pressure to innovate and continuously stimulate the market to ensure the growth potential of passengers, in order to avoid losing services to capital city ports. • Significant infrastructure investment needed to allow further growth.

The following points are the most significant conclusions from the SWOT analysis:

For the *strengths* in the departure area before applying the lean six-sigma approach, it appears that KKIA is located in a high-growth region, which makes customer attendance for this airport higher than that of other airports in KSA. Also, KKIA has high awareness and appeal compared with other airports in the area. The number of tourist passengers shows that the airport management cares about tourism and tourists' satisfaction. Regarding the ground infrastructures, they are also considered a strength of KKIA, as the components are well selected. Additionally, KKIA has a proven track record for international services.

For the *weaknesses* in KKIA, it appears that there is high portion of lower-yield leisure passengers. Also, KKIA cannot stimulate growth beyond a ceiling – due to the size of the population base. Moreover, the higher cost of other airport service providers in KKIA compared with other airports is a weakness. Regarding customer satisfaction, there is limited cargo potential for each customer. Another undeniable weakness in KKIA is the highly seasonal load (especially in the pilgrimage season); a further weakness is the peak hour infrastructure pressure. Moreover, there are high costs for airlines in KKIA due to low economies of scale. Also, KKIA consumers expect an international passenger experience that is better than the actual status. Regarding outside transportation, the passengers and visitors face problems with the limited number of ground transport options / public transport. All of these weaknesses lead to unsatisfactory levels of service for consumers of KKIA.

KKIA could utilize the *opportunities* identified to remove threats and weaknesses. The first opportunity is the ability to incentivize new airlines and services with flexible pricing agreements. Also, building on 'hubbing' to translate into feeder traffic is one of the most significant opportunities for KKIA. Another opportunity is the potential for tourism and industry partners to align to work co-operatively on a long-term marketing plan, with funding in place to support the growth of the route in the future. The plan and the funding should be tailored to the airline's model and should be matched to the profile and frequency of services. In addition, there are shops and a variety of successful

services, so the management could encourage the establishment of small businesses and investment in the airport.

Finally, the *threats* of KKIA include the economies of scale at capital city ports; competition from other international cities, declinational cities and destinations that are proven markets. Regional ports being seen as higher risk in times of global economic pressure, particularly for foreign carriers. Pressure to innovate and continuously stimulate the market to ensure the growth potential of passengers, in order to avoid losing services to capital city ports; and the significant infrastructure investment needed to allow further growth.

5.2.6. Suppliers, Inputs, Process, Outputs, and Customers Process Map (SIPOC)

The SIPOC process map is another tool that is used in quality management studies. It is used to determine the inputs and outputs of each process, in order to understand all details of the process. This is shown in the following figure 5.13.

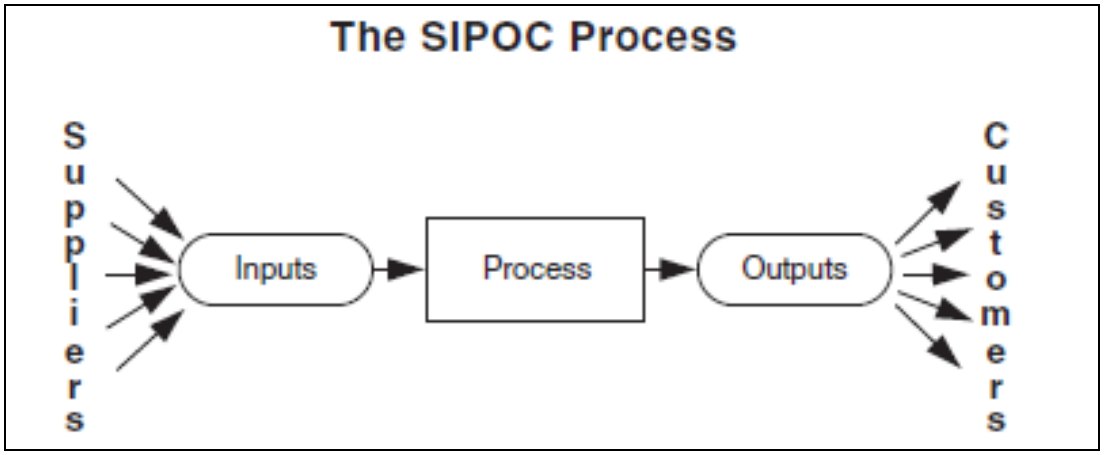


Figure 5.13: The SIPOC Process (Brassard et al., 2002)

In KKIA, many processes were found in the departure area by using VSM in the first step of the DMAIC process. The following table shows the SIPOC process map of the processes in the departure area at KKIA.

Table 5. 5:: SIPOC Process Map of the Departure Area at KKIA

Suppliers	Inputs	Process	Outputs	Customers
	Passengers, goods and prohibited items	Baggage x-ray	Passengers and goods	
	Passengers and goods	Boarding area	Passengers	
	Unspecified passengers	Immigration area	Only allowed passengers	
	Passengers and prohibited items	X-ray area	Passengers	

According to Table 5.5, the inputs and the outputs of each process are clear; the significance of each step is defined by the step's ability to serve customers.

5.2.7. Problem and Goal Statement

The main aim of the 'define' step in the DMAIC process is the identification of a problem statement. Based on the tools used in this step, the main problem in the departure area was identified: crowding. This was due to reasons such as un-organized areas, un-structured sectioning at the departure area landside. The researcher noticed many problems in the departure area at KKIA, as follows:

- The counter in the waiting area is located between the main entrance and the entrance to the immigration area.
- The entrance of the boarding area is not separated from the exit door of this area.
- The customer has to enter the boarding area from the waiting area. After checking in baggage, the customer has to return to the waiting area to reach the immigration area.
- The number of self-service check-in kiosks is not sufficient for the number of customers: there are only three self-service check-in kiosks.
- There is no system to organize the queues in the departure area at KKIA.

All these problems were measured in the next step of the DMAIC approach by the use of different tools.

5.3. Measuring the Service Quality in KKIA

In the ‘measure’ step of the DMAIC methodology, the following tools were used:

- VSM
- CTQ tree mapping (by the use of SERVQUAL questionnaires)
- Interviews

These tools were used in the second stage because they had also been used in the ‘define’ step. The following subsections explain the results of the application of each of these tools:

5.3.1. Value Stream Mapping

The first stage of VSM shows that there are four processes influencing customer satisfaction in the departure area at KKIA, and these processes are value-added processes. The waiting time required for each step was measured by the researcher in different conditions, in order to measure the average required time. Figure 5.15 explains the VSM in detail. As shown in this chart, in three different conditions, the researcher measured the waiting times and available spaces for passengers in the departure area landside at KKIA. The three conditions were: low traffic (the number of passengers was less than 750), medium traffic (the number of passengers was between 750 and 1500) and high traffic (the number of passengers was higher than 1500) (see Figure 5.14). At peak times, there were approximately 1,700 passengers per hour (KKIA, Operations, 2011). The highest number of passengers within the departure area was between 1,700 and 2,000.

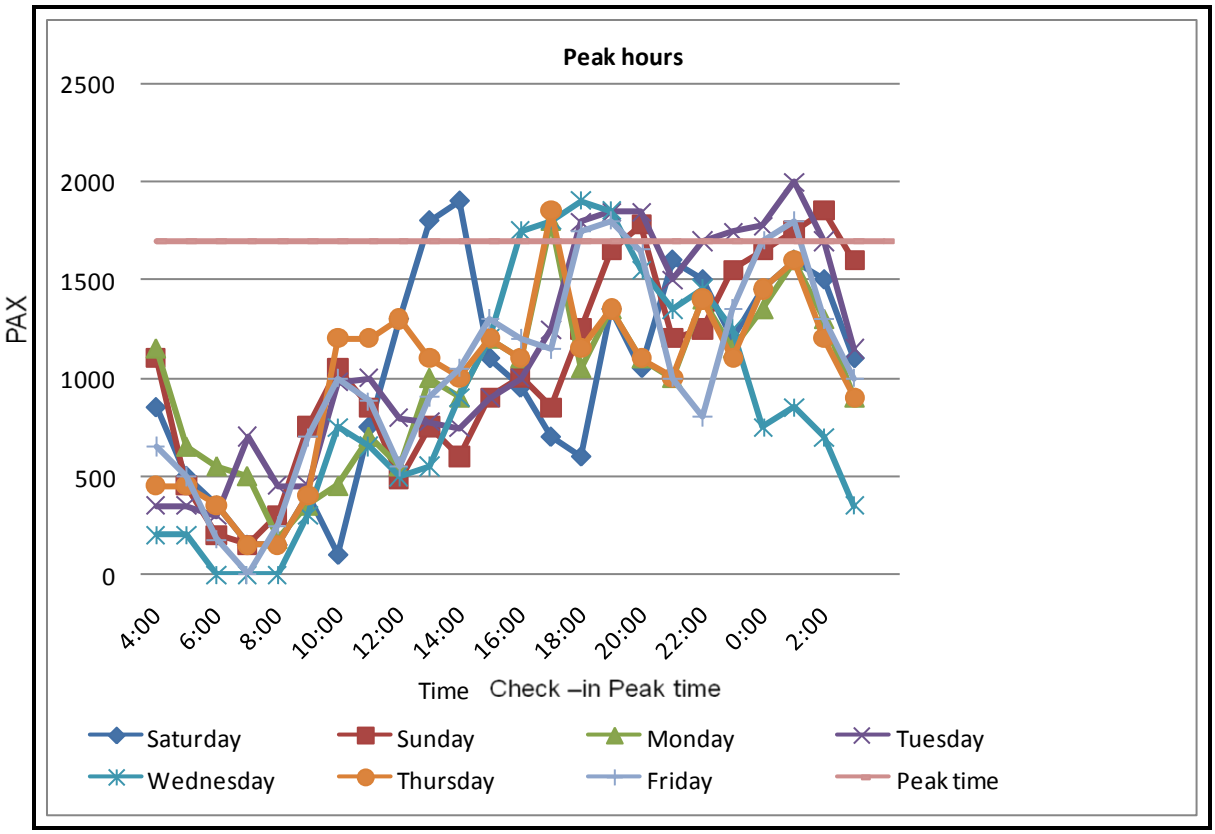


Figure 5. 14: Peak Time chart at KKIA (general authority of civil aviation, King Khalid International Airport, airport operations)

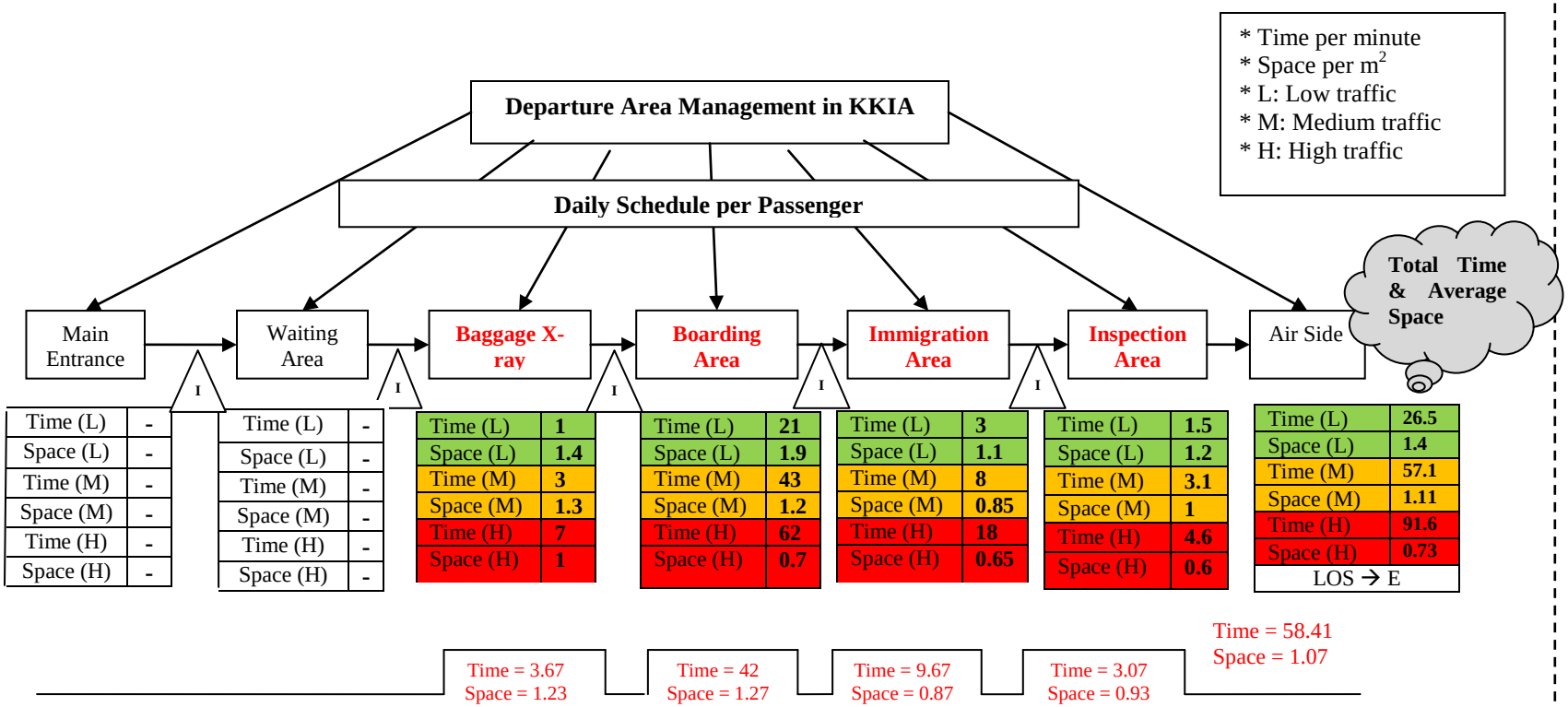
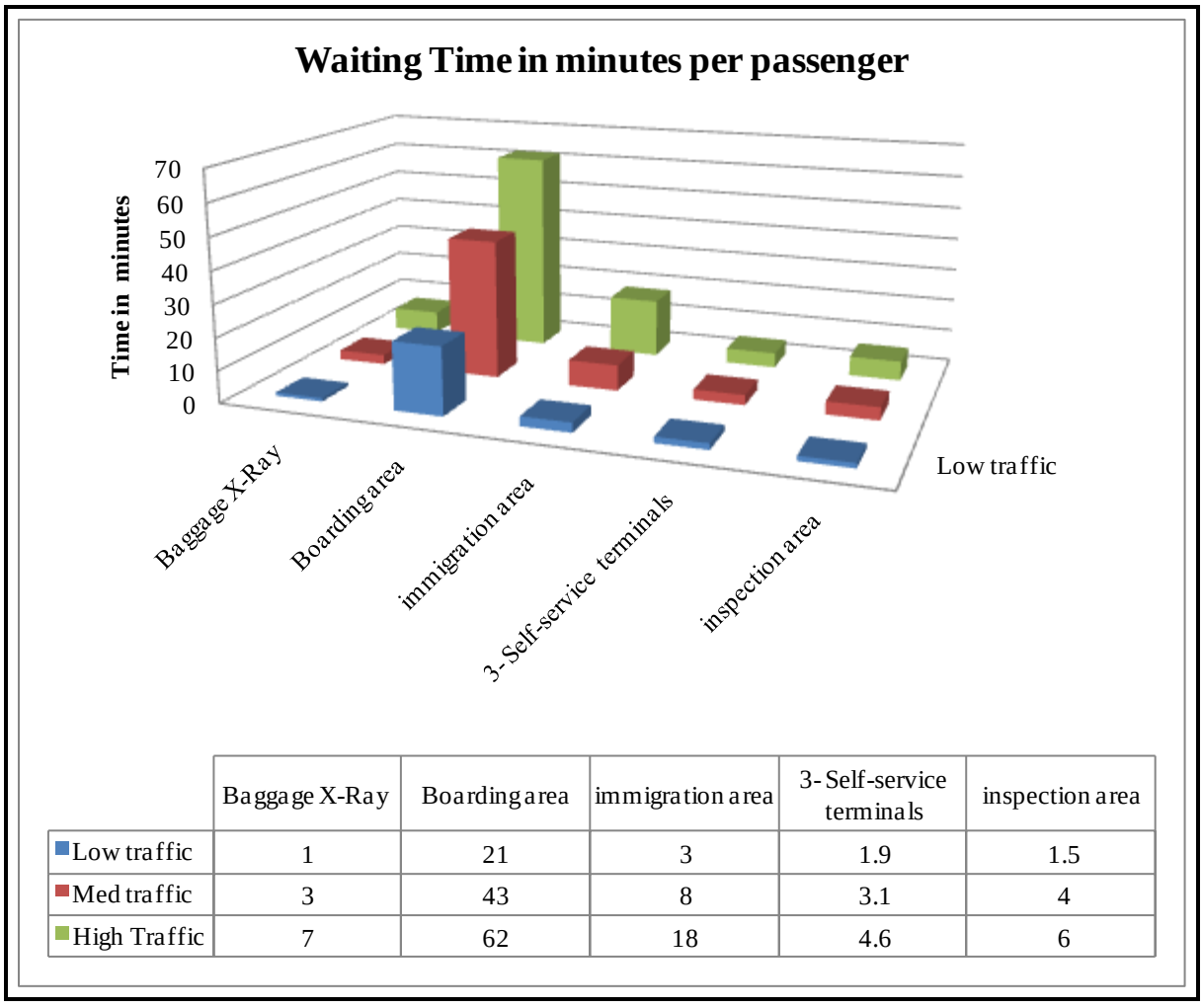


Figure 5.15: VSM Chart before Modifications

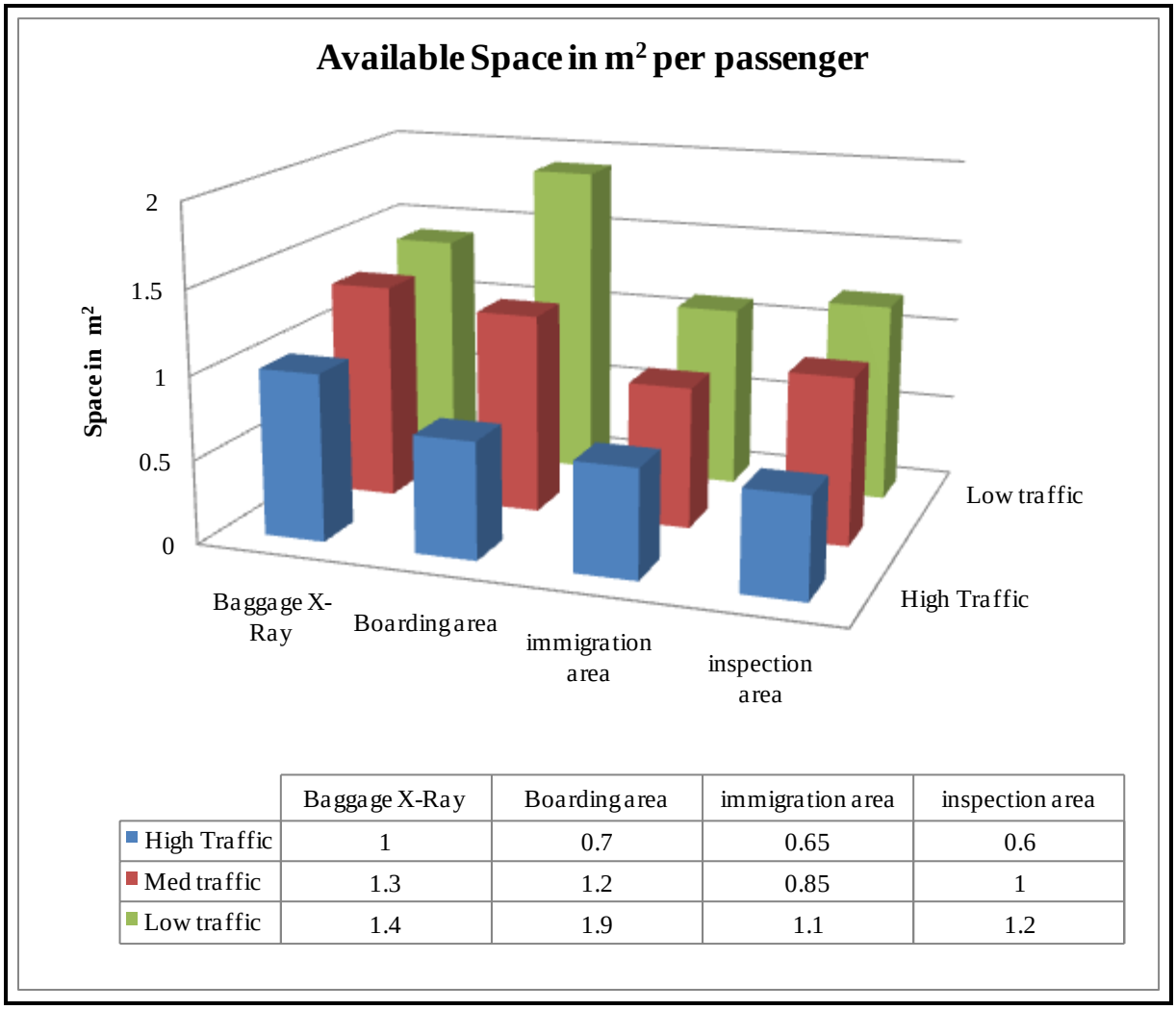
According to the previous figure, the average total time required for a passenger to reach the air side is 58.41 minutes, and the average available space for him/her and his/her baggage is 1.07 m^2. In detail, for the low-traffic case, the average total time required is 26.5 minutes and there is an average available space of 1.4 m^2; for the medium-traffic case, the average total time required is 57.1 minutes and there is an average available space of 1.11 m^2; and for the high-traffic case, the average total time required is 91.6 minutes and there is an average available space of 0.73 m^2. These numbers indicate a level of service (E) based on the IATA LOS scale. The following chart illustrates the findings for each area.



	Baggage X-Ray	Boarding area	immigration area	3- Self-service terminals	inspection area
Low traffic	1	21	3	1.9	1.5
Med traffic	3	43	8	3.1	4
High Traffic	7	62	18	4.6	6

Figure 5.16: Waiting Times per Passenger in the Departure Area at KKIA

According to the previous figure 5.16, the longest waiting time is in the boarding area. The next figure 5.17 shows the space per person in each area.



	Baggage X-Ray	Boarding area	immigration area	inspection area
High Traffic	1	0.7	0.65	0.6
Med traffic	1.3	1.2	0.85	1
Low traffic	1.4	1.9	1.1	1.2

Figure 5.17: Available Area for each Passenger in the Departure Area at KKIA

According to the previous figures and based on IATA standards, 90% of the passengers can travel through the airport within 30–45 minutes

5.3.2. Critical to Quality Tree

In the second stage of setting up the CTQ tree, the researcher measured the predefined CTQ factors from the different perspectives in the departure area at KKIA by the use of SERVQUAL questionnaires (see Appendix A).

The SERVQUAL model uses five specific criteria that recognize and evaluate the quality of services rendered. Questions were drawn from these five criteria, which can be seen as identifying the gaps between existing perceptions and expectations in terms of quality.

The SERVQUAL questionnaires measures CTQ factors from two aspects: perceptions and expectations. This was done in order to evaluate the actual statuses of the services in the departure area at KKIA.

The sample size for the pre-implementation data collection was 500 (see Chapter 4, table 4.1) participants selected from passengers in the departure area at KKIA. In total, 550 questionnaires were distributed at different times and on different days. The 50 missing questionnaires were deleted due to reasons such as incomplete forms, giving more than one answer to any question or spoilt answers. The first part of the SERVQUAL questionnaire consists of demographic questions regarding nationality, age and gender, the following table 5.6 provides a detailed explanation of the sample's demographic variables.

Table 5. 6: Demographic Variables of the Sample

Demographic Variable	Category	Frequency	Percentage (%)
Nationality	Saudi	485	97.0
	Other nationality	15	3.0
Age	Under 25	15	3.0
	26–35	194	38.8
	36–45	201	40.2
	46 and above	90	18.0
Gender	Male	485	97.0
	Female	15	3.0

Regarding nationality, it appears that most of the participants were from Saudi Arabia (97%). This could be because of the location of KKIA: near the capital of KSA. For the age variable, it is clear that most of the participants were from the middle groups (26–35 years and 36–45 years). Finally, it is clear that the gender variable was influenced by

Saudi culture, which urges the prevention of males and females dealing directly with one another. The researcher is male and this is reflected clearly in the sample's concentration of males, as only 15 participants were females. (see chapter 3).

The second part of SERVQUAL questionnaire is the seven-point scale. The SERVQUAL questionnaire about the variables determined in the CTQ tree. The responses were collected from two aspects: perceptions and expectations. Then, the general variables were included in a question that asked the participant to divide 100 points among the variables based on each variable's significance from their viewpoint. The following table 5.7 shows the participants' responses regarding expectations.

Table 5.7: Means and Standard Deviations of Expected Services

Variable	Question	Mean	Standard Deviation
TANGIBLES	1. Excellent airports will have modern-looking equipment	5.87	1.55
	2. The physical facilities in excellent airports will be visually appealing	5.83	1.40
	3. The personnel in excellent airports will be neat in appearance	6.04	1.42
	4. The materials associated with services (such as pamphlets or statements) will be visually appealing in excellent airports	5.47	1.59
RELIABILITY	5. When excellent airports promise to do something by a certain time, they will do it	6.18	1.12
	6. When a passenger has a problem, an excellent airport will show a sincere interest in solving it	6.13	1.27
	7. Excellent airports will get things right the first time	5.81	1.29
	8. Excellent airports will provide their services at the time they promise to do so	6.11	1.15
	9. Excellent airports will insist on error-free records	5.96	1.29
RESPONSIVENESS	10. The personnel in excellent airports will tell passengers exactly when services will be performed	5.95	1.24
	11. The personnel in excellent airports will give prompt services to passengers	6.01	1.16

	12. The personnel in excellent airports will always be willing to help passengers	6.11	1.20
	13. The personnel in excellent airports will never be too busy to respond to passengers' requests	5.95	1.21
ASSURANCE	14. The behaviour of the personnel in excellent airports will instil confidence in passengers	6.07	1.18
	15. The passengers of an excellent airport will feel safe in their dealings with the airport's services	6.14	1.07
	16. The personnel in excellent airports will be consistently courteous to passengers	5.73	1.19
	17. The personnel in excellent airports will have the knowledge to answer passengers' questions	5.78	1.35
EMPATHY	18. Excellent airports will give passengers individual attention	5.78	1.26
	19. Excellent airports will have operating hours that are convenient for all their passengers	5.62	1.46
	20. Excellent airports will have staff who give passengers personal attention	5.75	1.16
	21. Excellent airports will have passengers' best interests at heart	5.85	1.34
	22. The personnel of excellent airports will understand the specific needs of their passengers	5.64	1.35

The results above all show positive responses towards the expected services in the departure area at KKIA. For the first variable, tangibles, the highest scores were for the third statement: "The personnel in excellent airports will be neat in appearance", with a mean value of 6.04 and a standard deviation of 1.42. The lowest scores were for the fourth statement: "The materials associated with services (such as pamphlets or statements) will be visually appealing in excellent airports", with a mean value of 5.476and a standard deviation of 1.59.

For the second variable, reliability, the highest scores were for the fifth statement: "When excellent airports promise to do something by a certain time, they will do it", with a mean value of 6.18 and a standard deviation of 1.12. The lowest scores for this variable were

for the seventh statement: “Excellent airports will get things right the first time”, with a mean value of 5.81 and a standard deviation of 1.29.

For the variable of responsiveness, the highest scores were for the twelfth statement: “The personnel in excellent airports will always be willing to help passengers”, with a mean value of 6.11 and a standard deviation of 1.20. The lowest scores were for the tenth statement: “The personnel in excellent airports will tell passengers exactly when services will be performed”, with a mean value of 5.95 and a standard deviation of 1.24.

For the fourth variable, assurance, the highest scores were for the fifteenth statement: “The passengers of an excellent airport will feel safe in their dealings with the airport’s services”, with a mean value of 6.14 and a standard deviation of 1.07. The lowest scores for this variable were for the sixteenth statement: “The personnel in excellent airports will be consistently courteous to passengers”, with a mean value of 5.73 and a standard deviation of 1.19.

For the last variable, empathy, the highest scores were for the twenty-first statement: “Excellent airports will have passengers’ best interests at heart”, with a mean value of 5.85 and a standard deviation of 1.34. The lowest scores for this variable were for the nineteenth statement: “Excellent airports will have operating hours that are convenient for all their passengers”, with a mean value of 5.62 and a standard deviation of 1.46.

In general, these results reflect positive expectations of all the aspects of service quality that were determined as CTQ factors using the previous tools; in other words, passengers expect to find high-quality services in the departure area at KKIA. The SERVQUAL questionnaire measures their expectations to determine the required quality of services, which can help in achieving customer satisfaction. Also, this questionnaire measures their perceptions in order to determine the current level of service, so the results can determine the gaps between expectations and perceptions. The next table 5.8 shows the responses of the participants from the perception aspect.

Table 5.8: Means and Standard Deviations of Perceived Services

Variable	Question	Mean	Standard Deviation
TANGIBLES	1. The airport has modern-looking equipment	3.57	1.86
	2. The physical facilities in the airport are visually appealing	3.46	1.82
	3. The personnel in the airport are neat in appearance	3.85	1.74
	4. The materials associated with services (such as pamphlets or statements) are visually appealing	3.22	1.96
RELIABILITY	5. When the airport promises to do something by a certain time, it does it	3.35	1.83
	6. When you have a problem, the airport shows a sincere interest in solving it	3.45	1.83
	7. The airport gets things right the first time	3.45	1.83
	8. The airport provides its services at the time it promises to do so	3.46	1.85
	9. The airport insists on error-free records	3.54	1.87
RESPONSIVENESS	10. The personnel in the airport tell you exactly when services will be performed	3.55	1.87
	11. The personnel in the airport give you prompt services	3.52	1.88
	12. The personnel in the airport are always willing to help you	3.41	1.85
	13. The personnel in the airport are never too busy to respond to your requests	3.26	2.01
ASSURANCE	14. The behaviour of the personnel in the airport instils confidence in you	3.42	1.91
	15. You feel safe in your dealings with the airport's services	3.60	1.93
	16. The personnel in the airport are consistently courteous to you	3.45	1.76
	17. The personnel in the airport have the knowledge to answer your questions	3.66	1.85

EMPATHY	18. The airport gives you personal attention	3.33	1.86
	19. The airport has operating hours that are convenient for all its passengers	3.99	1.72
	20. The airport has personnel who give you personal attention	3.39	1.91
	21. The airport has your best interests at heart	3.40	1.83
	22. The personnel of the airport understand your specific needs	3.51	1.71

According to the seven-point scale of agreement used in SERVQUAL questionnaires, the mean of this scale is 4. As can be seen in Table 5.8, all the variables scored values below the mean of the scale, which indicates negative responses towards the perception aspect from the participants' viewpoints.

For the first variable, tangibles, the highest scores were for the third statement: "The personnel in the airport are neat in appearance", with a mean value of 3.85 and a standard deviation of 1.74. The lowest scores were for the fourth statement: "The materials associated with services (such as pamphlets or statements) are visually appealing", with a mean value of 3.22 and a standard deviation of 1.96.

For the second variable, reliability, the highest scores were for the ninth statement: "The airport insists on error-free records", with a mean value of 3.54 and a standard deviation of 1.87. The lowest scores for this variable were for the fifth statement: "When the airport promises to do something by a certain time, it does it", with a mean value of 3.35 and a standard deviation of 1.83.

For the variable of responsiveness, the highest scores were for the tenth statement: "The personnel in the airport tell you exactly when services will be performed", with a mean value of 3.55 and a standard deviation of 1.87. The lowest scores were for the thirteenth statement: "The personnel in the airport are never too busy to respond to your requests", with a mean value of 3.26 and a standard deviation of 2.01.

For the fourth variable, assurance, the highest scores were for the seventeenth statement: "The personnel in the airport have the knowledge to answer your questions", with a mean value of 3.66 and a standard deviation of 1.85. The lowest scores for this variable were for the fourteenth statement: "The behaviour of the personnel in the airport instils confidence in you", with a mean value of 3.42 and a standard deviation of 1.91.

For the last variable, empathy, the highest scores were for the nineteenth statement: "The airport has operating hours that are convenient for all its passengers", with a mean value of 3.99 and a standard deviation of 1.72. The lowest scores for this variable were for the eighteenth statement: "The airport gives you personal attention", with a mean value of 3.33 and a standard deviation of 1.86.

These results indicate the low satisfaction levels of passengers with the quality of services available in the departure area at KKIA, as all of the scores were below the mean of the scale. However, to measure the quality of services, the responses of the participants on both perceptions and expectations were compared, in order to find the differences between the expectations and perceptions of the participants. It is worth noting here that the analysis of the gaps is mainly explained in reference to the next step of the DMAIC process. Nevertheless, the significance of some features was also measured through the SERVQUAL questionnaire, and the results of the collected data are explained in the table 5.9 below.

Table 5.9: Significance of Each Feature in the Departure Area at KKIA

Feature	Percentage
The appearance of the airport's physical facilities, equipment, personnel and communication materials	21.44
The airport's ability to perform the promised service dependably and accurately	22.33
The airport's willingness to help passengers and provide a prompt service	19.35
The knowledge and courtesy of the airport personnel and their ability to convey trust and confidence	19.13
The caring, individualized attention that the airport provides to its passengers	17.91

The previous table shows that the passengers placed the highest significance on the services that are related to the airport's ability to perform the promised service dependably and accurately, which is related to the variable of reliability. The next priority was given to the variable of tangibles, as the second rank was gained by "The appearance of the airport's physical facilities, equipment, personnel and communication materials". The least significant feature from the passengers' perspective was "The caring, individualized attention the airport provides to its passengers", which refers to the variable of empathy.

5.3.3. Conducting Interviews

In order to improve the accuracy of the findings and collect as much data as possible, the structured interviews were used to collect qualitative data from the managers in the departure area at KKIA. Appendix B contains the structured interviews questions that the participants were asked. The analysis of the collected data is introduced in the next step of the DMAIC process (the 'analyse' step), but the interviews are mentioned here as they are considered part of the 'measure' step. The interview results can support the SWOT analysis results, as they focus on the same concepts and aims.

5.3.4. Summary

At the end of the 'measure' step, it appears that the customers expected more satisfactory services than the actual services available in the departure area at KKIA, as the expectation values were higher than the mean of the scale and the perception values were below the mean of the scale. In addition, these results can be linked with the results from the use of VSM, where some problems appeared in the process flow, as both waiting times and the space available for each passenger were not enough to satisfy them. The next step in the study involved analysing these problems and suggesting the most suitable solutions to increase customer satisfaction.

5.4. Analysing the Problems in the Departure Area

As mentioned before, the main aim of this step is to analyse the measured problems that appeared in the previous steps and suggest some solutions to resolve them. To this end, the following tools were selected for this step:

- The sort, set in order, shine, standardize and sustain (5S) strategy
- Statistical analysis
- Interview analysis
- A cause and effect diagram

5.4.1. Sort, Set in Order, Shine, Standardize and Sustain Strategy

According to the 5S tool, the improvements in the departure area at KKIA have to be achieved in the following manner: sort, set in order, shine, standardize and sustain.

Starting with the 'sort' process, it can be achieved by sorting and identifying the factors influencing the process or operation. Therefore, the sorting process follows the order of the steps that were found by the use of VSM in the previous steps. Returning to Figure 5.10, the figure shows the scheme of the departure area at KKIA. Figure 5.18 below shows the actual picture of that area, which was taken by the researcher.

Figure 5.18: The Main Entrance and the Counter in the Departure Area at KKIA (photo taken by the researcher)

As shown above, the counter is placed in the middle of the departure area and opposite to the check-in counters. This is considered one of the major causes of crowding in the

check-in area. Additionally, this leads to less space in the departure area, resulting in fewer self-service check-in terminals, which is considered another cause of the crowding problem in the area. From the 'sorting' perspective, it appears that the counter is not placed correctly; removing it could add space and obviate the need to expand the departure area at the airport. In addition, removing the counter could contribute to increasing the number of check-in terminals.

The next step in the 5S strategy is 'set in place'; this is achieved by suggesting the most appropriate improvements in their proper places. The improvements involve the removal of the counter from the departure area. Another improvement could be to expand the airport's space, but this improvement requires a very coherent feasibility study, which may be done in the future. Moreover, new check-in terminals could be added to handle the huge and annually increasing number of passengers.
The application of the 5S tool was continued in the 'analyse' and 'improve' steps of the DMAIC process.

5.4.2. Statistical Analysis

This tool was applied to the data collected from the SERVQUAL questionnaires, as detailed in the 'measure' step. Therefore, this part included testing the hypotheses of this study based on the collected data.

These variables were used to define the gaps according to the SERVQUAL model, which are as follows (Al Muhareb and Graham-Jones, 2014):

- Gap 1: This gap was between passengers' expectations and the management's perception of these expectations. This gap represents the airport management's inability to determine the needs and desires of passengers. For example, the airport management expects the passengers to want better restaurants and coffee shops, but the passengers want reduced waiting times at queues in the check-in area, the passport area and the security inspection area.

- Gap 2: This gap was between the management's perception of passengers' expectations and the planned level of services in the airport. This could be due to

reasons such as limited financial resources or misunderstanding the basics of quality in an airport.

- Gap 3: This gap was between service quality specifications and service delivery. Rules and guidelines are not translated into practice by employees. This could be a result of low-quality training and developmental strategies for the communication skills of the employees. The employees may need further training in understanding service concepts, listening to customers and completing services quickly.

- Gap 4: This gap was between service delivery and communications with passengers. The promises made to passengers do not match the service delivery. For example, the agreement between the customer and the airport management is that the customer will not have to wait a long time at check-in, passport scanning and security inspection. However, when the customer arrives at the airport, the opposite can be found, without prior agreement between the parties.

- Gap 5: This gap was between passengers' expectations and perceptions of services in the airport. This results from the differences between the passengers' expected level of services and the actual level they faced.

Before testing the hypotheses, the means and standard deviations of each dimension (and of all the dimensions together) were calculated for both expectations and actual perceptions. The results are listed in Table 5.10.

Table 5.10: Statistics for Each Dimension – Expectations and Perceptions

Dimension		Mean	N	Std. Deviation
Tangible	Expectations	5.80	500	1.28
	Perceptions	3.53	500	1.70
Reliability	Expectations	6.04	500	1.11
	Perceptions	3.45	500	1.76
Responsiveness	Expectations	6.00	500	1.11
	Perceptions	3.44	500	1.84
Assurance	Expectations	5.93	500	1.06
	Perceptions	3.53	500	1.76
Empathy	Expectations	5.73	500	1.16
	Perceptions	3.53	500	1.67
Total	Expectations	5.90	500	0.99
	Perceptions	3.49	500	1.70

The mean of the scale in the above table is 4; therefore, a mean that is higher than 4 indicates a positive response to the dimensions, whereas a value that is lower than 4 indicates a negative response. As is clear from the above table 5.10, the participants' expectations were positive for all the dimensions. This could be due to the advertisements and announcements that they had heard before dealing with KKIA in reality, as their actual perceptions of the departure area at KKIA appeared to be negative, which indicates unsatisfied attitudes.

In order to identify whether these negative attitudes could significantly affect the customers' total perceptions, the following hypothesis was tested:

$H1_0$: There is no statistically significant difference ($\alpha \leq 0.05$) between the expected dimensions and the perceived dimensions for the services offered at KKIA.

The t-test was used to test this hypothesis with paired samples, and the results can be seen in the following table 5.11:

Table 5.11: Paired Samples T-test

Dimension		T	Df	Sig. (2-tailed)
Tangible	P-E	22.15	499	0.00
Reliability	P-E	24.59	499	0.00
Responsiveness	P-E	23.55	499	0.00
Assurance	P-E	23.13	499	0.00
Empathy	P-E	22.62	499	0.00
Total	P-E	24.43	499	0.00

The t-value for each difference is significant at the level of 0.05, so the null hypothesis was rejected and the alternative one was accepted. This means that there is a statistically significant difference ($\alpha \leq 0.05$) between the expected dimensions and the perceived dimensions for the services offered in the departure area at KKIA. The gaps between the participants' responses regarding the expected and perceived services were calculated. Negative values indicate negative responses towards the services in the departure area in KKIA (see Table 5.11).

Table 5.12: Gap Score Analysis

Dimension	N	Mean	Std. Deviation	Skewness	Kurtosis
Gap in tangibles	500	-2.27	2.29	0.45	-0.81
Gap in reliability	500	-2.58	2.35	0.56	0.23
Gap in responsiveness	500	-2.56	2.43	0.42	-0.36
Gap in assurance	500	-2.40	2.32	0.24	-0.57
Gap in empathy	500	-2.20	2.17	0.08	-0.68
Total gap	500	-2.40	2.20	0.35	-0.51
Valid N (list-wise)	500				

The gap values resulted from the difference between the mean values for expectations and perceptions. The following points discuss the most important highlights from this analysis:

- *Tangibles:* The average gap for this dimension is -2.27. Also, the distribution is positively skewed with a skewness of 0.45, which indicates that the figures deviate more to the right. The Kurtosis value is -0.81, which means that there is clustering somewhere away from the mean of (-2.27). In addition, a negative gap indicates that the difference between expectations and perceptions is significant and affected passengers' attitudes towards this dimension. The passenger terminal, lounge, waiting areas and staff offices are inadequate for the current level of service provided by the airport. The mean gap score for this dimension is negative because the design of the airport and the physical facilities in the departure area did not meet the passengers' expectations. In addition, the number of available personnel was considered insufficient to cover all the required services.

- *Reliability:* The average gap for this dimension is -2.58. Also, the distribution is positively skewed with a skewness of 0.56, which indicates that the figures deviate

more to the right. The Kurtosis value is 0.23, which means that there is clustering somewhere away from the mean of (-2.58). In addition, the negative gap indicates that the difference between expectations and perceptions is significant and affected passengers' attitudes towards this dimension. The airport management has limited interest in the fast and accurate delivery of services, which is reflected negatively in the level of service provided.

- *Responsiveness:* The average gap for this dimension is -2.56. Also, the distribution is positively skewed with a skewness of 0.42, which indicates that the figures deviate more to the right. The Kurtosis value is -0.36, which means that there is clustering somewhere away from the mean of (-2.56). In addition, the negative gap indicates that the difference between expectations and perceptions is significant and affected passengers' attitudes towards this dimension. The mean gap score for this dimension is negative because the passengers expected higher responsiveness levels from the personnel at the airport. The reason for this gap could be because of the insufficient number of personnel in the departure area at KKIA.

- *Assurance:* The average gap for this dimension is -2.40. Also, the distribution is positively skewed with a skewness of 0.24, which indicates that the figures deviate more to the right. The Kurtosis value is -0.57, which means that there is clustering somewhere away from the mean of (-2.40). In addition, the negative gap indicates that the difference between expectations and perceptions is significant and affected passengers' attitudes towards this dimension. This could be due to the insufficient knowledge of the personnel in answering passengers' enquiries.

- *Empathy:* The average gap for this dimension is -2.20. Also, the distribution is positively skewed with a skewness of 0.08, which indicates that the figures deviate more to the right. The Kurtosis value is -0.68, which means that there is clustering somewhere away from the mean of (-2.20). In addition, the negative gap indicates that the difference between expectations and perceptions is significant and affected passengers' attitudes towards this dimension. The mean gap score for this dimension is negative because the passengers expected more attention than they received from the personnel and managers in the departure area at KKIA.

- *Total Gap:* The average total gap is -2.40. Also, the distribution is positively skewed with a skewness of 0.35, which indicates that the figures deviate more to the right. The Kurtosis value is -0.51, which means that there is clustering somewhere away from the mean of (-2.40). In addition, the negative gap indicates that the difference between expectations and perceptions is significant and affected passengers' attitudes towards all the dimensions. The total mean gap score is negative because the passengers expected better in relation to the five dimensions.

This explains the statistical view of the numbers that resulted from SPSS calculations. However, from a managerial perspective, identifying the problems that cause these gaps in the SERVQUAL dimension results is the significant part of this study. Also, the results indicate that the aforementioned gaps are significant. Now, for the next step, the researcher found these start points in order to decrease the gaps as much as possible. Therefore, factor analysis was used. The KMO test result in this case is 0.903, which is between 0 and 1; this indicates that factor analysis is relevant for the study. Table 5.13 shows the results of the factor analysis.

Table 5.13: Results of the Factor Analysis

Total Variance Explained			
Component	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
1	13.76	62.56	62.56
2	2.05	9.31	71.88
3	1.13	5.15	77.03
4	0.84	3.82	80.85
5	0.60	2.74	83.59
Extraction Method: Principal Component Analysis.			

According to the previous table, only the first five components appear to be significant. This is explained in the following table. The results of factor analysis shows in table 5.14

that the highest value of the initial Eigen values has a total number of 13.76 with a percentage of variance of 62.56. And for the last component it has a total number of 0.60 with a percentage of 2.74

Table 5.14: Extraction Sums of Squared Loadings

Total Variance Explained			
Component	Initial Eigenvalues	Extraction Sums of Squared Loadings	
	Cumulative %	Total	% of Variance
1	62.56	13.76	62.56
2	71.88	2.05	9.31
3	77.03	1.13	5.15
4	80.85	0.84	3.82
5	83.59	0.60	2.74
Extraction Method: Principal Component Analysis.			

The extraction method used in this test with the sums of squared loadings was principle component analysis, as shown in the above table (Table 5.14). The sums of squared loadings were rotated. The results of this rotation are shown in the following table.

Table 5.15: Rotation Sums of Squared Loadings

Total Variance Explained			
Component	Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %
1	13.36	60.73	60.73
2	2.31	10.52	71.26
3	1.03	4.69	75.95
4	0.92	4.22	80.18
5	0.75	3.41	83.59
Extraction Method: Principal Component Analysis.			

According to the previous table, the highest total after rotation was 13.36 with a percentage of 60.73. Moreover, the least total after rotation become 0.75 with a percentage of 3.41. Now, the final step was to determine the component matrix in regard to the selected five components.

The results of this are shown in the following table:

Table 5.16: Component Matrix

Component Matrix [a]					
	Component				
	1	2	3	4	5
expQ1	0.85				
expQ2	0.91				
expQ3	0.88				
expQ4	0.77				
expQ5		0.90			
expQ6		0.92			
expQ7		0.86			
expQ8		0.93			
expQ9		0.90			
expQ10			0.93		
expQ11			0.90		
expQ12			0.94		
expQ13			0.91		
expQ14				0.93	
expQ15				0.90	
expQ16				0.87	
expQ17				0.84	
expQ18					0.95

expQ19	0.81
expQ20	0.94
expQ21	0.87
expQ22	0.83
Extraction Method: Principal Component Analysis.	

To conclude, the factor analysis results in the above tables show the factor loadings for each item in relation to the five factors; these values show the correlation between each item and its factor. Therefore, the items are related properly to their factors. For more details, the questions from 1 to 4 are related to the first factor. The questions from 5 to 9 are related to the second factor. The questions 10 to 13 are related to the third factor. The questions 14 to 17 are related to the fourth factor. And finally, the questions 18 to 22 are related to the fifth factor.

5.4.3. Interview Analysis

This section discusses the responses of the ten managers in the structured interviews with the researcher. It identifies the relationships, themes and patterns of the responses; summarizes the results; and derives the main points correlated to the quality of services in the departure area at KKIA.

First, the structured interviews started with questions related to the demographic variables of the participants. Regarding the age range of the respondents, half of the respondents (five managers) were in the age range of 36–45 years, while the remaining five respondents were 46 or older. Moreover, the interviewees were all part of the airport management but had differing job titles.

In regard to the interview questions, the first non-demographic question was: "*Are there any suggestion or complaint boxes in important areas in the airport (the passenger entrance, luggage area, market area or waiting hall)? Does the administration pay attention to complaints Please mention the policy followed in measuring and dealing with passenger complaints and suggestions.*" The responses were similar and all the answers indicate that the airport does not have complaint and suggestion boxes, while the policy followed to collect complaints and suggestions was random. Some of the

respondents said that there had been boxes in the past, but these boxes were neglected and thus removed.

The second question was: "*Have any operations been carried out to improve the quality of services in the airport? Please mention these in detail.*" The prominent response to this question was "yes", and the managers specified different operations that had been carried out (some incomplete) to improve the quality of services. These operations included the enlargement of the airport's capacity, the renewal and addition of seats in all halls, improvements in the air-conditioning units, the provision of Internet services to passengers, working to minimize the queuing time in front of the check-in and check-out offices, and other enhancements in the washrooms and different facilities.

The third question was: "*Please mention the problems that passengers may suffer (or have suffered) and which reduce their satisfaction and the service quality. Please also mention the plan to solve these problems.*" The responses to this question all focused on the real problems that passengers face and encounter in the airport, including the long waiting times for checking in and out; bad behaviour from the staff in the airport; poor services; the least level of delivering food and drinks; uncomfortable resting places; the departure hall's small capacity; poor air conditioning; and the low level of guidance and help within the airport. Moreover, the respondents said that there are some plans to resolve such problems, but the plans in general are random and very slow.

The fourth question asked: "*After developments in the airport, have there been any evaluations of the service quality and passenger satisfaction? What is the policy followed to assess passenger satisfaction and service quality in the airport?*" Almost all of the respondents answered that development is very weak and that complaints and dissatisfaction from passengers are only realized when passengers write about the weak management and poor quality of the airport in magazines, newspapers and press briefings.

The fifth question was: "*Are there any manuals inside the airport to make passengers' movements easier and are the manuals updated? Please mention the policy used.*" All the

managers responded that there are no manuals but there are boards and electronic screens to guide passengers around the airport and to help them find specific areas.

The sixth question was: "*From your point of view, can passengers differentiate between the services that the airport and the airway companies provide? Sometimes, a drop in the quality of services is caused by a malfunction on behalf of an airway company… Have such problems ever been noticed and what are the ways the airport deals with them?*" The answers to this question were similar and showed that passengers are mostly not able to differentiate between airport and airline services. The airport management staff had encountered different cases in which the airline companies had provided poor services and the passengers had complained to the airport. Some of the respondents said that a malfunction in an airline service within the airport should be redirected to the airport management because the airport management should manage all the services in the airport, including services provided by the airlines.

The seventh question was: "*To what degree are service quality and passenger satisfaction prioritized? Please mention the reason for your answer.*" The respondents indicated that the quality of services is of high significance to the airport but that improvements and decision-making are very weak and slow. Furthermore, improvements and enhancements in the airport are not actually done to the expected quality level.

5.4.4. Cause and Effect Diagram

A cause and effect diagram is a graphical illustration of the relationship between the required goals and the factors influencing the achievement of these goals. In this study, a cause and effect diagram was used to determine the factors within the departure area at KKIA and their positive and negative influences on the quality level of the area. This helped in determining the root causes of the problems in the departure area, as well as identifying positive factors. The following Figure (5.19) shows a cause and effect diagram representing the aim of increasing the quality level of the departure area in KKIA.

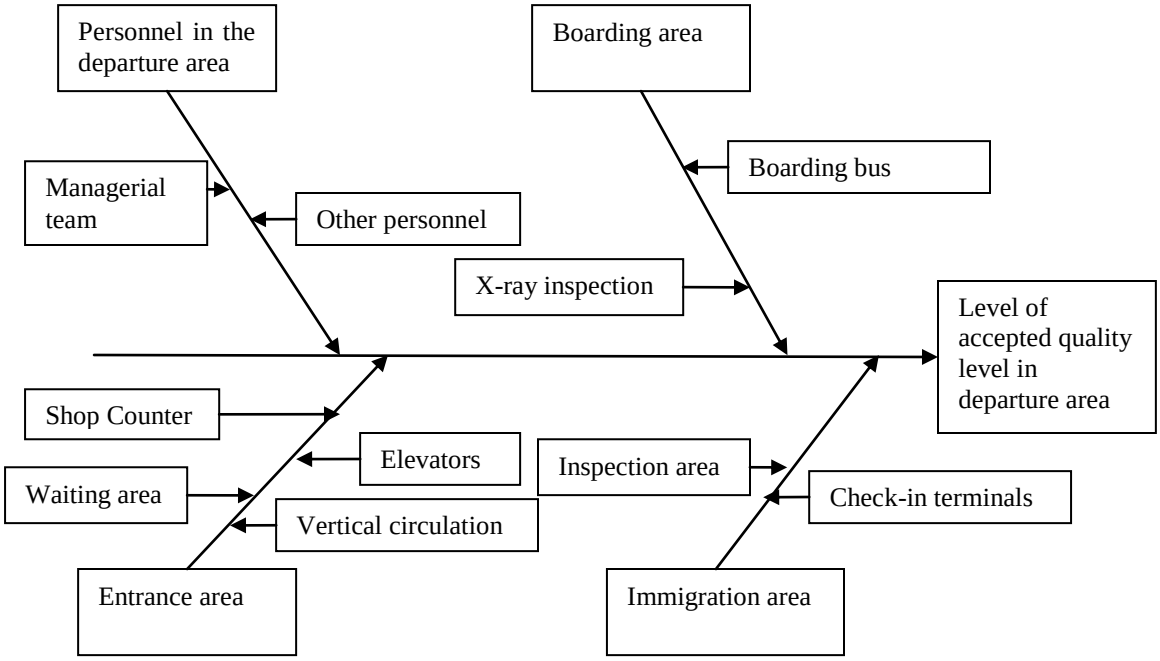


Figure 5.19: Cause and Effect Diagram of the Departure Area at KKIA

The main elements and influencing factors in the departure area at KKIA are included in the cause and effect diagram. As an example, the counter is one of the elements causing crowding in the entrance area, which negatively influences the level of quality in the departure area at KKIA.

5.5. Summary

To conclude, it appears that the following points are the basic problems in the service quality in the departure area at KKIA:

- The counter is located between the main entrance and the entrance to the immigration area, which affects the waiting time and available space for each passenger. (see section 5.2.1, figure 5.2& figure 5.18).
- The entrance to the boarding area is not separated from the exit door of this area, which causes crowding and disorganization (see figure 5.10).

- The customer has to enter the boarding area from the waiting area. After checking in his/her baggage, he/she has to return to the waiting area to reach the immigration area (see figure 5.10).
- There are an insufficient number of self-service check-in kiosks in relation to the number of customers: there are only three self-service check-in kiosks (see section 5.2.7).
- There is no specific system to organize the queues in the departure area at KKIA (see figure 5.6).

These problems were first defined and then measured by the use of different techniques, which found that the customers expected more satisfactory services than the actual services available in the departure area at KKIA. This is because the expectation values were higher than the mean of the scale and the perception values were below the mean of the scale. In addition, these results can be linked to the results of the VSM tool, which identified problems in the process flow. The VSM tool found that the waiting times and the space available for each passenger were not enough to satisfy them.

The final step in this chapter was the analysis of the measured data, which assured the existence of the main predefined problems.

Through this chapter, the first three steps in implementing the lean six-sigma approach were explained. The three steps were define, measure and analyse; the remaining two steps (improve and control) are discussed in the next chapter.

Nevertheless, it is worth to note here that the Saudi culture appeared to be an effective aspect in these steps where the majority of participants were from males (see chapter 3) In addition, some of them does not accept the idea of researching or cannot understand the lean meaning. Therefore, the culture is also considered one of the barriers that should be faced and treated with lean six sigma strategy.

Chapter Six: The Implementation of Lean Six-Sigma Management Through Continuous Improvement

6.1. Introduction

In this chapter, the implementation of the final two steps of the six-sigma approach in the departure area at KKIA are discussed and explained in detail. In the previous chapter (Chapter 5), the 'define', 'measure' and 'analyse' steps of the DMAIC methodology were explained in detail. The main problems in the departure area were identified, measured and analysed. The researcher described the tools that were used in each step.

Following on from the previous chapter, the present chapter explains and discusses the 'improve' and 'control' steps. Starting with the 'improve' step, this chapter discusses the tools that were used to improve the workflow process in order to remove any problems or defects. The actual implementation of change was done in this step, whereas the previous steps were used to gather introductory measurements and data.

As it is necessary to continue controlling for any defects that may happen following the 'improve' step, the 'control' step was implemented afterwards. In this step, employees and managers concentrate on keeping the level of quality high, as well as removing any defects in the long term.

The results of the previous steps in the DMAIC approach were used in the 'improve' and 'control' steps until the desired level of quality could be achieved in this case study.

6.2. Improving Quality

The results of the 'measure' step show that the problems in the departure area at KKIA were mainly as follows:

- In the waiting area, the gift shop (counter) was located between the main entrance and the entrance to the immigration area.
- In the boarding area, the entrance was not separated from the exit.

- The customer had to enter the boarding area from the waiting area. After checking in baggage, the customer had to return to the waiting area to reach the immigration area.
- The number of self-service check-in kiosks was not suitable for the number of customers, especially in high-traffic situations.

In the 'improve' step, solutions to the above problems were selected and applied. The efficiency and effectiveness of these solutions were then measured.

The following solutions/tools were used to achieve the aim of this step, which was to improve the quality level in the departure area at KKIA:

- Changing the layout of the departure area
- Queuing theory
- Increasing the number of self-service check-in kiosks in the departure area landside
- 5S (sort, set in order, shine, standardize and sustain)
- SERVQUAL and statistical analysis
- VSM (after modifications)

6.2.1. Reorganising the Layout of the Departure Area

The departure area landside was improved in accordance with lean thinking procedures to decrease waiting times and increase passenger flow whilst following international airport legislature and standards (KKIA Yearly Report, 2012). According to the parameters that were measured and analysed in the previous steps, it appears that the counter in the waiting area was creating an obstacle by taking up a huge amount of space in the area without returning sufficient usefulness. Therefore, the first recommended change was to remove the counter completely.

After removing the big counter, the new space was used to solve the problem of separating the boarding area from the immigration area, in addition to the problem of having the same entrance and exit in the boarding area. These two areas were not considered well-designed areas. Therefore, the second recommendation was to change the layout of these two areas (with the help of the newly available space), in order to improve passenger flow. The new layout is shown in the following figure.

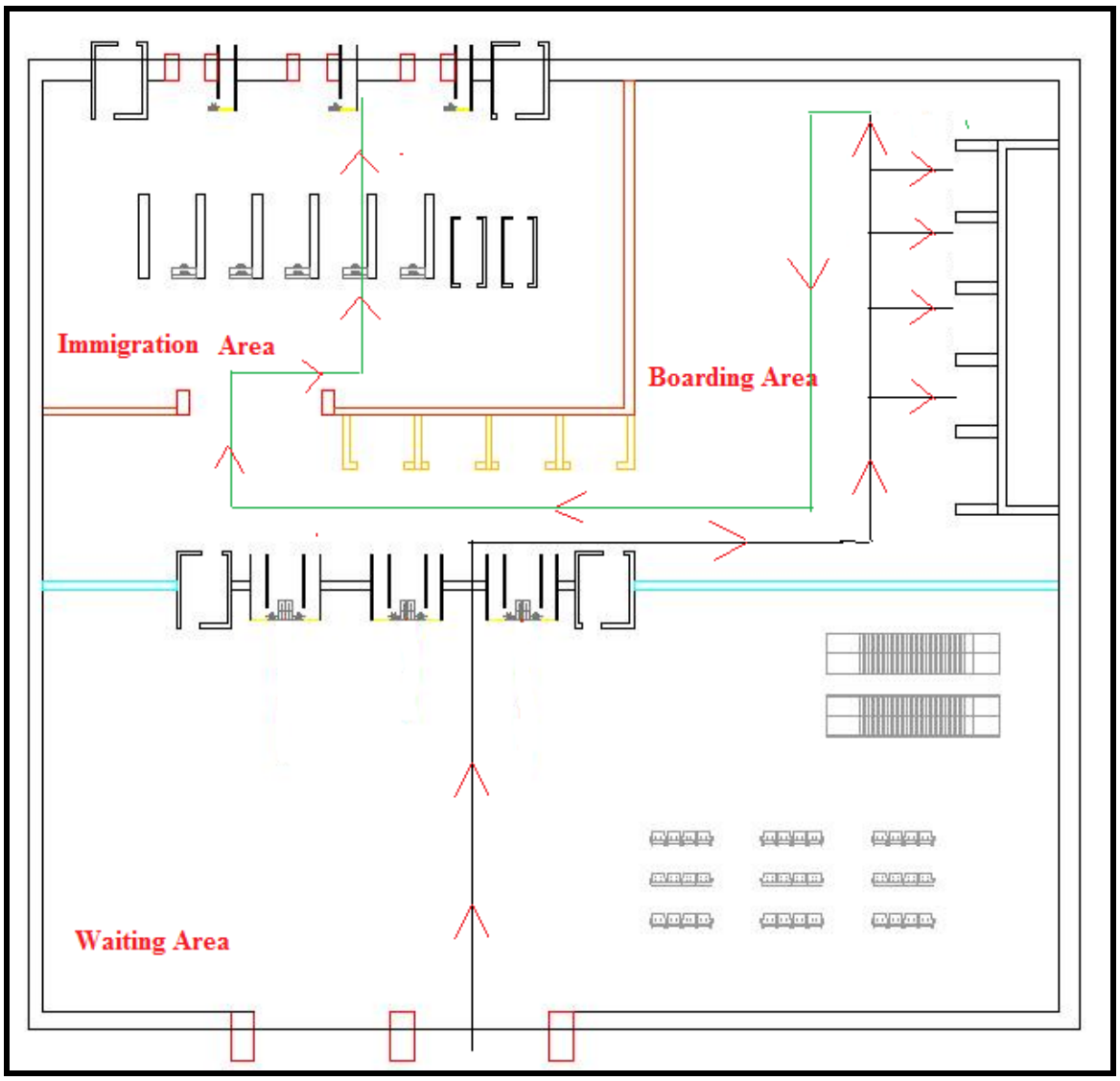


Figure 6.1: The Layout of the Departure Area at KKIA after Modifications (researcher's illustration)

As shown in Figure 6.1, the new design of the departure area indicates the following:

- The removed of the gift shop counter from the waiting area

- Extending the entrance of the boarding area in front of the immigration area
- Separating the entrance and exit of the boarding area
- Having only one security point in front of the boarding area. The x-ray borders in the immigration area were removed, as the entrance was unified

Despite these changes to decrease the number of obstacles for passengers, the number of passengers in the departure area was still high. Therefore, other theories were used to reduce crowding by utilizing the available space in the best possible way.

6.2.2. Queuing Theory

Queuing theory is used to solve space problems by reorganizing customers in waiting lines; also, it is important for staff to stand near the queues to guide customers. Queuing theory reorders straight queues into zigzagging lines, as shown in the next figure.

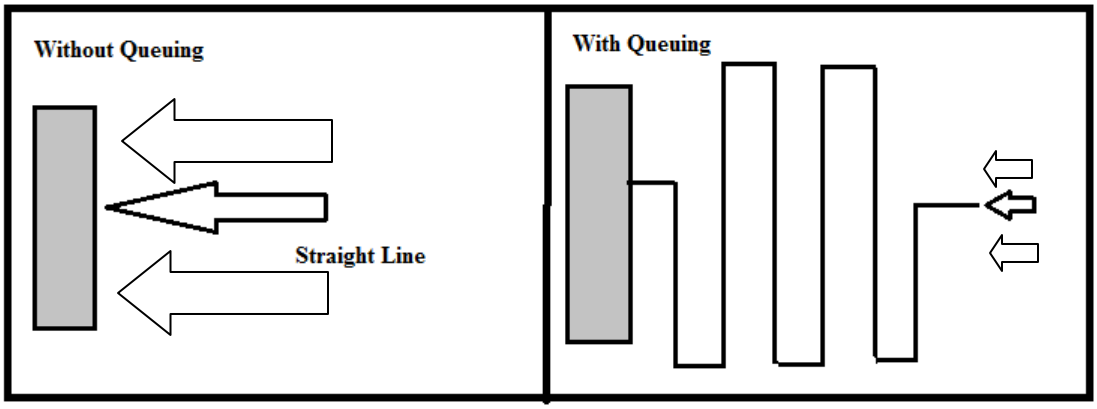


Figure 6.2: Queuing Theory

In the departure area at KKIA, queuing theory was used in order to make best use of the available area and arrange the crowds in front of any borders; therefore, queuing theory was used in front of the following borders:

- The entrance to the boarding area (x-ray inspection border)
- Boarding bus

- X-ray inspection after the immigration area

The new queues in front of these points and borders are shown in the following figure.

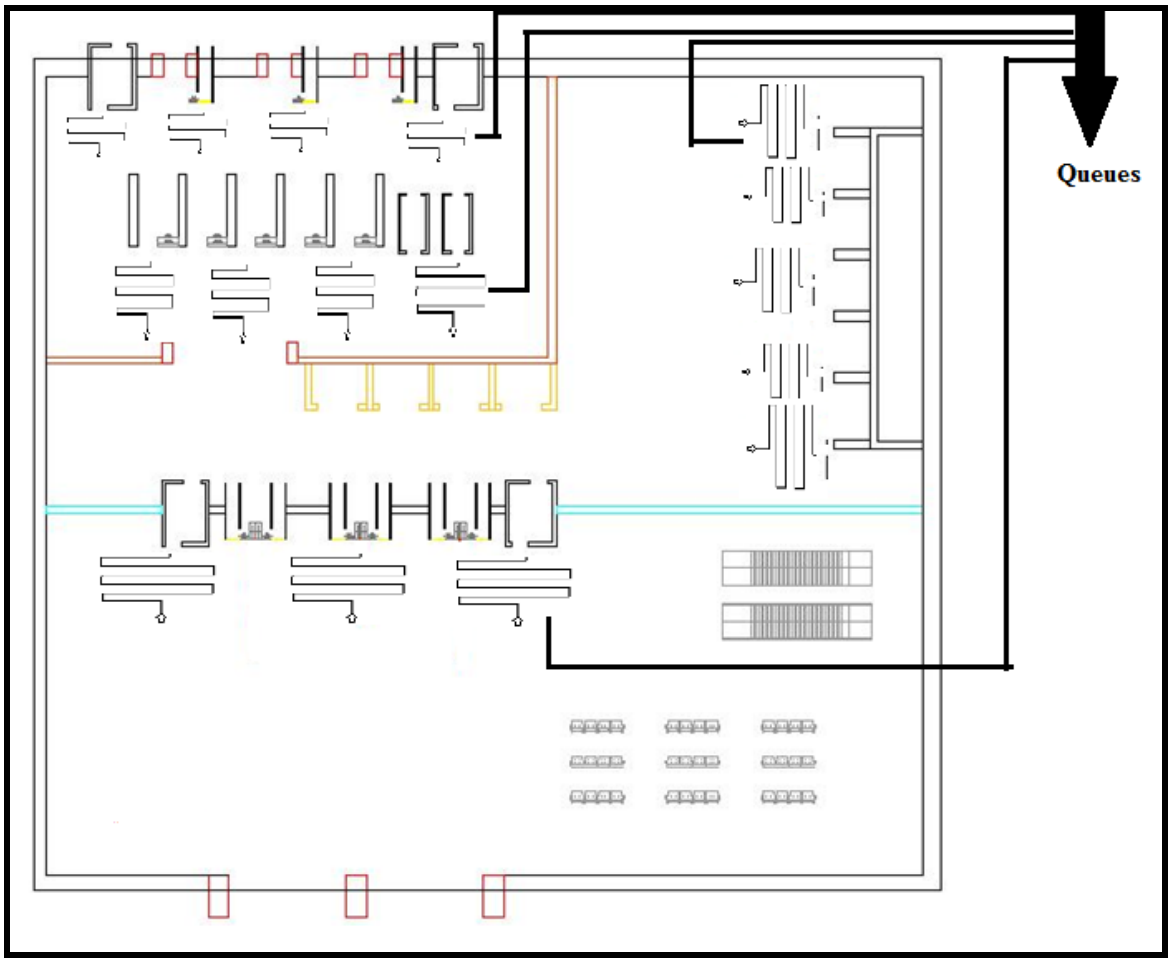


Figure 6.3: Queues in the Departure Area at KKIA

As shown in Figure 6.3, the recommended queues in the departure area utilize the available area in the best possible way to organize the crowds and facilitate the airport's operations. The following figures show photos taken of the departure area at KKIA after these new queues were implemented.

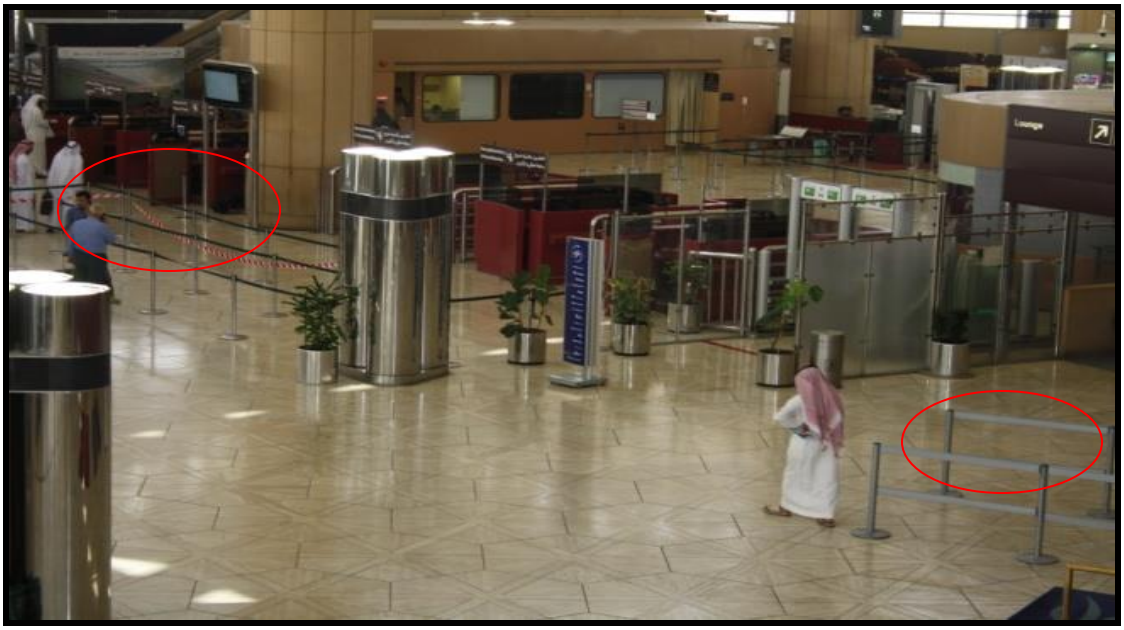


Figure 6.4: Queues in the Departure Area at KKIA after Modifications (photo taken by the researcher)

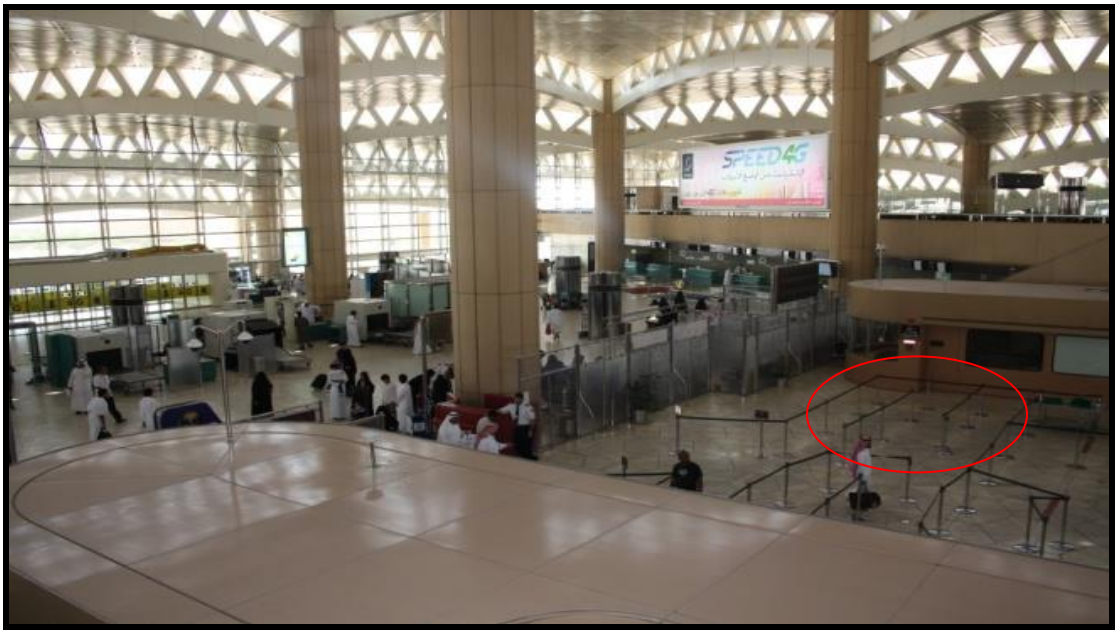


Figure 6.5: Queues in the Departure Area at KKIA after Modifications (photo taken by the researcher)

Figure 6.6: Queues in the Departure Area at KKIA after Modifications (photo taken by the researcher)

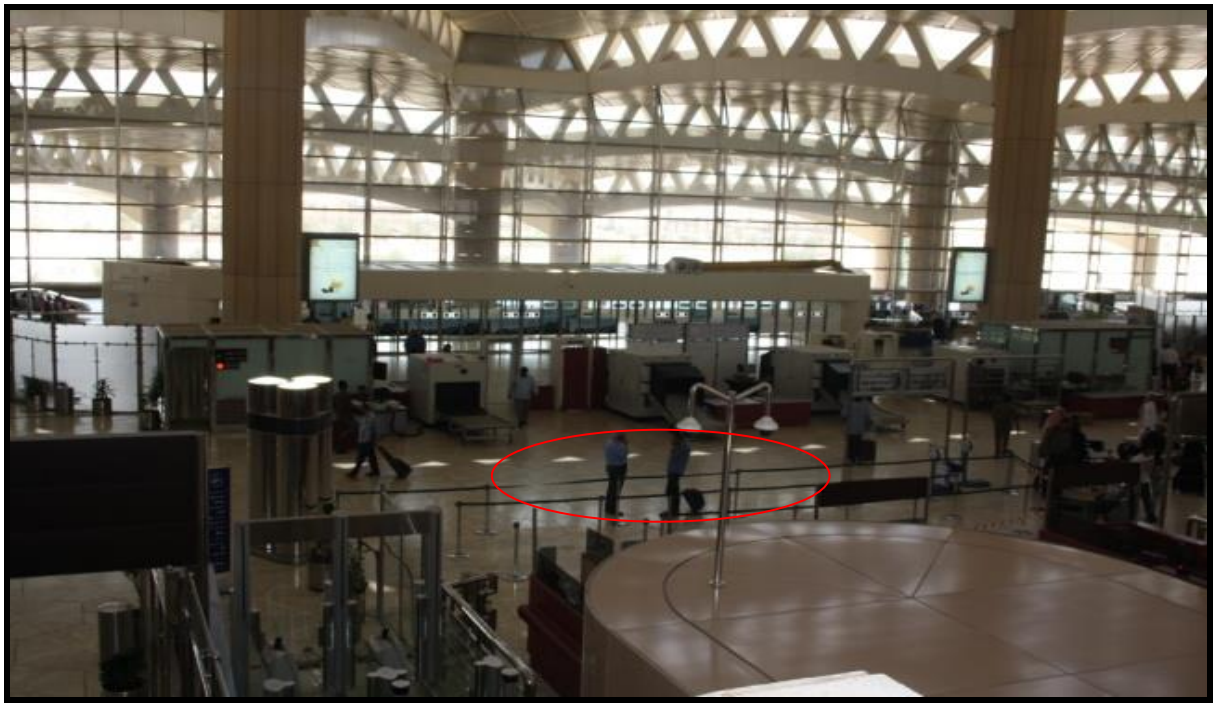


Figure 6.7: Queues in the Departure Area at KKIA after Modifications (photo taken by the researcher)

6.2.3. Increasing the Number of Self-service Check-in Kiosks

Self-service check-in kiosks are characterized by many features that make them better than traditional counters. Self-service check-in kiosks do not require employees, can work 24 hours a day and seven days a week, and can conduct the required transactions quickly and accurately. However, in Saudi culture, there are some people who cannot utilize electronic instruments easily, as well as people who suffer from technophobia; these sorts of people prefer traditional kiosks. They need guidance on how to use self-service kiosks. Also, if self-service check-in kiosks break down, traditional check-in counters are needed. However, as a conclusion, both traditional and self-service check-in counters are required in the aviation industry. Based on this conclusion, both types were being used in the departure area at KKIA.

The problem that appeared in regard to the check-in area was the crowding in front of the check-in terminals and the required time to pass through this border from passengers' perspectives. The solution selected for this problem was to increase the number of self-service check-in kiosks from three to ten. The number of traditional counters remained the same. This change can be seen in the following photos.

Figure 6.8: Traditional Check-in counters in the Departure Area at KKIA (photo taken by researcher)

Figure 6.9: Self-service Check-in Kiosks in the Departure Area at KKIA (photo taken by researcher)

In the previous figures, both traditional counters (figure 6.8) and self-service check-in kiosks (figure 6.9) are shown.

6.2.4. Sort, Set in order, Shine, Standardize and Sustain (5S)

As mentioned before, the 5S strategy consists of five main steps: sort, set in order, shine, standardize and sustain. The first two steps were done in the 'analyse' step of the DMAIC methodology. This section details the implementation of the remaining 5S steps.

The 'shine' step was realized by performing the improvements in the departure area at KKIA to the highest possible quality and standards. These improvements were based on the identification of the problems, the measurement and analysis of the data collected, and forecasting (to estimate low, moderate and high passenger numbers). The developments were also based on the analysis of the questionnaires and interviews, which helped in identifying the main problem, the sub-problems and the causes of the problems. The 'shine' step was mainly achieved by improving facilities and services through redesigning the departure area landside, as mentioned earlier in this chapter.

The next 5S strategy is ‘standardize’, which is achieved by conducting audits of working processes and the developments carried out. Hence, it involves looking for defects in the improvements and trying to standardize and improve the processes. This sustainability and continuous improvement. The senior management were informed through the project and need to able informed of the recommendations. The improvements should be continuously evaluated and checked so that defects can be eliminated directly and with the least time and costs.

Finally, the ‘sustain’ step entails ensuring the sustainability of the improvements, which is necessary for continuous economic growth and the avoidance of previous problems returning. The implemented practices and strategies can be maintained by creating a culture with a shared set of values. In KKIA, the ability to perform the change successfully whilst considering the individual, team and organizational perspectives, along with a proper understanding of the culture in the airport, helped in creating the shared values and sustaining the development.

By achieving the ‘improve’ step, the departure area at KKIA was enhanced as desired. However, this was not the end of the DMAIC process; there were still several steps that needed to be performed to ensure the effectiveness and efficiency of the changes. Therefore, the next step was done in order to measure the effectiveness and efficiency of the changes.

6.2.5. SERVQUAL and Statistical Analysis

The sample size (The post-implementation data collection was 461) (Chapter 4, table 4.1), participants selected from passengers in the departure area at KKIA. In total, 545 questionnaires were distributed at different times and on different days. The 84 missing questionnaires were deleted due to reasons such as incomplete forms, giving more than one answer to any question or being spoilt.

This section analyses and describes the variables from a statistical point of view, including means, standard deviations and t-values. Descriptive analysis (means and standard deviations) is used to describe the passengers’ attitudes towards the statements.

Table 6. 1: Means and Standard Deviations of Expected Services

Variable	Question	Mean	Standard Deviation
TANGIBLES	1. Excellent airports will have modern-looking equipment	5.62	0.74
	2. The physical facilities in excellent airports will be visually appealing	5.54	0.76
	3. The personnel in excellent airports will be neat in appearance	5.66	0.86
	4. The materials associated with services (such as pamphlets or statements) will be visually appealing in excellent airports	5.67	0.75
RELIABILITY	5. When excellent airports promise to do something by a certain time, they will do it	6.56	0.58
	6. When a passenger has a problem, an excellent airport will show a sincere interest in solving it	6.49	0.68
	7. Excellent airports will get things right the first time	6.47	0.63
	8. Excellent airports will provide their services at the time they promise to do so	6.56	0.62
	9. Excellent airports will insist on error-free records	6.44	0.66
RESPONSIVENESS	10. The personnel in excellent airports will tell passengers exactly when services will be performed	6.16	0.52
	11. The personnel in excellent airports will give prompt services to passengers	6.13	0.82
	12. The personnel in excellent airports will always be willing to help passengers	6.27	0.73
	13. The personnel in excellent airports will never be too busy to respond to passengers' requests	6.18	0.68
ASSURANCE	14. The behaviour of the personnel in excellent airports will instil confidence in passengers	6.05	0.63
	15. The passengers of an excellent airport will feel safe in their dealings with the airport's services	5.88	0.83
	16. The personnel in excellent airports will be consistently courteous to passengers	5.94	0.78
	17. The personnel in excellent airports will have the knowledge to answer passengers' questions	5.98	0.72

EMPATHY	18. Excellent airports will give passengers individual attention	6.10	0.69
	19. Excellent airports will have operating hours that are convenient for all their passengers	6.01	0.84
	20. Excellent airports will have staff who give passengers personal attention	6.07	0.81
	21. Excellent airports will have passengers' best interests at heart	6.08	0.77
	22. The personnel of excellent airports will understand the specific needs of their passengers	6.00	0.75

In addition, the survey above (Table 6.1) was conducted after the implementation of the changes "Post- implementation Data Collection".

The results show positive responses towards the expected services in the departure area at KKIA. For the first variable, tangibles, the highest scores were for the fourth statement: "The materials associated with services (such as pamphlets or statements) will be visually appealing in excellent airports", with a mean value of 5.67. The lowest scores were for the second statement: "The physical facilities in excellent airports will be visually appealing", with a mean value of 5.54.

For the second variable, reliability, the highest scores were for the fifth and eighth statements: "When excellent airports promise to do something by a certain time, they will do it" and "Excellent airports will provide their services at the time they promise to do so" (respectively), with mean values of 6.56. The lowest scores for this variable were for the ninth statement: "Excellent airports will insist on error-free records", with a mean value of 6.44.

For the variable of responsiveness, the highest scores were for the twelfth statement: "The personnel in excellent airports will always be willing to help passengers", with a mean value of 6.27. The lowest scores were for the eleventh statement: "The personnel in excellent airports will give prompt services to passengers", with a mean value of 6.13.

For the fourth variable, assurance, the highest scores were for the fourteenth statement: “The behaviour of the personnel in excellent airports will instil confidence in passengers”, with a mean value of 6.05. The lowest scores for this variable were for the fifteenth statement: “The passengers of an excellent airport will feel safe in their dealings with the airport’s services”, with a mean value of 5.88.

For the last variable, empathy, the highest scores were for the eighteenth statement: “Excellent airports will give passengers individual attention”, with a mean value of 6.10. The lowest scores for this variable were for the twenty-second statement: “The personnel of excellent airports will understand the specific needs of their passengers”, with a mean value of 6.00.

In general, these results reflect positive expectations of the service quality in the departure area at KKIA; in other words, passengers expect to find high-quality services in the departure area at KKIA. The SERVQUAL questionnaire measures expectations to determine the required quality of services, which can help in achieving customer satisfaction. Also, this questionnaire measures their perceptions in order to determine the current service quality in the departure area at KKIA, so the results can determine the gaps between expectations and perceptions. The next table shows the means and standard deviations reflecting customer attitudes towards the perception questions. It was found that there were positive attitudes towards all the statements because the means were above the mean of the scale.

Table 6. 2: Means and Standard Deviations of Perceived Services after Modifications

Variable	Question	Mean	Standard Deviation
TANGIBLES	1. The airport has modern-looking equipment	4.48	1.14
	2. The physical facilities in the airport are visually appealing	4.48	1.25
	3. The personnel in the airport are neat in appearance	4.37	1.40
	4. The materials associated with services (such as pamphlets or statements) are visually appealing	4.39	1.32
RELIABILI Y	5. When the airport promises to do something by a certain time, it does it	4.93	0.66
	6. When you have a problem, the airport shows a sincere interest in solving it	5.02	0.70
	7. The airport gets things right the first time	5.00	0.78
	8. The airport provides its services at the time it promises to do so	4.72	0.72
	9. The airport insists on error-free records	4.47	0.66
RESPONSIVENESS	10. The personnel in the airport tell you exactly when services will be performed	4.51	0.62
	11. The personnel in the airport give you prompt services	4.60	0.64
	12. The personnel in the airport are always willing to help you	4.54	0.69
	13. The personnel in the airport are never too busy to respond to your requests	4.35	0.64
ASSURANCE	14. The behaviour of the personnel in the airport instils confidence in you	4.37	0.62
	15. You feel safe in your dealings with the airport's services	4.34	0.72
	16. The personnel in the airport are consistently courteous to you	4.29	0.73
	17. The personnel in the airport have the knowledge to answer your questions	4.31	0.55

EMPATHY	18. The airport gives you personal attention	4.39	0.70
	19. The airport has operating hours that are convenient for all its passengers	4.49	0.76
	20. The airport has personnel who give you personal attention	4.23	0.73
	21. The airport has your best interests at heart	4.29	0.78
	22. The personnel of the airport understand your specific needs	4.23	0.61

According to the seven-point Likert scale of agreement in the SERVQUAL questionnaire, the mean of this scale is 4. As can be seen in Table 6.2, all the variables scored values above the mean of the scale, which indicates positive responses towards the perception aspect from the participants' viewpoints.

For the first variable, tangibles, the highest scores were for the first and second statements "The airport has modern-looking equipment" and "The physical facilities in the airport are visually appealing" (respectively), with mean values of 4.48. The lowest scores were for the third statement: "The personnel in the airport are neat in appearance", with a mean value of 4.37.

The results reflect the improvements to the tangibles in the departure area, namely redesigning the layout of the departure area landside, creating new space to solve the problem of separating the boarding area from the immigration area, and increasing the number of self-service check-in kiosks. However, the air-conditioning system is one of the remaining major problems, especially during the summer period. The researcher believes that decreasing the temperature from 25/26°C to 22 or 23°C in the departure area would enhance passenger satisfaction.

For the second variable, reliability, the highest scores were for the sixth statement: "When you have a problem, the airport shows a sincere interest in solving it", with a mean value of 5.02. The lowest scores for this variable were for the ninth statement: "The airport insists on error-free records", with a mean value of 4.47.

The results reflect the improvements to the reliability in the departure area, as the airport's management has started to focus on providing services in a timely and accurate manner. Passengers do not have to queue for a long time and can submit feedback to the suggestions and complaints box in the waiting area. However, the airport's management should try to sympathize with passengers when they submit complaints and try to resolve the issues.

For the variable of responsiveness, the highest scores were for the eleventh statement: "The personnel in the airport give you prompt services", with a mean value of 4.60. The lowest scores were for the thirteenth statement: "The personnel in the airport are never too busy to respond to your requests", with a mean value of 4.35.

The results reflect the improvements to the responsiveness in the departure area. The personnel in the airport now offer a better experience in guiding and helping passengers. There are personnel who stand near the queues at the boarding area to answer simple questions; the management has created a desire among the workers to help travellers. It is worth mentioning that smiling whilst offering help is always required by the staff, even at critical points within the airport (such as the security checkpoint, check-in area and immigration area). Unhappiness in the passengers as analysed in the research was detailed to the senior airport managers. Training courses in customer care (We Care, 2012) were developed as a result of this research. However, the staff should be further trained to inform travellers about key service details (e.g. travel times).

For the fourth variable, assurance, the highest scores were for the fourteenth statement: "The behaviour of the personnel in the airport instils confidence in you", with a mean value of 4.37. The lowest scores for this variable were for the sixteenth statement: "The personnel in the airport are consistently courteous to you", with a mean value of 4.29.

The results reflect the improvements to the assurance in the departure area. The personnel operate smoothly and focus on delivering a high level of help and service. KKIA's personnel have undergone training courses so that they may deliver the expected services and improve passenger satisfaction. The management has also launched its Front-Line programme, which requires staff to wear badges behind their airport IDs. These badges specify the name and job of the bearer (see Figure 6.10) and contain the words "WE

CARE". This has increased the personnel's service mentality. However, KKIA should develop training programmes to increase its personnel's technical skills.

Figure 6. 10: Front-Line Badge (KKIA HR Department, 2012)

For the last variable, empathy, the highest scores were for the nineteenth statement: "The airport has operating hours that are convenient for all its passengers", with a mean value of 4.49. The lowest scores for this variable were for the twenty-second statement: "The personnel of the airport understand your specific needs", with a mean value of 4.23.

The results show that there have been some improvements to the empathy in the departure area. The personnel in the airport understand and realize the significance of paying friendly attention to passengers' needs. As well as the training and badges that have been implemented under the Front-Line programme, new uniform designs have

been applied. However, one-off training is not sufficient. KKIA needs to give this issue more attention, supervise the training, and prepare a continuous and transparent monitoring system (random checks). The training sessions should inform staff of the role of their behaviour in the process of lean management and in improving the airport's level of service quality.

These results indicate the high satisfaction levels of passengers with the service quality available in the departure area at KKIA, as all of the scores were above the mean of the scale. However, to measure the service quality, the responses of the participants on both perceptions and expectations were compared, in order to find the differences between the expectations and perceptions of the participants.

The significance of some features was also measured through the SERVQUAL questionnaire, and the results of the collected data are explained in the table below.

Table 6. 3: Significance of Each Feature in the Departure Area at KKIA

Feature	Percentage
The appearance of the airport's physical facilities, equipment, personnel and communication materials	19.96
The airport's ability to perform the promised service dependably and accurately	24.52
The airport's willingness to help passengers and provide a prompt service	21.75
The knowledge and courtesy of the airport personnel and their ability to convey trust and confidence	17.45
The caring, individualized attention that the airport provides to its passengers	16.27

Table 6.3 above shows that the participants placed highest importance on the second feature: "The airport's ability to perform the promised service dependably and accurately". The least significant feature from the passengers' perspective was "The caring, individualized attention that the airport provides to its passengers".

Table 6. 4: The Importance of the Study Variables

Variable	Number of Times Grade 5 Chosen
1. Tangibles	308
2. Reliability	0
3. Responsiveness	0
4. Assurance	33
5. Empathy	116

It was found that the tangibles variable had the highest degree of importance, according to the sample (table 6.4). This was followed by empathy and then assurance. Reliability and responsiveness received the least responses.

In order to evaluate the hypothesis, it was tested again after the modifications had been applied to the departure area at KKIA. The hypothesis was:

$H1_0$: There is no statistically significant difference ($\alpha \leq 0.05$) between the expected dimensions and the perceived dimensions for the services offered at KKIA.

The t-test was used to test this hypothesis with paired samples, and the results can be seen in the following table 6.5:

Table 6. 5: Paired Samples T-test

Paired Samples Statistics				
Dimension		**Mean**	**N**	**Std. Deviation**
Tangibles	Expectations	5.62	461	1.14
	Perceptions	4.43	461	0.59
Reliability	Expectations	6.50	461	0.37
	Perceptions	4.83	461	0.43
Responsiveness	Expectations	6.18	461	0.29
	Perceptions	4.50	461	0.48
Assurance	Expectations	5.96	461	0.32
	Perceptions	4.33	461	0.55
Empathy	Expectations	6.05	461	0.38
	Perceptions	4.33	461	0.54
Total	Expectations	6.08	461	0.30
	Perceptions	4.49	461	0.37

Paired Samples Test				
Dimension		**T**	**df**	**Sig. (2-tailed)**
Tangibles	P-E	23.81	460	0.00
Reliability	P-E	74.98	460	0.00
Responsiveness	P-E	76.02	460	0.00
Assurance	P-E	60.12	460	0.00
Empathy	P-E	69.87	460	0.00
Total	P-E	116.63	460	0.00

Table 6.5 above shows that there was a positive gap between the expected and perceived dimensions for the total service, which means that the expected service level was lower than the perceived one. The t-value for each difference is significant at the 0.05 level, so the null hypothesis was rejected and an alternative one was accepted. This means that there is a statistically significant effect (at $\alpha \leq 0.05$) of lean management practices on the quality of service / customer satisfaction (including tangibles, reliability, responsiveness, empathy and assurance).

Also, the gaps were measured for these scores in order to understand which area most benefits from the significant differences in the t-test results. The following table 6.6 explains the gap score analysis for each dimension individually and for the total score.

Table 6. 6: Gap Score Analysis

Dimension	N	Mean	Std. Deviation	Skewness	Kurtosis
Gap in tangibles	461	-1.19	1.07	1.068	1.10
Gap in reliability	461	-1.67	0.47	0.554	2.00
Gap in responsiveness	461	-1.68	0.47	0.178	0.78
Gap in assurance	461	-1.63	0.58	-0.767	-0.42
Gap of empathy	461	-1.72	0.53	-0.422	-0.48
Total gap	461	-1.59	0.29	-0.773	1.11
Valid N (list-wise)	461				

The gap values resulted from the differences between expectations and perceptions mean values. The following points discuss the most important highlights from this analysis:

- *Tangibles:* The average gap for this dimension is -1.19. Also, the distribution is positively skewed with a skewness of 1.06, which indicates that the figures deviate more to the right. The Kurtosis value is 1.10, which means that there is clustering somewhere away from the mean of (-1.19).

- *Reliability:* The average gap for this dimension is -1.67. Also, the distribution is positively skewed with a skewness of 0.55, which indicates that the figures deviate more to the right. The Kurtosis value is 2.00, which means that there is clustering somewhere away from the mean of (-1.67).

- *Responsiveness:* The average gap for this dimension is -1.68. Also, the distribution is positively skewed with a skewness of 0.17, which indicates that the figures deviate more to the right. The Kurtosis value is 0.781, which means that there is clustering somewhere away from the mean of (-1.68).

- *Assurance:* The average gap for this dimension is -1.63. Also, the distribution is negatively skewed with a skewness of -0.76, which indicates that the figures deviate more to the right. The Kurtosis value is -0.421, which means that there is clustering somewhere away from the mean of (-1.63).

- *Empathy:* The average gap for this dimension is -1.72. Also, the distribution is negatively skewed with a skewness of -0.42, which indicates that the figures deviate more to the right. The Kurtosis value is -.481, which means that there is clustering somewhere away from the mean of (-1.72).

- *Total Gap:* The average gap for this dimension is -1.59. Also, the distribution is negatively skewed with a skewness of -0.77, which indicates that the figures deviate more to the right. The Kurtosis value is 1.11, which means that there is clustering somewhere away from the mean of (-1.59).

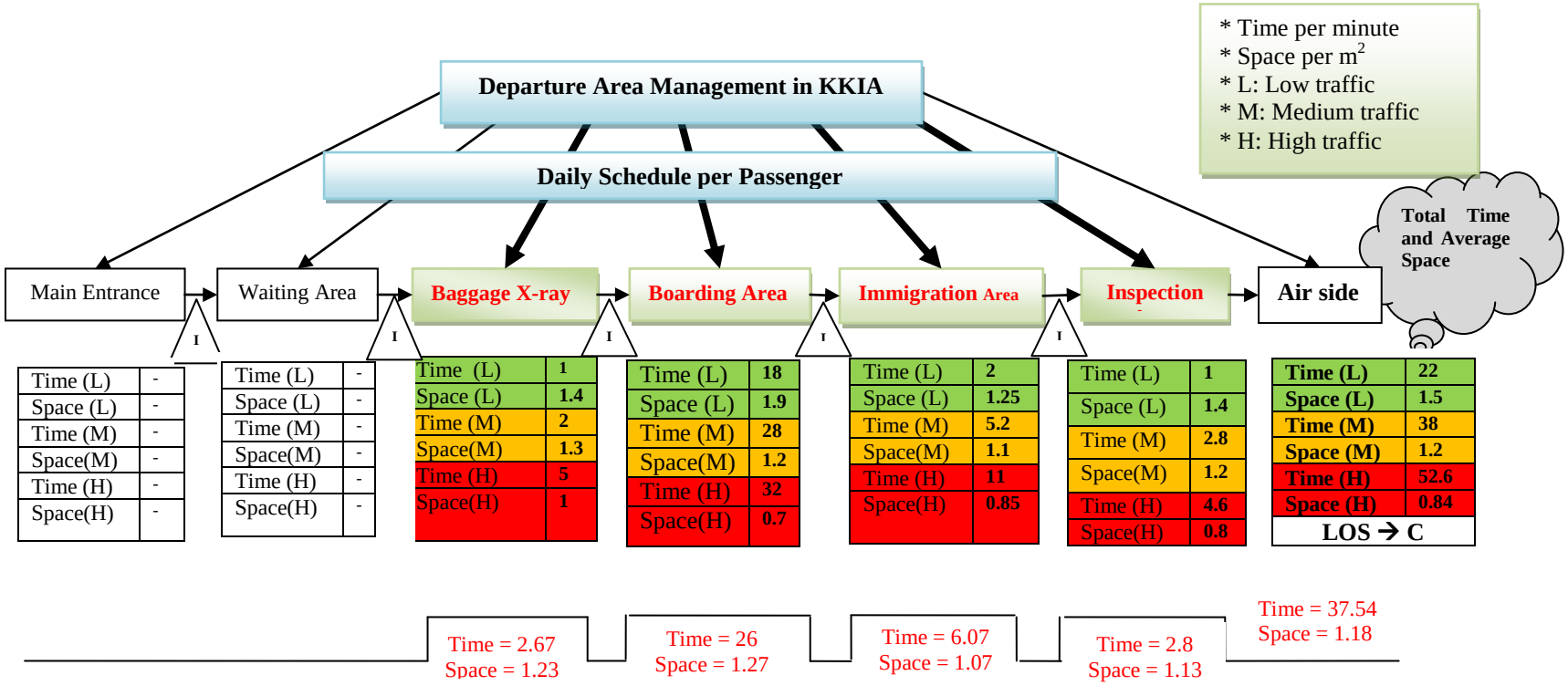
Based on the results above, it is clear that the negative gaps have disappeared, as the perceived service levels are higher than the expected service levels. This indicates that the modifications to all aspects of the departure area at KKIA were successful.

Table 6. 7: Summary of the Gaps before and after Modifications

Dimension	Before	After
Gap in tangibles	-2.27	-1.19
Gap in reliability	-2.58	-1.67
Gap in responsiveness	-2.56	-1.68
Gap in assurance	-2.40	-1.63
Gap in empathy	-2.20	-1.72
Total gap	-2.40	-1.59

6.2.6. VSM after Modifications

In order to measure the enhancements in waiting times and passenger space in the departure area at KKIA, the VSM tool was used again. The resulting map is shown in figure 6.11 in next page



Performance Standard (IATA)

* 90% of passengers can access the airport within 30–45 minutes (travel through the airport)).

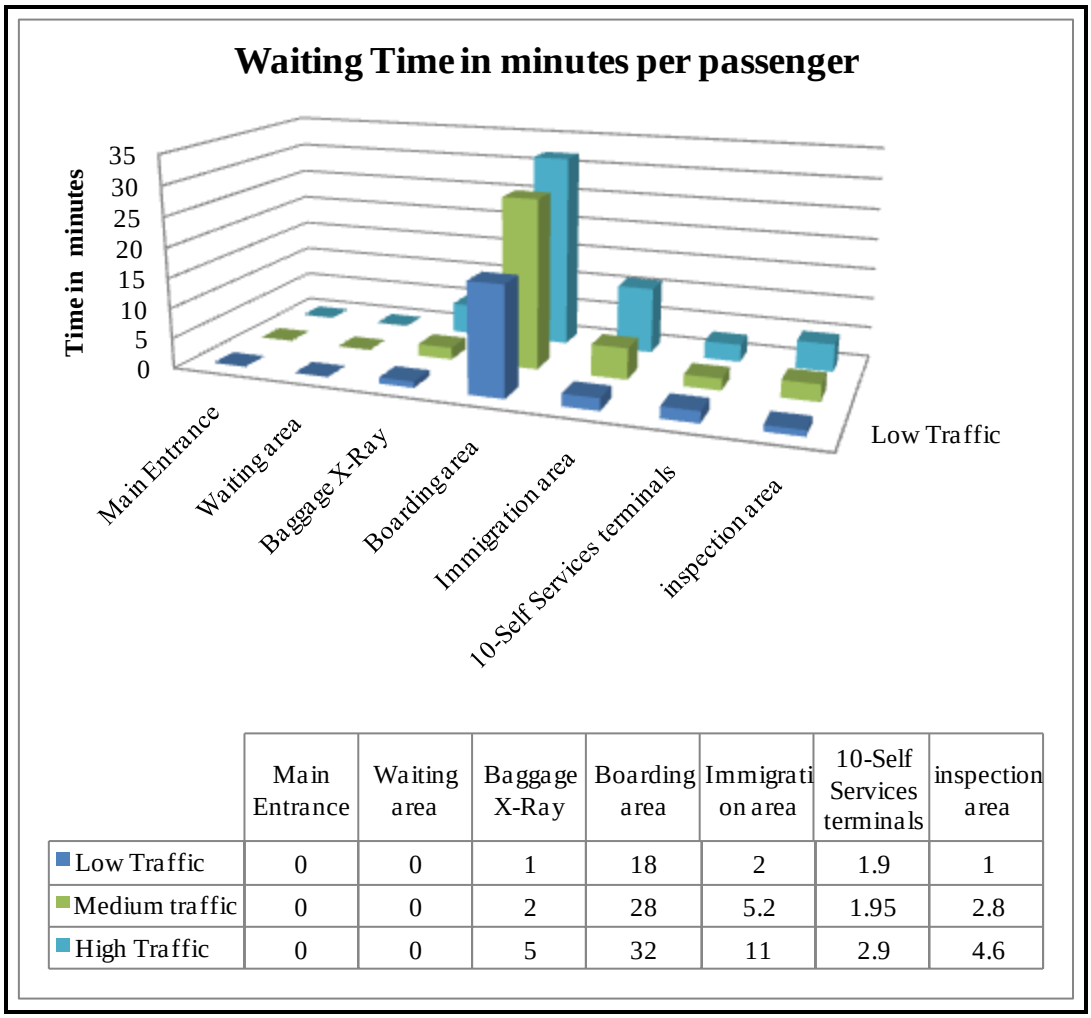
* 90% of the passengers are served within 5–10 minutes (Boarding Area).

* 90% of the passengers are served within ten minutes of waiting (Immigration Area)

***** 90–95% of the passengers are screened within three minutes of waiting (Security Screening).

Figure 6. 11: VSM Chart after Modifications

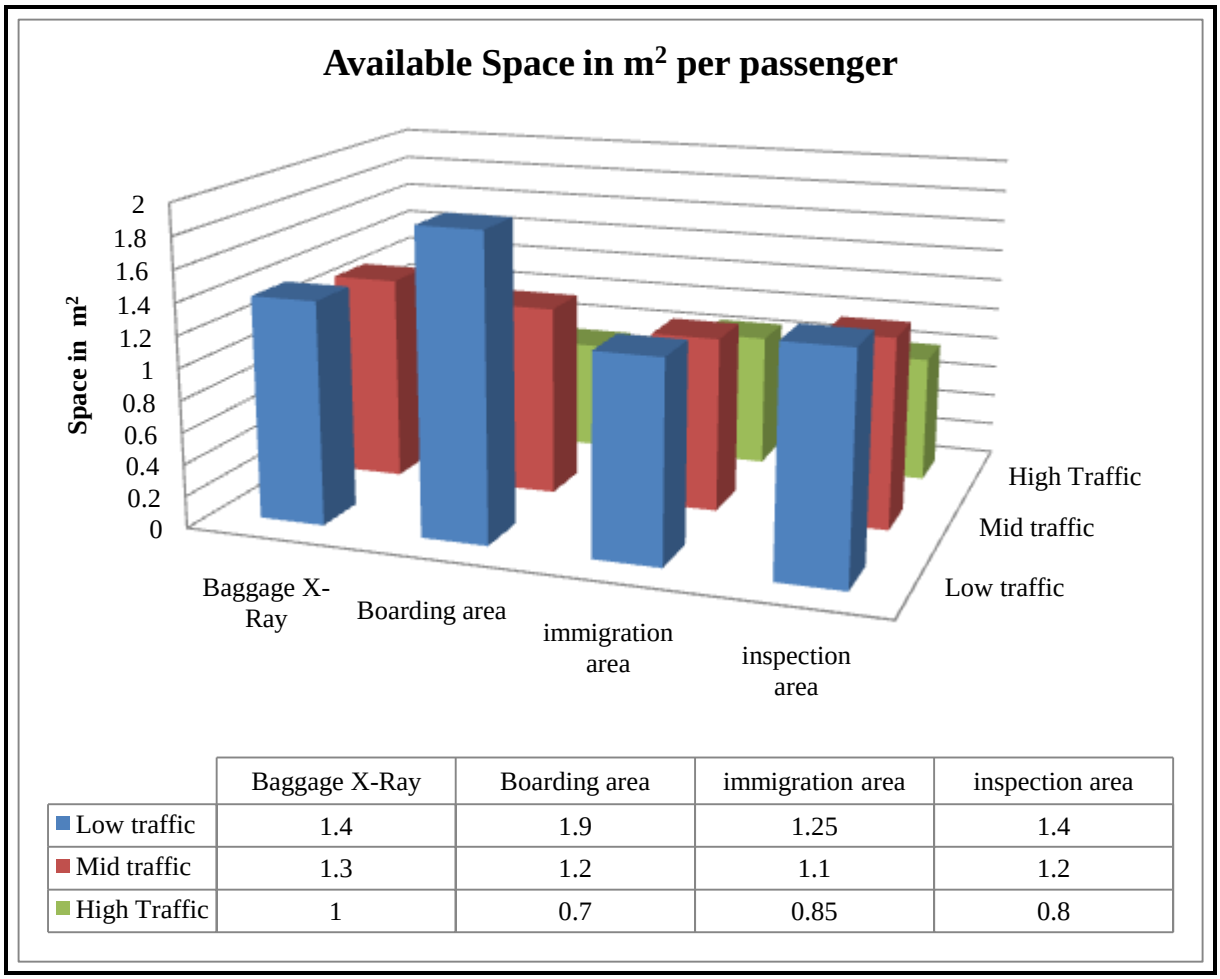
According to the previous figure, the level of service has enhanced to reach the C level on the IATA LOS scale. The following figure 6.12 shows the average waiting time in each area in detail. It appears that the numbers have been enhanced after the modifications.



	Main Entrance	Waiting area	Baggage X-Ray	Boarding area	Immigration area	10-Self Services terminals	inspection area
Low Traffic	0	0	1	18	2	1.9	1
Medium traffic	0	0	2	28	5.2	1.95	2.8
High Traffic	0	0	5	32	11	2.9	4.6

Figure 6. 12**: Waiting Times per Passenger in the Departure Area at KKIA after Modifications**

The available space for each passenger in each area of the departure area at KKIA is explained in the following figure 6.13. It appears that the numbers have been enhanced after the modifications.



	Baggage X-Ray	Boarding area	immigration area	inspection area
Low traffic	1.4	1.9	1.25	1.4
Mid traffic	1.3	1.2	1.1	1.2
High Traffic	1	0.7	0.85	0.8

Figure 6. 13: Available Space for each Passenger in the Departure Area at KKIA after Modifications

According to the IATA LOS scale, the results in regard to time and space per passenger indicate that the departure area at KKIA has a level of service (C). This mean is a ‘’Good’’ level with acceptable delays and stable flows based on the IATA LOS scale. This increase in LOS indicates that the implementation of the DMAIC methodology has enhanced the services in the departure area landside at KKIA in an obvious way.

6.3. Controlling Improvements

The ‘control’ step is achieved by continuously reviewing the achieved changes. For the departure area at KKIA, a mind diagram was composed to understand and review the changes carried out. Regular audits of the actions taken and the standards followed should be undertaken, along with continuous monitoring and assessment.

Moreover, control is achieved by creating a culture that understands the importance of changes and hence works to sustain the developments; this is achieved by properly understanding the organization's culture and its needs and the successful management of change.

In the departure area at KKIA, the control phase is significant for maintaining service quality and IATA LOS standards because the improvements must be controlled and sustained to avoid regressions to the previous state. As the number of passengers is increasing annually, this requires the proper control of the improvements using questionnaires and assessments.

In this project, the passengers' satisfaction with the services in the departure area at KKIA was evaluated twice by distributing SERVQUAL questionnaires before and after the implementation of the lean practices suggested by the researcher. In addition, the results of the questionnaires were reinforced by interviews with the airport's supervisors and managers.

Actually, in DMAIC projects, the 'control' phase is implemented by the use of different tools. This study cannot cover this process for the departure area at KKIA because of time limits. Therefore, the following tools are proposed for this phase:

- Kaizen theory
- Failure mode and effects analysis (FMEA)
- A control plan

6.3.1. Kaizen Theory

Kaizen is a Japanese word that means continues improvement (Thessaloniki, 2006). The kaizen philosophy consists of many organizational components, as shown in figure 6.14.

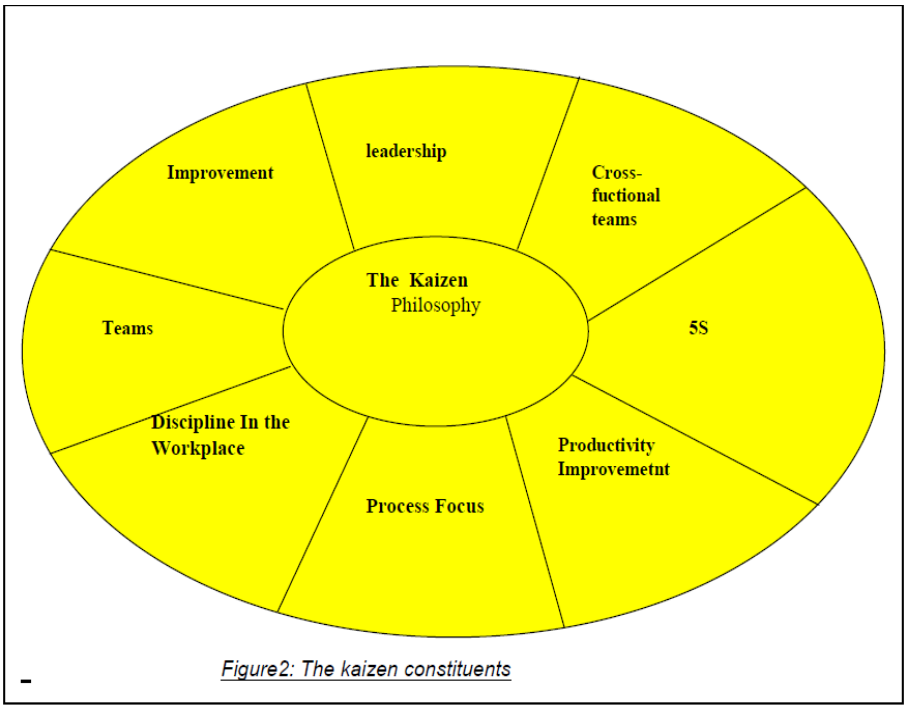


Figure 6. 14: Kaizen Theory Components (Thessaloniki, 2006)

Some of the tools used in the present study's implementation of the DMAIC methodology in the departure area at KKIA are components of kaizen philosophy, such as the 5S strategy. The aim of using kaizen philosophy in the departure area at KKIA would be to achieve continuous improvement. Therefore, many strategies have been applied to collect recommendations and suggestions for improvements from employees, managers and passengers in the departure area at KKIA. One of these strategies was the addition of a suggestions box to the waiting area. Another strategy is holding interviews with managers. Also, frequent meetings should continue to be held with employees and managers to let them participate in decision making so that the most important suggestions can be taken into consideration.

6.3.2. Failure mode and effects analysis

FMEA is a very effective tool to find quick solutions by predicting the possible failures in any process or service before they occur. In the departure area at KKIA, this tool could be used to control the services by tracking them and predicting possible failures. This would allow any failures to be addressed immediately. This control system could be used in the departure area landside at KKIA by the use of the following table 6.8.

Table 6. 8: FMEA Control Chart in the Departure Area at KKIA

Team: _____	Project: Checking in			Date: _____
Service or process	**Expected Failure**	**Expected Effects of Failure**	**Potential Causes**	**Recommended Actions**
-Self-service check-in kiosks	Some passengers will not use the kiosks	Passengers will change to traditional counters to check in	Passengers are not familiar with the technology	Offer guidance on how to use self-service kiosks
-Queuing theory	Increased the passengers at queuing	Delay for check-in , scanning passport, and checking security	Many flights in the same time	Consider time of flights to spread flights through the 24 hours 7 days a week Workers (Chapter 5, figure 5. 14 Peak Hours)
-Inspection area	Increased the passengers at queuing	Miss flights	Staff	supervise the Ctraining, and prepare a continuous and transparent monitoring system (random checks).

To ensure the benefits obtained from the improvement initiatives are sustained, the IATA LOS scale below should be followed.

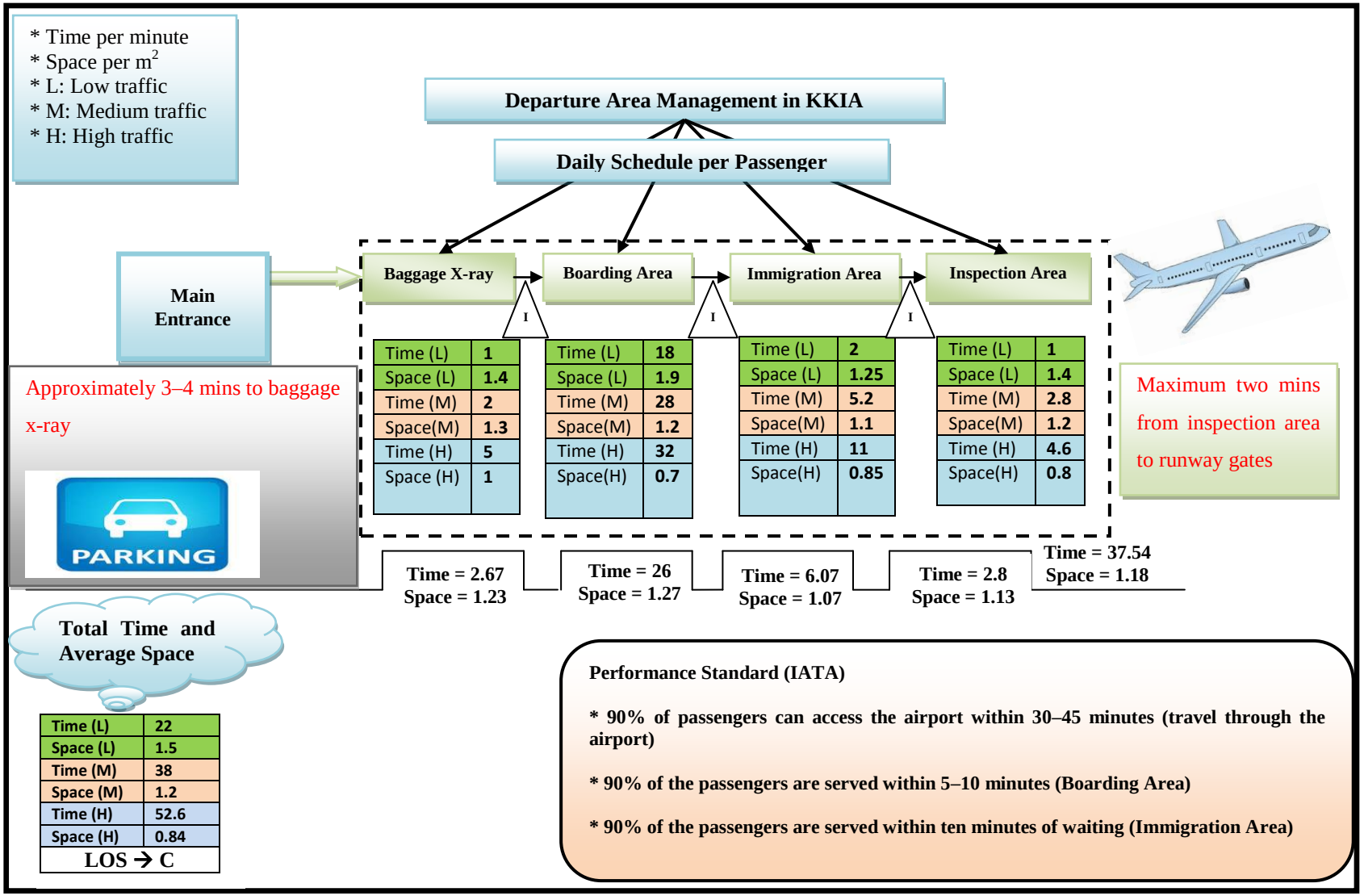


Figure 6. 15: VSM after modifications in the departure area at KKIA

6.3.3. Control Plan

A control plan decides the main plans for an organization over a specific period of time. In the list below, the researcher suggests certain points that should be followed in the airport in the next three years, in order to maintain service quality and enhance the level of service in the departure area at KKIA.

- The first strategy for the managers of the departure area at KKIA should be to conduct regular meetings to identify any issues. The managers can then identify the best possible solutions to these issues.

- Training and development are very important in any organization. Therefore, it is suggested that training courses should be held for the employees of the departure area at KKIA, especially on topics related to lean and six-sigma strategies. They should also be trained in managerial procedures.

- It is suggested that the management should train additional teams to be yellow and green six-sigma belts, as a kind of employee development.

- Evaluate customer satisfaction, it is suggested that a SERVQUAL questionnaire or other quality measurement tool be distributed yearly among passengers. The results of the collected data could aid in improving quality control in the departure area at KKIA.

- It is suggested that the airport should monitor its services against some international standards of aviation service quality, such as the IATA standards.

All of the previous points focus on quality improvement. For other improvements for KKIA in general, it is suggested that postgraduate students should be assisted in conduct research using the airport as a case study, in order to utilize the results of such research for future improvements in the airport.

Regarding the services in the departure area, the DMAIC methodology still needs to be applied in the following areas:

- The parking of the airport has not been improved at all and still follows traditional techniques (entrance and exit gates with operators issuing parking tickets).

- There is no advanced technology in the inspection area to increase the flow of passengers.
- The general transportation to and from the airport is weak and needs to addressed urgently.

All of the above are general suggestions to modify the airport. These could be considered by the professionals managements the departure area at KKIA.

These are the most significant results of this study. The steps in implementing the DMAIC approach with lean thinking are explained in detail in chapters 5 and 6. The following table explains the most significant conclusions after the implementation:

Table 6. 9: Results after Implementing the DMAIC Approach with Lean Thinking in the Departure Area at KKIA

Step	Tool	Results
Define	Observations	It can be summarized that there were huge crowds in all areas in the departure area, which was the reason that the passenger distribution was not organized. It is also found that the crowds in the entrance area were making people nervous and uncomfortable.
	VOC	Customer satisfaction is linked with implementing customer requirements and ensuring the desired products or services are as expected or better.
	CTQ tree	It can also be concluded that five dimensions such as tangibles, reliability, responsiveness, assurance and empathy are main CTQ factors. It can also be summarized that these are the dimensions of SERVQUAL questionnaires.
	VSM	From the results, it can also be concluded that to map all the processes that face a passenger from their first step into the airport until they reach their plane, this tools was effective to use by the researcher. It was also effective for value-added places in the departure area.

Step	Tool	Results
	SWOT analysis	It can also be summarized that use of SWOT analysis tool was effective to highlight the most significant strengths, weaknesses, opportunities and threats in the departure area to define the problem in the departure area at KKIA
	SIPOC process mapping	It can also be stated that to determine the inputs and outputs of each process in order to understand all details of the process, the use of SIPOC process mapping was effective for the researcher.
	Problem and goal statement	The counter in the waiting area was located between the main entrance and the entrance to the immigration area. It is found that the entrance and exit of the boarding area were not separated. Passengers had to enter the boarding area from the waiting area, check their baggage in and then return to the waiting area to reach the immigration area. The number of e-gates (two) in the immigration area was not suitable for the number of passengers. The number of self-service check-in kiosks is not sufficient for the number of customers: there are only three self-service check-in kiosks. There is no system to organize the queues in the departure area at KKIA.
Measure	VSM	Based on the IATA LOS scale, the waiting times and space available for each passenger placed the airport at level E.
	CTQ factors (using SERVQUAL questionnaires)	Reduction the differences between the passengers' expected level of services and the perceived level they faced.
	Conducting interviews	Interviews were held with the managers in the departure area.
Analyse	5S strategy	It is found that sort and set in order was two strategies, in which, under sort the counter was placed in the middle of departure area and opposite to the check-in counters. Additionally, in set in order strategy the counter was not placed correctly, so removing it could add space.
	SERVQUAL analysis	From the results of this analysis, it is found that there was dissatisfaction from customers' perspectives, as negative gaps appeared between the expected and perceived levels of

Step	Tool	Results
		services.
	Interview analysis	Through interview, it is identified that the managers aimed to improve the airport's services but strategy was a problem. Therefore, the DMAIC strategy was used to improve the level of service.
	Cause and effect diagram	It can also be concluded that the use of cause and effect diagram was effective to identify all the causes of the level of service problem in the departure area.
Improve	Reorganising the layout	Through this tool, the layout was organized. The counter (the gift shop) was removed. The entrance to the boarding area was combined with the entrance to the immigration area and the entrance and exit of the boarding area were separated.
	Queuing theory	By queuing theory, queues were added in front of, the entrance to the boarding area (x-ray inspection border), the boarding bus, immigration terminals and X-ray inspection after the immigration terminals
	Increasing the number of self-service check-in kiosks	With the help of this tool, the number of self-service check-in kiosks was expanded from three to ten.
	5S strategy	In this, through shine strategy the layout of the departure area was redesigned. In addition, through standardize strategy, the improvements were standardized. Beside these, through sustain strategy measures were put in place to ensure the sustainability of the improvements.
	SERVQUAL questionnaire and statistical analysis	Through this tool, it was found that the gaps were positive, which indicates increases in customer satisfaction for all areas.
	VSM	Through this tool, enhancements were detected in waiting times and space per passenger. In addition, the level of service in the departure area was enhanced to be C levels.
Control	Kaizen theory	In order to apply this theory suggestion and complaints boxes were added to the departure area. Additionally, in

Step	Tool	Results
		concern to this theory it was recommended to the management that company should conduct frequent meetings with employees to let them participate in decision making. Apart from this, it was also recommended that interviews should be held frequently with managers.
	FMEA	In regard to FEMA, it was recommended that a control chart can be used to manage any failures quickly.
	Control plan	It is identified that this tool was used for suggesting further improvements for the next three years.

The following table 6.10 is a summary of the improvements after the implementation of lean and six-sigma approach in the departure area at KKIA:

Table 6. 10: Summary of the improvements after the Implementation of the Six-sigma Approach in the Departure Area at KKIA

Measure	Before Lean Implementation	After Lean Implementation
Service quality (SERVQUAL)	Gap: P - E = -2.4062	Gap: P - E = -1.5932
Level of service	E (Inadequate) Unstable flows Unacceptable delays	C (Good) Stable flows Acceptable delays
Waiting time in the queue in the Baggage X-ray	3.67 mins	2.67mins (28% reduction)
Waiting time in the queue in the boarding area	42 mins	26 mins (38% reduction)
Waiting time in the queue in the immigration area	9.67 mins	6.07 mins (37% reduction)
Waiting time in the queue in the security area	3.07 mins	2.80 mins (9% reduction)
Total Waiting times	54.74 mins	34.87 mins (35.7% reduction)

Obstacles in the departure area landside	The area was completely filled to capacity	Area is improved: • More space • Increased passenger flow • Clear routes

6.4. Summary

In this chapter, the final two steps of the DMAIC methodology (the 'improve' and 'control' steps) were explained. Starting with the 'improve' step, many tools were used, such as the 5S strategy, SERVQUAL analysis, interview analysis, changing the layout of the departure area landside at KKIA, queuing theory, increasing the number of self-service check-in kiosks ,statistical analysis and VSM. The final step of the DMAIC approach is the 'control' step. Three tools were suggested for the airport to achieve this step: kaizen, FMEA and a control plan. The 'control' step provides a plan that will help the departure area to control any possible defects in the future.

Chapter Seven: Conclusion and Recommendations

7.1. Conclusion

This study analysed a very important and critical environment: the aviation environment. The study was a descriptive analytical study of an operational change process. The study was conducted in order to evaluate the effectiveness of using a lean six-sigma managerial approach to enhance the level of service and customer satisfaction in airport environments, in particular the departure area at KKIA. The work described lean implementation and the process of applying the DMAIC approach in the area from the start of the implementation until the final step (see table 6. 9). The main aim of the study was to identify, describe and suggest recommendations for service quality and level of service in the departure area at KKIA.

To this end, the passenger flow through the airport was assessed to measure the quality of services. Existing studies that discuss lean six-sigma implementation in airports were also explored. Afterwards, an in-depth exploration of the considerations and principles of lean six-sigma procedure was conducted, followed by the collection of appropriate data about the departure area at KKIA and its level of maturity. Following this, a SERVQUAL questionnaire was used to evaluate passenger satisfaction with the service level. It was shown to be level E of the IATA Performance standard (Inadequate) (see figure 5.15), Next, different models were evaluated for the implementation of lean six-sigma in the departure area at KKIA. Finally, a best practice lean six-sigma methodology was suggested for the departure area at KKIA, and the outcomes were related to future implementations at other airports.

These aims and objectives were achieved by following the DMAIC approach with lean thinking as the study methodology. The results show the following:

- Before any improvements were implemented, the level of service was measured level E (Inadequate) through tools such as a SERVQUAL questionnaire, interviews, SWOT analysis, etc. This analysis showed that the departure area needed many improvements; therefore, the problems were analysed with the use of tools such as

statistical and narrative analytical approaches, in order to define the most critical issues (Section 5.3.1).

- After identifying, measuring and analysing the problems in the departure area at KKIA, some modifications were made. Improvements included reorganisations of the layout and flow of passengers, increasing self-service provision, and removal of items that restricted passenger flow.

- Following this, measurement tools were applied to evaluate the success level of improvement (Fig 6.15). The results show that, were obvious enhancements in customer satisfaction (Fig 7.1), lower waiting times (Table 6.10) and greater space per passenger (Fig6.13). The level of service has improved to IATA Performance standard (C), ‘’Good’’ (Section 6.2.6).

- Following these improvements, discussions are ongoing with the Airport senior management to implement lean to other sections of the airport. Currently this includes the car parks, Arrival level, baggage handling, Technologies that increase automation of passenger flow measurements.

Interesting different cultural approaches to lean management became evident during the study when compared to other implementations in Europe to the Middle East. Cultural difference and perspective will always affected the reliability of the results. A reflective review of these cultural different and perspective used tools such as Power Distance Index (PDI), Individualism (IDV), Masculinity (MAS), Uncertainty Avoidance Index (UAI) (see section 3.6.1). However, by considering these cultural effects in answering questions and interviews, the lean implementation was still successful (see flowing figure 7.1.) Arabic culture has seen considerable influences from around the world. As Arabic culture changes are ongoing, evaluation of the situation at KKIA is required for ongoing improvements.

In order to comprehend fully the culture of Saudi Arabia one needs to understand the extensive influence of Islamic religion on society. The overwhelming majority of the populations of Saudi Arabia are Arabs who adhere to the Wahhabi sect of Islam. Islam, which governs every aspect of a Muslim’s life, also permeates every aspect of the Saudi

state.(see section 3.6.3) As a result, Saudi culture is often described as detail orientated, whereby emphasis is placed on ethics and expected social behaviour such as generosity, respect and solidarity.

The Cultural managerial issues and possible short-comings in managerial approach at KKIA comes from many different situations including

- prioritising personal relations over the organizational or the professional relations;
- lack of delegation and empowerment;
- subjectivity in promotions and lack evaluation of employees; shortage of plans and policies for human resources
- unclear objectives of the organization, outdated administrative systems and policies together with rigidity and the anti-innovation approach of the organization;
- Historically nepotism is within Arabic culture, however, with the complexity in Airports this needs to be avoided.
- Prestige is a fundamental issue of daily Arabic life. Full commitment of airport staff to a decision or improvement policies is needed that improves the situation rather than being done only for prestige.

The following graph (Figure 7.1). is a qualitative summary of the improvements after the implementation of the lean and six-sigma approach in the departure area at KKIA is showing a clear improvement in the Liker scale from Perceived (Before-After). There is still an improvement between the Expected before to after, but this increase is not as great.

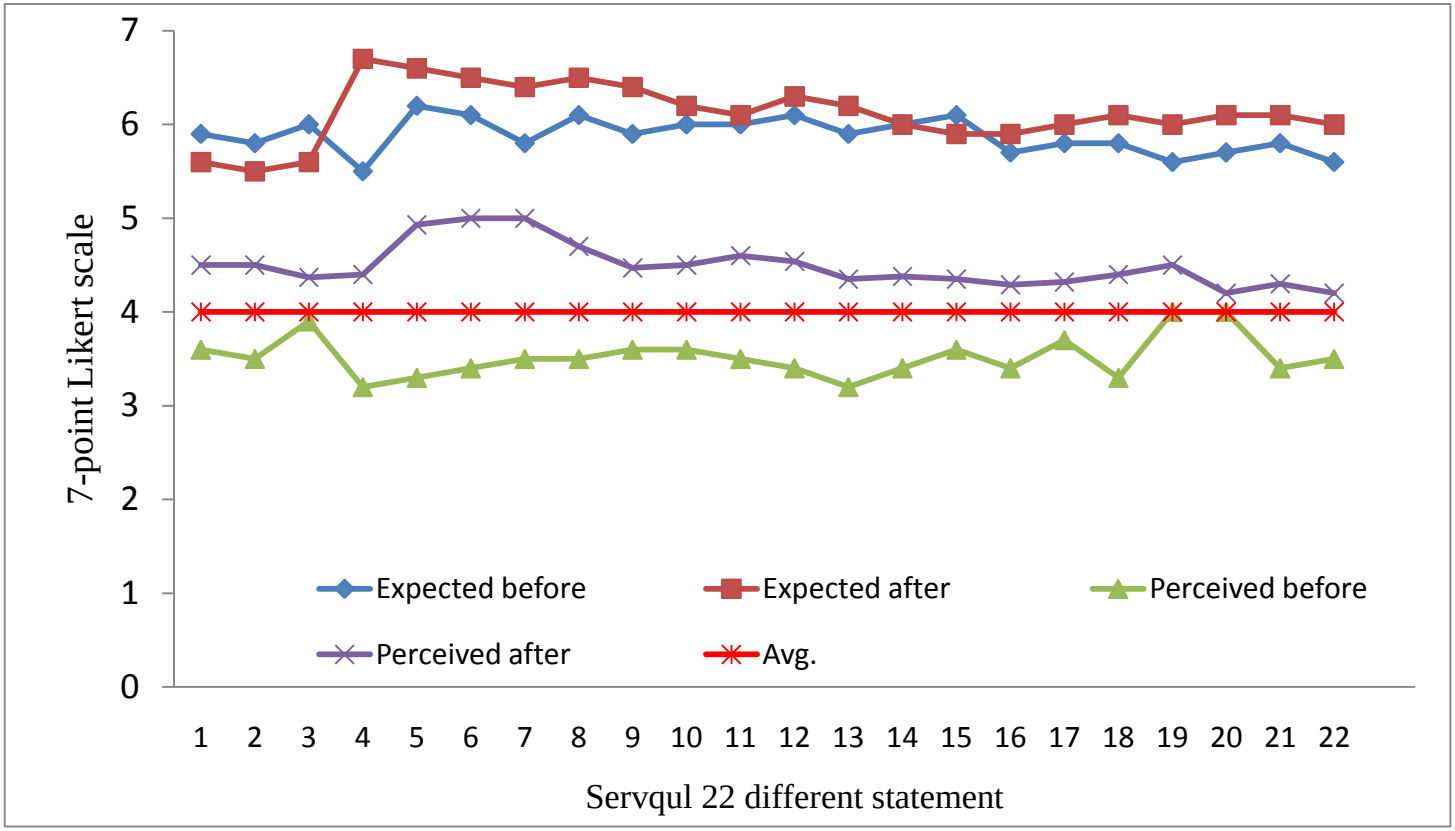


Figure 7.1 qualitative summary of the improvements after the implementation of the lean and six-sigma

7.2. Recommendations to KKIA management

The following recommendations for KKIA are based on the results of this research:

- Lean culture is very important for successful lean management. The most important element in creating a new the culture at KKIA would be holding training courses for the employees, especially in topics related to lean and six-sigma strategies (including becoming yellow, green and black belts). This would improve the organizational culture in relation to six-sigma and lean thinking procedures. (Al Muhareb, T. Graham-Jones, J. 2011).

- It is recommended that the airport should recruit a number of skilled and experienced personnel of different nationalities to work as check-in staff. They must be easily identified and must have the ability to deliver the best service quality to passengers of different cultures, languages and nationalities. This is one of the ways that the airport could increase passenger satisfaction and service quality at a low cost.

- It is suggested that KKIA should focus on further improvements that could be implemented to improve the level of service and passenger satisfaction; these implementations might be called a service programme.

- Within the airport, passengers must find high-quality services and welcoming staff. When considering the level of service, the behaviour of staff affects customers' overall satisfaction. To make the passengers feel comfortable and satisfied, staff should smile, even at critical points within the airport (such as the security checkpoint, immigration scanning and check-in counters). Staff should be informed of this through training sessions or meetings, so that they can better understand the role of their behaviour in the process of lean management and improving the level of service quality. The lean six-sigma methodology could be usefully applied to other areas of the airport, such as the parking area. Parking management has not been improved at all for passengers and employees at KKIA. Passenger parking still follows traditional techniques (manual gates with operators) to enter or exit from the parking area, which increases waiting times in the car park, especially at peak times. One of the biggest problems with this area is the lack of technology. Hence, it is suggested that lean management should be implemented in the

parking area. For example, Skidata mechanized technology could reduce waiting times in the car park, as well as save costs. Payment for parking could be made at machines located in convenient locations near the exit of the passenger terminal.

- Changes should not only happen within the airport but also in terms of the logistics of getting into and out of the parking area or airport. Currently, unlike most airports in the world, KKIA (despite its size and high number of passengers) does not have any means of transit between the airport itself and the city centre. There are no buses, trains or airport shuttles. This means that passengers arriving at or leaving the airport can only leave the premises by using private transport (friends, family and colleagues) or by taxi. This, of course, causes major disruption and overcrowding at the entrances and exits of the airport, especially if passengers are not aware of the system, are travelling in big groups or need to queue for taxis. Consequently, a bus line should be established between the airport terminals and the city centre, preventing the crowding of critical areas of the airport and improving the level of service. This is particularly important as such logistics options are available at most other international airports.

- In KKIA, ten self-service check-in kiosks are available to help passengers to check in automatically and quickly without the help of staff; this have been achieved by adding 7 self-service check-in kiosks to the previous number of self-service check-in kiosks which leads to decreasing the waiting times by (0.95) minutes. However, 10 kiosks are not sufficient and should be increased to 16 as it would reduce the waiting time to be almost (1.45) minutes at queuing kiosks.

- Furthermore, in KKIA, for check -in passengers with their luggage, there are only traditional counters used. There is no common use terminal equipment (CUTE) in the departure area The CUTE ensures the passage of passengers through the different check-in points, making the process of checking in easier and quicker and saving airport space. This would improve the level of service and passenger satisfaction and would eliminate waste. With this method, there would a noticeable reduction in the overall cost of the check-in process and in passenger queuing.

- In KKIA, only two e-gates are available to help passengers scan their passports automatically and quickly without the help of staff. The system uses facial recognition technology to compare the passenger's face to the photograph recorded on the microchip in his/her passport. Once a match has been confirmed, the gates will open automatically for the passenger to go through. E-gates ensure the quick passage of passengers through scanning points and save space. However, two e-gates are not sufficient and should be increased to four as it would reduce the waiting time by (1.5) minutes (chapter 5), This Increasing would improve the level of service and passenger satisfaction and would eliminate waste.

- It is the researcher's firm belief that the current terminals in operation at the airport do not adequately cater for the amount of passengers and staff and will be even less able to do so in years to come, as the amount of people travelling will increase drastically. Currently, the capacity of airport is 16 million passengers per year which is up from 9.8 million in 2004 (chapter 5 Table 5.1). This issue is that the changes from 3 to 10 self-service check-in kiosks and other changes will not be sufficient in the coming 10 years with expected 25 million in 2025(chapter 5 Figure 5.2). The needs of the customers need to be anticipated.

- There is a passenger terminal that was built thirty years ago as an auxiliary terminal but has never been used because it remains unfinished. The terminal was built with the understanding that, at some point, there would be a need to expand the airport due to increased air travel. The researcher is of the opinion that the moment has come to complete this terminal and open it to the public. However, the best practice as currently established will be achieved by a changed internal layout that forces on passenger flow. There is little point in just opening a terminal that was design 33 years ago, as this would not be suitable in current thinking. Rather a complete re-design of the internal design to further increase passenger flow and satisfaction.

- It is crucial that passengers are given an area devoted to them, featuring cafes, restaurants and waiting rooms with catering facilities. At present, passengers can either wait in the main area (near the check-in area, by the entrances, etc.). It would be a good idea to open some cafes, to start with, followed by a couple of restaurants. This, again,

would help passenger flow within the airport, allowing passengers to leave the main area and wait comfortably whilst having a drink and a meal (particularly as the food on most airlines has become very basic).This has improved but there is opportunity for further improvements.

- In KKIA, there is a need for pleasant waiting areas for passengers, which are one of the most significant services that an airport must deliver to its passengers. Transit passengers sometimes stay in airports for a long time waiting for their second flights, so they must be provided with high-quality services in pleasant waiting areas.

- Another, perhaps smaller, issue that could be addressed without much difficulty would be the introduction of motorized support for disabled and elderly people. This would improve the general flow of passengers and also give invaluable support to customers. This could avoid flights being delayed by passengers running late and could encourage customers to shop more, in the knowledge that, if needed, there is the option of being escorted to the gate and back.

- The researcher's suggestion is to implement a people-counting system to improve the level of service in KKIA. This type of system uses wireless sensors to detect the number of people in different parts of the airport and to give prompt and accurate information on current events within the airport. This system is more technologically advanced than current solutions. This sensitive technology would allow many areas of the airport to become more secure and efficiently monitored, as it would indicate how many people are waiting in a certain area at a specific time. This would also allow for the better management of essential amenities such as electricity (lights, escalators, heating, air conditioning, etc.). In terms of maintenance, knowing that certain escalators, elevators, sliding doors, swing doors, walk detectors or moving walkways are used more than others would allow for more efficient and effective maintenance. Al muhareb (2009).

I believe that the lean implementation of the above changes would ensure that the management and level of service in the airport improve, allowing the airport to be considered a more efficient, reliable and worthy centre of KSA.

7.3. Research Contribution

There are many more aspects that must be taken into account whilst managing change in the implementation of lean management in KKIA. This is because the implementation of lean management in the airport has to meet customers' needs, improve the available facilities within the airport environment and improve the airport in general.

This research study has made several contributions to extant knowledge, as explained below:

- Lean six-sigma implementation took place for the first time at KKIA or any other Saudi Arabian airport.
- The lean six-sigma approach and the accurate measurement of service quality using SERVQUAL questionnaires were new approaches for KSA.
- This study specifically analysed KKIA to measure the success of implementing an international approach within the context of a developing country.
- The implementation of findings from this study has contributed to enhancing the level of service and passenger flow in the departure area at KKIA, which has led to an increase in customer satisfaction.
- This study has made a major contribution to understanding the best practice for such implementations at other airports both in KSA and worldwide.
- The research focused on Arabian cultures in general and Saudi culture in particular. It demonstrated that studying the influence of culture on change management has considerable benefit for future lean implementations in airports and other organizations.

7.4. Future Work

Future work would ideally examine the following for Future lean evaluation:

- To hold the same study (Lean implementation) in the other areas at KKIA and other international airports at Saudi Arabia e.g. parking area and luggage handling at Arrival level .
- To analyse the Saudi culture and gender effects on the rapidly growing aviation industry at Saudi Arabia in comparison to other airports in different areas.
- Consider advances in technology that could monitoring crowding from overhead cameras and automatically adjust staffing levels

List of References

Abbasi, S., and Hollman, K. (1993). Business success in the Middle East. *Management Decisions, 31*(1), 55-60.

Abdalla, A., and Al-Homoud, M. A. (2001). Exploring the implicit leadership theory in the Arabian Gulf States. *Applied Psychology, 50*(4), 506-531.

Abrahamsson, S., and Isaksson, R. (2012). Implementing Lean – Discussing Standardization Versus Customization with Focus on National Cultural Dimensions. *Management and Production Engineering Review, 3*(4), 4-13.

Adair, J. (2009), 100 Greatest Ideas for Being a Brilliant Manager. Available at: http://www.johnadair.co.uk/published.html, (last accessed 25th May. 2012).

Adler, N. and Berechman, J. (2001), 'Measuring Airport Quality from Airlines' View Point: an application of data envelopment analysis'. Transport Policy, 8(3): 171- 181.

Airport Council International (ACI), ACI World Report (2011), Switzerland: ACI

Aksenova, E. A. and Sokolov, A. V. (2011), 'Optimal Implementation of Two FIFO-Queues in Single-Level Memory'. Applied Mathematics, 2(10): 1297-1302.

Al-Dana, B. J. (2011), 'kaizen methodology in quality management to reduce wastes'. Studia Universitatis, 21(1): 375-381.

At-Twaijri, M. I., and Al-Muhaiza, I. A. (1996). Hofstede's cultural dimensions in the GCC countries: An empirical investigation. *International Journal of Value-Based Management, 9*(2), 121-131.

Atkinson, P. (2010). Lean is a cultural issue. *Management Services, 54*, 35-44.

Al Muhareb, T and Graham-Jones, J. (2014), 'Using Lean Six-Sigma in the Improvement of Service Quality at Aviation Industry: Case Study at the Departure Area in KKIA', World Academy of Science, Engineering and Technology, International Science Index 85, International Journal of Social, Human Science and Engineering, 8(1), 607 – 614

Al Muhareb T and Graham-Jones, J. (2012), A Review of Lean Management Models at King Khaled International Airport (KKIA), Research Journal of Applied Sciences, Engineering and Technology, 4(13): 1833-1840

Al Muhareb T and Graham-Jones, J. (2011), Lean implementation for continues improvements at airports. World Applied Sciences Journal 14(1): 16-22, ISSN 1818-4952.

Al muhareb (2009), A study of passenger traffic at king Khalid international airport and recommendation of strategic changes to cater for future demand, University of Portsmouth Hants, UK, PO1 2UP.

Al-Najem, M. N., Dhakal, H. N., Labib, A., and Bennett, N. (2013), 'Lean readiness level within Kuwaiti manufacturing industries'. International Journal of Lean Six Sigma, 4(3): 597-620

Al-Najem, M., Dhakal, H. N., and Bennett, N. (2012), 'the role of culture and leadership in lean transformation: a review and assessment model'. International Journal of Lean Thinking, 3(1): 119-138

Ali and Schaupp, G., (1992) , (1992), "Value Systems as Predictors of Managerial Decision Styles of Arab Executives", International Journal of Manpower, Vol. 13 Iss: 3, pp.19 – 26.

Ali, A. J. (1990). Decision-making style, individualism, and attitudes toward risk of Arab executives. *Inter-national Studies of Management and Organization, 23*(3), 53-73.

Ali, A. J. (1989b). Decision style and work satisfaction of Arab executives: A cross-national study. *Interna-tional Studies of Management and Organization*, *19*(2), 22–37.

Al-Rasheed, A. (2001). Features of traditional Arab management and organization in the Jordan business environment. *Journal of Translational Management Development, 6*(1-2), 27-53.

Ali, A. J., and Al-Kazemi, A. (2006). Human resources management in Kuwait. In P. S. Budhwar, and K. Mellahi (Eds.), *Managing human resources in the Middle East* (pp. 79-96). London: Routledge.

Al-Jaza'eri, S., Mohammad, A. and Shteit, B. (2008), Measurement and Assessment of Health Services Quality Application Study in AL-Faiha General Hospital – Basrah. [Arabic Study], Available at: http://www.iasj.net/iasj?func=fulltext&aId=48931 (Accessed 15 October 2012).

Al- Jaafari, A. (2003), Project management in the age of Complexity and Change. Project Management Journal,34, pp15-20.

Al-Kazemi, A. A., and Ali, A. J. (2002). Managerial problems in Kuwait. *Journal of Management Development, 21*(5), 366-375.

Al-Khafaji, S. K. H., Al-Rahman, N. M. A., and Al- Dauod, Z. I. A. (2005), 'Design of a Programmable System for Failure Modes and Effect Analysis of Steam-Power Plant Based on the Fault Tree Analysis'. Al-Khwarizmi Engineering Journal, 1(2): 64-85.

Al-Kharashi, A. and Skitmore, M. (2009) Causes of delays in Saudi Arabian public sector construction projects. *Construction Management and Economics*, 27(1), pp.3-23

Al-Shaikh, F. (2003). The practical reality theory and business ethics in non-Western context. *Journal of Management Development, 22*(8), 679-693.

Al-Swidi, A. K., and Mahmood, R. (2011). How does Organizational Culture Shape the Relationship between Entrepreneurial Orientation and the Organizational Performance of Banks?. *European Journal of Social Sciences, 20*(1), 28-46.

Amaratunga, D., Baldry, D., Sarshar, M. and Newton, R. (2002),''Quantitative and qualitative research in the built environment: Application of 'mixed' research approach'' work study, Vol.51, No. 1, 17-32

Andreatta, G., Brunetta, L., Righi, L., and Romanin-Jacur, G. (2001), "Evaluating Terminal Management Performance Using SLAM: The case of Athens International Airport". In Proceedings of Odysseus. CD, Palermo, Italy, 2003.

Angelis, J., Conti, R., Cooper, C. and Gill, C. (2011) Building a high-commitment lean culture. *Journal of Manufacturing Technology Management*, 22(5), pp.569-586.

Annual Report from KKIA, (2012), Report by the Executive Board.

Appelbaum, S. H. and Fewster, B. M. (2004), "Human Resource Management Strategy in the Global Airline Industry – A Focus on Organisational Development'. Business briefing: aviation strategies _ challenges & opportunities of liberalization, Airline Issues: 70-75

Appelt, S., Batta, R. and Lin, L. (2007), Simulation of Passenger Check-In at a Medium-Sized US Airport. New York, USA: University of Buffalo

Arbor, A. (2012), Lean-Six Sigma Green Belt Certification – Tap into the Power of Lean-Six Sigma for Optimal Process Improvement. Michigan, USA: InterPro, MI.

Armenakis, A. (1999), Organizational Change: A Review of Theory and Research in the 1990s. Journal of Management. Vol. 25, No. 3, 293–315.

Atilgan, E., Akinci, S., and Aksoy, S. (2008), Measuring and mapping customers' expectations and perceptions for airlines: the Sun express case with the gabs model'. Journal of Global, Strategic Management, 3: 68-78.

Atiyyah,H.S (1993), Management development in Arab countries: The challenges of the 1990s, Journal of management Development, No12, pp3-12.

Atiyyah,S. (1991), Effectiveness of Management Training in Arab Countries, Journal of Management Development, Vol. 10 Iss: 7, pp.22 – 29.

Avraham, Y. (2009), Combining Lean, Six-Sigma, and the Theory of Constraints to Achieve Breakthrough Performance. New Haven, Cuba: AVG

Ayanzadeh, R. Shahamatina, E., and Setayeshi, S. (2009), 'determining optimum queue length in computer networks by using mimetic algorithm'. Journal of applied science, 9(15): 2847-2851

Bandeira, M. (2007), 'Degree of importance of airport passenger terminal components and their attributes'. Aerlines Magazine, 37: 1-4.

Bangura, A.S. (2011), Changing Attitudes and Behavior of Consumers with Marketing Communication. Final Degree Thesis, Programme in International Business Management and Project Leading Change, Savonia University.

Barros, A., Somasundaraswaran, K., and Wirasingha, S. (2007), 'Evaluation of Level of Service for Transfer Passengers at Airports'. Journal of Air Transport Management. 13(5): 293–298.

Bartley, R. (2011), Tools for Quality Management for an ISO compliant Quality Management System that includes "End-of-Waste" procedures. Brussels, Belgium: Bureau of International Recycling

Bartol, K. M., & Martin, D. C.,(1991), Management. New York: McGraw Hill, Inc.

Bashiri, M., Koosha, M., and Karimi, H. (2012), 'Permutation based decision making under fuzzy environment using Tabu search'. International Journal of Industrial Engineering Computations, 3: 301-312.

Bass, B. M. (1990), From transactional to transformational leadership: Learning to share the vision. Organizational Dynamics, (Winter): 19-31.

Becken, S. (2002), Analysing International Tourist Flows to Estimate Energy Use Associated with Air Travel. Journal of Sustainable Tourism 10(2), 114-131.

Bell,J. (1986), "The IAM Facilities Management Group (FMG)", Facilities, Vol. 4 Iss: 3, pp.14 – 14.

Bennis, Warren (2009), Knowing yourself. On becoming a leader: the leadership classic. New York: Basic Books.

Besta, P. and Lenort, R. (2009), 'Kaizen – Right Management'. Contemporary Economics, 2(4): 99-106.

Bhasin, S. (2012) An appropriate change strategy for lean success. *Management Decision,* 50(3), pp.439-458.

Boland, D., Morrison, D. and O'Neill, S. (2002), The Future of CRM in the Airline Industry: A new paradigm for customer management. New York, USA: IBM Institute for Business Value

Bovey, W.H. and Hede, A. (2001), Resistance to organizational change: the role of cognitive and affective processes. Leadership and Organization Development Journal. 22(8), 372-382.

Bowen, B. D. and Headley, D. E. (2011), Airline Quality Rating. Wichita, USA: Wichita State University

Brassard, M., Finn, L., Ginn, D., and Ritter. D. (2002), The six sigma memory jogger II - a pocket guide of tools for six sigma improvements teams. GOAL/QPC: USA

Brunetta, L., and Romanin-Jacur, G. (2004), Passenger and Baggage Flow in an Airport Terminal: a flexible simulation model. Prosdocimi Beldomand, Italy: University of Padova.

Bryman, A. and Bell, E. (2005), Business Research Methods. Oxford: Oxford University Press.

Brunetta, L., Righi, L., and Andreatta, G. (1999), 'an Operations Research Model for The Evaluation Of An Airport Terminal: SLAM (Simple Landside Aggregate Model)'. Journal of Air Traffic Management, 5: 161-175

Brussee, W. (2006), all about 6 Sigma: the easy way to get started. New York, USA: McGraw-Hill Education.

Burlikowska, M. D. (2011), 'Application of FMEA method in enterprise focused on quality'. Journal of Achievements in Materials and Manufacturing Engineering, 45(1): 89-102.

Caruth, J. D. (2013), 'Demystifying Mixed Methods Research Design: A Review of the Literature'. Mevlana International Journal of Education (MIJE), 3(2): 112-122

Cagliano, R., Caniato, F., Golini, R., Longoni, A. and Micelotta, E. (2011) The impact of country culture on the adoption of new forms of work organization. *International Journal of Operations & Production Management*, 31(3), pp.297-323

Chang, Y., and Yeh, C. (2002), 'a Survey Analysis of Service Quality for Domestic Airlines'. European Journal of Operational Research, 139:166- 177.

Chen, C. (2010), A Quality Improvement Framework for Air Transport: An Example of Cargo Sector in Taiwan Taoyuan International Airport. Yilan, Taiwan: Fo-Guang University'

Chen, Y. H., Tseng, M. L., and Lin, R. J. (2011), 'Evaluating the customer perceptions on in-flight service quality'. African Journal of Business Management, 5(7): 2854-2864.

Chou chang, C., Jen liu, L., Fang Huang, S., Ming Yih, J., and Chen Hen, T. (2010), 'An Evaluation of Airline Service Quality using the Fuzzy Weighted SERVQUAL Method'. . Applied Soft Computing, 11(2): 2117–2128

Clancy, M. (2001), Patterns of Airline Development. In Electronic Data Systems. Exporting Paradise: Tourism and Development in Mexico. Amsterdam, New York and London: Pergamon. pp6-17.

Clemes, M. D., Gan, C., Kao, T. H., and Choong, M. (2008), 'An empirical analysis of customer satisfaction in international air travels'. Innovative Marketing, 4(2): 49-62.

Consumer Protection Group (2009), The through Airport Passenger Experience: An assessment of the passenger experience and airport operations at Heathrow, Gatwick, Stunted and Manchester airports. Available at: http://www.caa.co.uk/docs/33/passenger_experience.pdf (Accessed 4 Mar 2013).

Correia, A. (2007a), a Global Index for Level of Service Evaluation at Airport Passenger Terminals. New York, USA: John Wiley & Sons.

Correia, A. (2007b), Overall Level of Service Measures for Airport Passenger Terminals. New York, USA: John Wiley & Sons.

Correia, A. R., Wirasinghe, S. C., and Barros, A. G. (2008), 'Overall level of service measures for airport passenger terminals'. Transportation Research Part A: Policy and Practice, 42(2): 330-346.

Correia, A., and Wirasinghe, S. (2005), 'Development of Level of Service Standards for Airport Check-In Facilities, Civil Engineering Department, University of Calgary'. Journal of Air Transport Management, 10(1016): 1- 7.

Cullen JB, Parboteeah KP and Hoegl M (2004) Cross-national differences inmanagers ' willingness to justify ethi- cally suspect behaviors: a test of institutional anomie theory. Academy of Management Journal 47(3): 411–21.

Dahlgaard, J. J., and Dahlgaard-Park, S. M. (2006). Lean production, six sigma quality, TQM and company culture. *The TQM Magazine, 18*(3), 263-281.

Daniel, C., and Berinyuy, L. (2010), Using the SERVQUAL model to assess service quality and customer satisfaction. Sweden: Student Umea School of Business.

Deng, H. (1999), 'Multicriteria analysis with fuzzy pair wise comparison'. International Journal of Approximate Reasoning, 21: 215-231.

Devane, T. (2004), Integrating Lean Six Sigma and High-Performance Organizations. New York, USA: John Wiley & Sons.

Dibia, F (2012), Implementation of the Leadership, People, Process and Outcome Model of Lean using Soft Systems Methodology in Triangulation , University of Portsmouth Hants, UK, PO1 2UP.

Emiliani, B. (2008). *Real Lean: The Keys to Sustaining Lean Management* (Vol. 3). Wethersfield, CT. USA: CLBM, LLC.

Faculty of Economics and Public Administration. (2011), FASCICLE OF THE FACULTY OF ECONOMICS AND PUBLIC ADMINISTRATION. 11, Faculty of Economics and Public Administration, University of Suceava, Romania

Faculty of Economics and Public Administration. (2011), FASCICLE OF THE FACULTY OF ECONOMICS AND PUBLIC ADMINISTRATION. 11, Faculty of Economics and Public Administration, University of Suceava, Romania

Fairbanks, C.B. (2007) Using Six Sigma and Lean Methodologies to Improve OR Throughput. *AORN Journal*, 86 (1), pp.73-82.

Fernandez, S. and Rainey, H. G. (2006), Managing Successful Organizational Change in the Public Sector. Public Administration Review.168-176.

Fischer, F. (1998), Beyond Empiricism: Policy Inquiry in Postpositivist Perspective. Policy Studies Journal, 26(1), 129-146.

Fodness, D., and Murray, B. (2006), Passengers' Expectations of Airport Service Quality, Marketing Graduate School of Management. Crusaders, USA: University of Dallas.

Francis, G., Fry, J., and Humphreys, I. (2001), Performance Management Research Unit (PMRU): An international survey of performance measurement in airports. Available at: http://www7.open.ac.uk/oubs/research/pdf/WP01_4.pdf (Accessed 4 March 2013).

Gilley, K. M. Worrell, D. L. Iii, W. N. D. and Jelly, A. E. (2000), Corporate environmental initiatives and anticipated firm performance: The differential effects of process-driven versus product-driven greening initiatives. Journal of Management,No 26, pp199-216.

Go Lean Six Sigma. (2012), DMAIC – The 5 Phases of Lean Six Sigma. Available at: http://www.goleansixsigma.com/wp-content/uploads/2012/02/DMAIC-The-5-Phases-of-Lean-Six-Sigma-Slides.pdf (Accessed 4 March 2013).

Govekar, J., and Agarwal, P. (2011), A Lean Approach in Improving the Performance of a Service Call Centre. New Jersey, USA: Tech Mahindra.

Grainger. (2006), Lean opportunities in MRO Procurement: Improved productivity and reduced waste. Available online: http://www.grainger.com/images/lean_mro.pdf (Accessed 15 October 2012).

Harding, P. (2007), Resource Efficiency and Corporate Responsibility: Managing Change. 3rd Ed. Government Office of the South West. Synthetic Communications,37(16), 2655.

Harper, J. (2007), Implementation Lean Material Management in an Extended Value Stream. Available at: http://dspace.mit.edu/bitstream/handle/1721.1/39895/182545210.pdf (Accessed 4 March 2013).

Harvey, D. (2004), 'a brief history of lean thinking'. Available at: http://www.davethehat.com/articles/LeanAgile.pdf (Accessed 4 March 2013).

Hersey and Blanchard. (1976), Saudi Arabia Background, from Anti Essays, your source for free research papers, essays, and term paper examples, Available at: http://www.antiessays.com/free-essays/70020.html.

Herron, C. and Hicks, C. (2008) The transfer of selected lean manufacturing techniques from Japanese automotive manufacturing into general manufacturing (UK) through change agents. *Robotics and Computer-Integrated Manufacturing*, 24(4), pp.524-531.

Hill, Charles. (2009), International Business: Competing in the Global Marketplace. New York, NY: McGraw Hill.

Hines, P., Francis, M., and Foundet, P. (2006), 'Towards lean product lifecycle management A framework for new product development'. Journal of Manufacturing Technology Management, 17(7): 866-887

Hoerter,S. (2011), ACRP Report 33: Guidebook for Developing and managing Airport contracts, Washington,DC:Transportaion research board of the national Academic, pp3-15.

Hofstede, G. (1980). Culture's Consequences: International Differences in Work-Related Values. Beverly Hills: Sage Publications.

Hofstede, G. (1997). *Cultures and Organizations: Software of the mind.* New York: McGraw-Hill.

Hook, M. and Stehn, L. (2008) Lean principles in industrialized housing production: the need for a cultural change. *Lean Construction Journal*, 2, pp.20-33.

Hsu, T., and Pan, F. (2004), Using fuzzy logic in the evaluation of customer perceived value on healthcare services. Available at: http://www.bus.sfu.ca/events/mcdm/Proceedings/Paper/AP41%20CF%20Pan%20Fuzzy%20service%20value.pdf (Accessed 7 October 2012).

Humphreys, I., and Francis, G. (2002), 'Performance measurement: a review of airports', International Journal of Transport Management, 1(2): 79–85.

Hutchings, K., Dawn Metcalfe, B. and Cooper, B. K. (2010) Exploring Arab Middle Eastern women's perceptions of barriers to, and facilitators of, international management opportunities. *The International Journal of Human Resource Management*, 21(1), pp.61-83.

Hvass, K.A. (2008), A Boolean Analysis Predicting Industry Change: Innovation, Imitation & Business Models. PHD thesis. Center for Tourism and Culture Management. Copenhagen Business School.

Institute for Healthcare Improvement. (2005), Going Lean in Health Care. Available at: http://www.entnet.org/Practice/upload/GoingLeaninHealthCareWhitePaper.pdf (Accessed 9 February 2013).

ITC. (2004), Principles of Lean Thinking Tools & Techniques for Advanced Manufacturing. Hamilton, New Zealand: ITC.

Jabnoun, N., and Al Khafaji, A. (2005). National Cultures for Quality Assurance and Total Quality Management. *Journal of Transnational Management, 10*(3), 3-17.

James, K. (2009), Innovation Reordering: Five principles for leading continuous renewal, In Schlomer, S. and Tomaschek, N. (Eds.), Leading in Complexity: New Ways of Management. Seiten, Germany; Verlag fur Systemische Forschung. pp 300.

Janawade, V. (2011), Consumer Perceptions of Service Quality of Complex Services: An application to airline alliances. Provence, France : Paul Cezanne University

Jennings, B. O. and Puha, L. A. (2013), 'fluid limits for overloaded multiclass FIFO single-server queues with general abandonment'. California State University San Marcos, 3(1): 262-321.

Jira C. (2004), Planning and Management, Addis Ababa University, Funded under USAID Cooperative Agreement No. 663-A-00-00-0358-00, pp64.

Jogulu, D. (2010), Culturally-linked leadership styles, Leadership & Organization Development Journal, Vol. 31 Iss: 8, pp.705 – 719.Jones, D., and Mitchell, A. (2006) Lean thinking for the NHS. London, UK: Lean Enterprise Academy.

Jones, Daniel N.; Paulhus, Delroy L. (2009). "Chapter 7. Machiavellianism". In Leary, Mark R. & Hoyle, Rick H. Handbook of Individual Differences in Social Behavior. New York/London: The Guilford Press. pp. 257–273. ISBN 978-1-59385-647-2.

Kaashoek, B., and Saola, B. (2009), Business Process Redesign at Amsterdam Airport Schiphol: The Case of Passenger Services. Available at: http://www.scribd.com/doc/13498233/43-Kaashoek-Schiphol-Passenger-Process-Redesign (Accessed 4 March 2013).

Kandt, R.K. (2002), Organizational Change Management Principles and Practices. Available at: http://trs-new.jpl.nasa.gov/dspace/bitstream/2014/10570/1/02-2625.pdf [last accessed 28th Aug. 2012].

Kilpatrick, J. (2003), Lean Principles. Available at: http://mhc-net.com/whitepapers_presentations/LeanPrinciples.pdf (accessed 9 February 2013).

KLM Marketing Division. (2009). the 7 Service Standards Customer Focus. Dutch: Air France KLM.

Kloosterziel, K., Oostra, R., Roche, E., Ringersma, P., Kuil, P., Banez, D., Werson, M., and Nuesink, J. (2009), King Khalid International Airport Master Plan and Passenger

Terminal Concept General Authority of Civil Aviation. Riyadh, Kingdom of Saudi Arabia, pp. 1-251

Krogstie, L. & Martinsen, K. (2013) Beyond Lean and Six Sigma; Cross-collaborative Improvement of Tolerances and Process Variations-A Case Study. *Procedia CIRP*, 7, pp.610-615.

Kotter, J. 1995. Leading change: Why transformation efforts fail.Harvard Business Review, 73 (2): 59 – 67.

Kovacheva, A. (2010), Challenges in Lean implementation. Available at: http://pure.au.dk/portal-asb-student/files/9093/ak83188...pdf (Accessed 9 February 2013).

Kuo, M., and Liang, G. (2010), Combining VIKOR with GRA techniques to evaluate service quality of airports under fuzzy environment. Expert Systems with Applications, 38(3): 1304–1312.

Le Gall, P. (1998), 'multiserver queuing networks and the tandem queue model'. Journal of Applied Mathematics and Stochastic Analysis, 11(3): 377-390.

Lean Enterprise Institute. (2012), Principles of lean. Available at: http://www.lean.org/whatslean/principles.cfm (Accessed 15 October 2012).

Levantar. (2012), what is Lean Manufacturing. Available at: http://www.levantar.co.uk/images/uploads/What%20is%20Lean%20Manufacturing%20pdf.pdf (Accessed 15 October 2012).

Liou, J., and Tzeng, G. (2007), 'A Non-Additive Model for Evaluating Airline Service Quality'. Journal of Air Transport Management, 13: 131–138.

Lock, H., Fattah, A. and Kirby, S. (2010). Airline of the Future: Smart Mobility Strategies that Will Transform the Industry. Cisco Internet Business Solutions Group (IBSG).

Lubbe, B., Douglas A., and Zambellis, J., (2010), 'an Application of the Airport Service Quality Model in South Africa'. Journal of Air Transport Management, 17(4): 224–227.

Lundgren, L. (1998), The technical communicator's role in bridging the gap between Arab and American business environments, Journal of Technical Writing and Communication, No.28 (4): 335-348.

Lunenburg, F. (2010), Approaches to Managing Organizational Change, International journal of scholarly academic intellectual diversity, Vol 12, No 1, pp1-10.

Lynes J. and Gibson, R. (1998), Voluntary Corporate Initiatives for Environmental Improvement. Alternatives 24(2), 18-19.

Mandahawi, N., Alhadeethi, R., and Obeidat, S. (2010), An Application of Customized Lean Six Sigma to Enhance Productivity at a Paper Manufacturing Company. Zarqa, Jordan. Hashemite University.

Mandahawi, N., Fouad, R. H., and Obeidat, S. (2012), 'An application of customized lean six sigma to enhance productivity at a paper manufacturing company' Jordan Journal of Mechanical and Industrial Engineering, 6(1): 103–109.

Mayer, T. A. (2011), Applying the Principles of Lean Management to Healthcare. Available at: http://webapps.acep.org/sa/Syllabi/SA-31.pdf (Accessed 15 October 2012).

McGregor, I. Prentice, M. and Nash, K. (2005), Anxious uncertainty and reactive approach motivation (RAM) for religious, idealistic, and lifestyle extremes. Journal of Social Issues,pp22-30.

Melton, T. (2005). The Benefits of Lean Manufacturing What Lean Thinking has to Offer the Process Industries. Chemical engineering research and design, 83(6), 662–673.

Mostert, P. G., De Meyer, C. F., and van Rensburg, L. R. J. (2009), 'The influence of service failure and service recovery on airline passengers' relationships with domestic airlines: an exploratory study'. Southern African Business Review, 13(2): 118-140.

Mustafa, A., Jia-Pei, F., Siaw-Peng, L., and Hamid, H. A. (2005), 'The evaluation of airline service quality using the analytic hierarchy process (AHP)', International Conference on Tourism Development. University Sains Malaysia, 9-11 Jan. Malaysia: Grand Plaza Parkroyal, pp. 382-390.

Naik, C., Gantasala, S., and Prabhakar, G. (2010), 'Service Quality (SERVQUAL) and its effect on customer satisfaction in retailing'. European Journal of Social Sciences, 16(2): 231-243.

Naor, M., Linderman, K. and Schroeder, R. (2010) The globalization of operations in Eastern and Western countries: unpacking the relationship between national and organizational culture and its impact on manufacturing performance. *Journal of Operations Management*, 28(3), pp.194-205.

Nauman,S. and Khan,A. (2006), Patterns of Leadership for Effective Project Management, Journal of Quality and Technology Management, Vol 20, pp50-66.

Nave, D. (2002), How to Compare Six Sigma, Lean and the Theory of Constraints: A framework for choosing what's best for your organization. Available at: http://www.lean.org/Admin/KM%5Cdocuments/76dc2bfb-33cd-4ef2-bcc8792c5b4ef6a6-ASQStoryonQualitySigmaAndLean.pdf (Accessed 5 March 2013).

Nikitha, K., Babu, T., and Lakshmi, D. (2012), 'Entropy measure integrated fuzzy gowa operators approach for multi-attribute decision making'. International Journal of Engineering Science and Technology, 4(1), pp. 189-196.

Obeidat, B. Y., Shanna, R. O., Masa'de, R., and Al-Jarrah, I. M. (2012). Toward Better Understanding for Arabian Culture:Implications Based on Hofstede's Cultural Model. *European Journal of Social Sciences, 28*(4), 512-522.

Oliveira, O. and Ferreira, E. (2009), 'Adaptation and application of the SERVQUAL scale in higher education', POMS 20th Annual Conference. Florida, USA, 1- 4 May. Paulo State, Brazil: Department of Production Engineering, pp. 1- 20.

Parasuraman, A., Zeithaml V. A., and Berry L. L. (1988), 'A conceptual model of services quality and its implication for future research'. Journal of Marketing, 49 (4): 41-50

Parast, M.M. (2011) The effect of Six Sigma projects on innovation and firm performance. *International Journal of Project Management*, 29 (1), pp.45-55.

Peters, A. (2010), Your Journey to Lean: Continuous Improvement Supported By Tools. Available at: http://www.lattix.com/files/dl/wp/journey_to_lean_continuous_improvement_supported_by.pdf (Accessed 5 March 2013).

Pierce, J.L., Gardner, D.G. and Dunham, R. B. (2002), Managing organizational change and development. Management and organizational behaviour: an integrated perspective. Cincinnati, OH: South-Western College Publishing, pp. 627-654.

Popovic, V., Kraal, B. j., and Kirk, P. J. (2009), Passenger Experience in an Airport An Activity-centred Approach. Kelvin Grove, Australia: Queensland University of Technology.

Poppendieck, M. (2002), "Principles of Lean Thinking". Available at: http://www.sel.unsl.edu.ar/ApuntesMaes/Anteriores/MetodologiasAgiles/LeanThinking.pdf (Accessed 15 October 2012).

Prasad, K. G. D., Subbaiah, K. V., and Padmavathi, G. (2012), ' Application of Six Sigma Methodology in an Engineering Educational Institution '. Int. J. Emerg. Sci, 2 (2): 222 - 237

Pyzdek, T. (2000), "Six Sigma and Lean Production Which process improvement approach is right for you and your need?", Available at: http://www.slideshare.net/Sixsigmacentral/six-sigma-and-lean-production (Accessed 4 March 2013).

Radnor, Z. (2010), Review of Business Process Improvement Methodologies in Public Services, Engineering and Physical Sciences Research Council. Available at: http://www.aimresearch.org/uploads/File/Publications/Academic%20Publications%202/Review_of_business_process_improvement.pdf (Accessed 4 March 2013).

Radnor, Z. (2012), Service improvement in the English National Health Service: Complexities and tensions, Journal of Management and Organization,No18(5), pp.594-607.

Radnor, Z., Walley, P., Stephens, A., and Bucci, G. (2006), Evaluation of the Lean Approach to Business Management and its use in the Public Sector, Edinburg, UK: Scottish Executive.

Rahaman, M., Abdullah, M., and Rahman, A. (2011), 'measuring service quality using SERVQUAL Model: A study on PCBs (Private Commercial Banks) in Bangladesh'. Business Management Dynamics, 1(1): 1-11.

Rahnama, M. R., Kheibari, K. K., Pour, S. A. H., and Najafi, M. (2013), ' Ranking and Investigation of Voice of Customer Index by Applying AHP Method in Local Management of Tehran Metropolis'. Journal of Management and Sustainability, 3 (1): 129-144

Raifsnider, R., and Kurt, D. (2004), Lean Six-Sigma in Higher Education: Applying proven methodologies to improve quality, remove waste, and quantify opportunities in colleges and universities. Available at: http://www.slideshare.net/Sixsigmacentral/lean-six-sigma-in-higher-education (Accessed 5 March 2013).

Ramakrishnan, V. (2008), The psychology of change management. Available at: http://www.changepartnership.com/PSYCHOLOGY%20OF%20CHANGE%20MGT.pdf [last accessed 28th Aug. 2012].

Rehman, S., and Askari, H. (2010). How Islamic are Islamic countries?. *Global Economy Journal, 10*(2).

Rendeiro R., and Cejas M. (2006), 'Tourism Service Quality begins at the Airport'. Tourism Management, 27: 874- 877.

Robson, C., (2002), Real world research, 2nd, Blackwell, Oxford

Ropp, T.D. (2008), Implementing Safety Management Systems for Aviation into an Aviation Technology Curriculum. Available at: http://technologyinterface.nmsu.edu/Winter09/Winter09/ropp.pdf (last accessed 28th Aug. 2012).

Ross, D., and McKee, R. (2004), From Lean Manufacturing to Lean Supply Chain: A Foundation for Change. Paul Street, USA: Lawson.

Saunders, M. N. K., Levis, P., & Thornhil, A., (2007), "Research Methods for Business Students", 4th Edition, Pearson Education Limited, England

Schaar, D., and Sherry, L. (2008), Comparison of Data Envelopment Analysis Methods Used in Airport Benchmarking. Available at: http://catsr.ite.gmu.edu/pubs/Schaar_Sherry_ICRAT.pdf (Accessed 13 August 2012).

Shah, R., and Ward, P. (2002), "Lean Manufacturing: Context, Practice Bundles, and Performance", Available at: http://carlsonschool.umn.edu/assets/101192.pdf (Accessed 9 Feb, 2013).

Stonemetz, J., Pham, J.C., Necochea, A.J., McGready, J., Hody, R.E. & Martinez, E.A. (2011) Reduction of Regulated Medical Waste Using Lean Sigma Results in Financial Gains for Hospital. *Anesthesiology Clinics*, 29 (1), pp.145-152.

Smith, Z. (1995), The Environmental Policy Paradox. Englewood Cliffs: Prentice-Hall.

Sohail, M. S., and Al- Gahtani, A. S., (2005), 'Measuring service quality at King Fahd International Airport'. International Journal of Services and Standards, 1(4): 482-493.

Somwang, C. (2008), "An Assessment of Passengers' Views of Service Quality in Thai Low Cost Carriers". RU International journal, 2(1): 70- 81.

Sousa, R. and Voss, C. A. (2008) Contingency research in operations management practices. *Journal of Operations Management*, 26(6), pp.697-713.

Su, C. T. (2006), 'Improving service quality by capitalizing on an integrated lean Six Sigma methodology'. International Journal of Six Sigma and Competitive Advantage, 2(1): 1- 22.

Sullivan, T.J. (2001), "Methods of Social Researches," London: Harcourt College Publishers. pp. 47

Sullivan, T.J. (2001), "Methods of Social Researches," London: Harcourt College Publishers. pp. 48

Sullivan, J. H. (2001), 'A Program for Retrospective Change-Point Analysis of Individual Observations'. Journal of Quality Technology, 33(2): 242-257

Sutherland, J., and Bennett, B. (2007), The Seven Deadly Wastes of Logistics: Applying Toyota Production System Principles to Create Logistics Value. Available at: http://www.distributiongroup.com/articles/SevenWastesofLogistics.pdf (Accessed 4 March 2013).

Tahmour, A., Khosravi, M., Akbari, M., Jalalid, A., Hassanpoo, R., and Saberhossein, S. (2012), 'SERVQUAL model and measurement of service quality'. Journal of Basic and Applied Scientific Research, 2(6): 5545- 5549.

Takeuchi, H., Osono, E., and Shimiz, N. (2008). The Contradictions That Drive Toyota's Success. *Harvard Business Review*, 96-104.

Tam, M. L. and Lam, W. (2004), 'Determination of service levels for passenger orientation in Hong Kong International Airport. Journal of Air Transport Management, 10(3): 181-189.

Tenge, M. (2012), 'Social Software Platforms as Motor of Operational Airport Efficiency? A Conceptual Framework', New Challenges of Economic and Business Development. Riga, 10-12 May. Riga: University of Latvia, pp. 1- 10

Tenera, A. & Pinto, L.C. (2013) A Lean Six Sigma (LSS) Project Management Improvement Model. *Procedia - Social and Behavioral Sciences*, 119, pp.912-920.

Vecchi, A. and Brennan, L. (2009) A cultural perspective on innovation in international manufacturing. *Research in International Business and Finance*, 23(2), 181-192.

Umoquit, M. J., Tso1, P., Burchett, H., and Dobrow, M. J. (2011), 'A multidisciplinary systematic review of the use of diagrams as a means of collecting data from research subjects: application, benefits and recommendations'. Medical Research Methodology, 11(11): 1-10

Wan, H. D. and Chen, F. (2008) A leanness measure of manufacturing systems for quantifying impacts of lean initiatives. *International Journal of Production Research*, 46(23), pp.6567-6584.

Weerdt, C., and Keijser, C. (2012), Lean Management in Relation to Drives. Netherlands, Holland: Accent Organisation Advice.

Weimar, J. (2011), Enhancing the passenger service quality at Frankfurt airport. Management Excellence Programme, Frankfurt.Wilkie, C. (2009) Response to Quality of Service Monitoring of Airports: Discussion Paper, Tourism & Transport Forum (TTF). Available at: http://www.infrastructure.gov.au/aviation/airport/files/SUB_QSM_FINAL_020709.pdf (Accessed 5 March 2013).

Welsh , D., and Raven, P. (2004). An exploratory study of SME management in the Middle. *International Journal of Entrepreneurship and Small Business, 1*, 121-135.

Womack, J. P., and Shook, J. (2005), Lean Management and the Role of Lean Leadership. Available at: http://www.atem.org.au/uploads/publications/-The_Principles_of_The_Lean_Business_System.pdf (Accessed 15 October 2012).

Wong, M. (2007). The role of culture in implementing lean production. *In Intemational Federation for Information Processing (IFIP). 246*, pp. 413-422. Boston: Olhager and F. Persson, Eds.

Xerox. (2009) Now What Counts. Measure What Matters. Deliver Results. Available at: http://www.xerox.com/downloads/usa/en/x/Xerox_Lean_Six_Sigma_Brochure.pdf (Accessed 9 February 2013).

Yang, C. W. (2010), 'Integrating fuzzy integral with multinomial log it model to evaluate the effects of service quality on travelling airline choice'. Information Technology Journal, 9(7): 1449-1457.

Yeh, Ch., and Kuo, Y. (2002), Evaluating Passenger Services of Asia-Pacific International Airports. Transportation Research Part E: Logistics and Transportation Review, 39(1): 35–48.

Yu, M. (2009), Assessment of Airport Performance using the SBM-NDEA Model. Omega Journal, 36(8): 440–452.

Yüksel, I. (2012), 'An Integrated Approach with Group Decision-Making for Strategy Selection in SWOT Analysis1'. International Journal of Academic Research in Business and Social Sciences, 2 (11): 134 – 161

Yurkl, G. (2002), Proactive Influence Tactics and Leader Member Exchange. University at Albany, State University of New York, Greenwich, CT: Information Age Publishing, pp. 87-103.

Zenglein, M. J., and Muller, J. (2007), Non-Aviation Revenue in the Airport Business – Evaluating Performance Measurement for a Changing Value Proposition. Berlin, Brazil: Berlin School of Economics.

Zu, X., Fredendall, L.D. & Douglas, T.J. (2008) The evolving theory of quality management: The role of Six Sigma. *Journal of Operations Management*, 26 (5), pp.630-650.

Appendices :

A. SERVQUAL Questionnaire

B. Structured interviews

- English version
- Arabic version

Appendix A: SERVQUAL Questionnaire (English version)

Measuring Quality of Service in King Khalid International Airport (KKIA) using SERVQUAL Questionnaire

Overview:

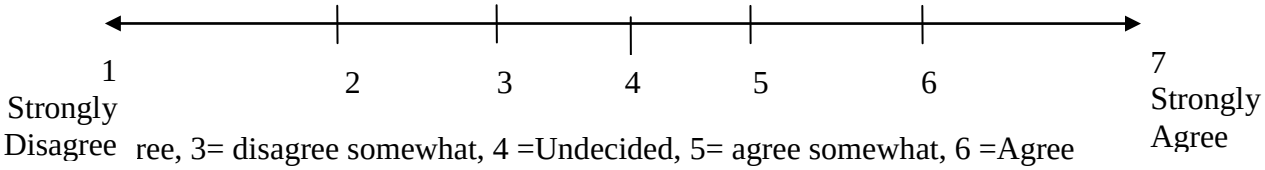
This research questionnaire aims to measure the quality of service in King Khalid International Airport (KKIA), the questionnaire is divided into two main sections; expectations for the airport that would provide excellent quality of service and perceptions for the feelings perceived in KKIA.

- Nationality: _____
- How old are you?
    - Under 25
    - 26-35
    - 36-45
    - 46 and above
- Gender
    - Male
    - Female

Expectations

Based on the quality of service provided in the King Khalid International Airport (KKIA), please consider the kind of airport that would provide excellent service quality. To what extent do you think such an airport would have the feature characterized by each of the statements in the following survey questionnaire? If the feature is found as not essential at all for excellent airport, you should circle the number 1. If the feature is found essential for excellent airport, you should circle the number 7. Moreover, you might circle other numbers in the middle (from 2-6) if you feel less strong regarding the feature. Please circle

the number that you think reflects truly your feelings for the airport that would provide excellent service quality.



ree, 3= disagree somewhat, 4 =Undecided, 5= agree somewhat, 6 =Agree

	Question	Strongly disagree						Strongly agree
TANGIBLES	1. Excellent airports will have modern-looking equipment	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	2. The physical facilities in excellent airports will be visually appealing	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	3. The personnel in excellent airports will be neat in appearance	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	4. The materials associated with services (such as pamphlets or statements) will be visually appealing in excellent airports	**1**	**2**	**3**	**4**	**5**	**6**	**7**
RELIABILITY	5. When excellent airports promise to do something by a certain time, they will do it	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	6. When a passenger has a problem, an excellent airport will show a sincere interest in solving it	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	7. Excellent airports will get things right the first time	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	8. Excellent airports will provide their services at the time they promise to do so	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	9. Excellent airports will insist on error-free records	**1**	**2**	**3**	**4**	**5**	**6**	**7**
RESPONSIVENESS	10. The personnel in excellent airports will tell passengers exactly when services will be performed	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	11. The personnel in excellent airports will give prompt services to passengers	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	12. The personnel in excellent airports will always be willing to help passengers	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	13. The personnel in excellent airports will never be too busy to respond to passengers'	**1**	**2**	**3**	**4**	**5**	**6**	**7**

	requests							
ASSURANCE	14. The behaviour of the personnel in excellent airports will instil confidence in passengers	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	15. The passengers of an excellent airport will feel safe in their dealings with the airport's services	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	16. The personnel in excellent airports will be consistently courteous to passengers	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	17. The personnel in excellent airports will have the knowledge to answer passengers' questions	**1**	**2**	**3**	**4**	**5**	**6**	**7**
EMPATHY	18. Excellent airports will give passengers individual attention	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	19. Excellent airports will have operating hours that are convenient for all their passengers	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	20. Excellent airports will have staff who give passengers personal attention	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	21. Excellent airports will have passengers' best interests at heart	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	22. The personnel of excellent airports will understand the specific needs of their passengers	**1**	**2**	**3**	**4**	**5**	**6**	**7**

Listed below are five features pertaining to airports and the service they offer. We would like to know how important each of these features is to you when you evaluate the service offered by an airport. Please allocate a total of 100 points among the five features according to how important each feature is to you - the more important a feature is to you, the more points you should allocate to it. **Please ensure that the points you allocate to the five features add up to 100**.

1. The appearance of the airport's physical facilities, equipment, personnel and communication materials. _____ points
2. The airport's ability to perform the promised service dependably and accurately. _____ points

3. The airport's willingness to help passengers and provide
   a prompt service. _____ points
4. The knowledge and courtesy of the airport personnel
   and their ability to convey trust and confidence. _____ points
5. The caring, individualised attention the airport
   Provides to its passengers. _____ points

Total allocated points 100 points

Please order the importance of the study variables from 1 to 5 based on your perspective

Variable	**Order No.**
1. Tangibles	
2. Reliability	
3. Responsiveness	
4. Assurance	
5. Empathy	

Perceptions

Based on your feelings perceived in the KKIA, you are required to answer the following statements by circling on the proper number. Your answers show to what extent you believe that the KKIA has the feature described by the feature. Once again, circling number 1 means that you strongly disagree that the airport you have attended has this feature and circling number 7 means that you strongly agree. You may circle any of the numbers in the middle that show how strong your feelings are. There are no right or wrong answers - all we are interested in is a number that best shows your perceptions about the airport which has provided different services to you.

	Question	Strongly disagree						Strongly agree
TANGIBLES	1. The airport has modern-looking equipment	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	2. The physical facilities in the airport are visually appealing	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	3. The Personnel in the airport are neat in appearance	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	4. Materials associated with the service (such as pamphlets or statements) are visually appealing	**1**	**2**	**3**	**4**	**5**	**6**	**7**
RELIABILITY	5. When the airport promises to do something by a certain time it does so.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	6. When you have a problem, the airport shows a sincere interest in solving it.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	7. The airport gets things right the first time.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	8. The airport provides its services at the time it promises to do so.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	9. The airport insists on error-free records.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
RESPONSIVENESS	10. The personnel in the airport tell you exactly when services will be performed.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	11. Personnel in the airport give you prompt service	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	12. Personnel in the airport are always willing to help you	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	13. Personnel in the airport are never be too busy to respond to your requests.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
ASSURANCE	14. The behaviour of personnel in the airport instils confidence in you	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	15. You feel safe in your dealings with the airport services and personnel.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	16. Personnel in the airport are consistently courteous with you	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	17. Personnel in the airport have the knowledge to answer your questions.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
EMPATHY	18. The airport gives you individual attention	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	19. The airport has operating hours convenient to all its passengers	**1**	**2**	**3**	**4**	**5**	**6**	**7**

	20. The airport has personnel who give you personal attention	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	21. The airport has your best interests at heart.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	22. The personnel of the airport understand your specific needs	**1**	**2**	**3**	**4**	**5**	**6**	**7**

We are thanking you for your kindness and spending the time for answering the questionnaire. Your answers will help us to improve the quality of services in the future.

Appendix A: SERVQUAL Questionnaire (Arabic version)

Measuring Quality of Service in King Khalid International Airport (KKIA) using SERVQUAL Questionnaire
قياس جودة الخدمات المقدمة في مطار الملك خالد الدولي باستخدام استبانة جودة الخدمة (سيرفكوال)

مقدمة:

يهدف هذا الاستبيان الى قياس جودة الخدمات المقدمة في مطار الملك خالد من خلال الاجابة على اسئلة الاستبيان التالي والتي تتفرع في فرعين رئيسيين وهما التوقعات لافضل جودة للخدمات التي يمكن ان يقدمها المطار والتصورات لمطار الملك خالد.

الجنسية: _____

العمر:

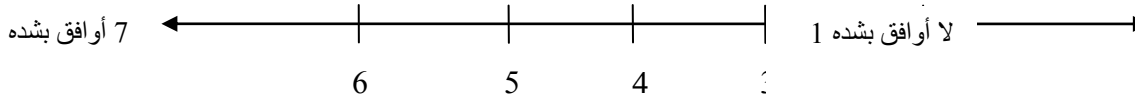
- ○ أقل من 25
- ○ 26-35
- ○ 36-45
- ○ 46 فأكثر

الجنس:

- ○ ذكر
- ○ انثى

التوقعات

استناداً على نوعية الخدمات المقدمة في مطار الملك خالد الدولي أرجو منكم تحديد المطار الذي من الممكن أن يقدم خدمات نوعية مميزة. لأي درجة تعتقد أن هذا المطار من شأنه أن يحتمل الصفات الموجودة في الاستبانة المرفقة ؟ اذا لم ويجد اي من الصفات المدرجة في هذها الاستبان يرجى تحديد الرقم (1) . اذا وجدت أحد الصفات بشكل أساسي في المطار يرجى تحديد الرقم (7). كما أنه بالامكان تحديد أرقام أخرى (2-6) حسب درجة اعتقادك بوجود هذه الميزة . يرجى تحديد الدرجة التي تعكس وجهة نظرك الداخلية حول المميزات الموجودة في المطار والتي تحدد ماهية الخدمة المميزة



		أوافق بشدة						أعارض بشدة
المميزات المادية	**1.**المطار المميز يكون عادة مجهز بأحدث التقنيات	7	6	5	4	3	2	1
	2.التسهيلات المادية في المطارات الحديثة عادة ما تكون جذابة بصريا	7	6	5	4	3	2	1
	3.الموظفون في المطارات الحديثة مرتبو الهيئة و الهندام	7	6	5	4	3	2	1
	4.المواد التي تعرض الخدمات في المطارات كالبروشورات و الكتيبات عادة ما تكون جذابة و ملفتة للنظر	7	6	5	4	3	2	1
الاعتمادية	**5.**المطارات الحديثة والمتطورة تفي بوعودها و تحترم المواعيد	7	6	5	4	3	2	1
	6.المطارات الحديثة تبدي الكثير من الاهتمام بالمسافرين عند التعرض لأي مشكلة	7	6	5	4	3	2	1
	7.المطارات المميزة تعطي نتائج ممتازة من أول مرة	7	6	5	4	3	2	1
	8.المطارات المميزة تقدم خدماتها بمواعيد معتمدة و محددة	7	6	5	4	3	2	1
	9.المطارات المميزة تصر على الوصول الى درجة الخلو من الاخطاء في سجلاتها	7	6	5	4	3	2	1
الاستجابة	**10.**الموظفون في المطارات المميزة يفون بمواعيد الخدمات المقدمة لهم	7	6	5	4	3	2	1
	11.الموظفون في المطارات المميزة يقدمون أفضل و أسرع الخدمات للمسافرين	7	6	5	4	3	2	1
	12.الموظفون في المطارات اللميزة يسارعون لخدمة المسافرين	7	6	5	4	3	2	1
	13.الموظفون في المطارات المميزة لا ينشغلون عن خدمة المسافرين	7	6	5	4	3	2	1
الضمان	**14.**سلوكيات الموظفين في المطارات المميزة تزرع الثقة في نفوس المسافرين	7	6	5	4	3	2	1
	15.المسافرين في المطارات المميزة يشعرون بالراحة عند التعامل مع الموظفين	7	6	5	4	3	2	1
	16.الموظفون في المطارات المميزة يتصفون الكياسة في التعامل مع المسافرين	7	6	5	4	3	2	1
	17.الموظفون في المطارات اللميزة قادرون على الاستجابة لجميع استفسارات المسافرين	7	6	5	4	3	2	1
التعاطف	**18.**الموظفون في المطارات المميزة بمنحون الاهتمام لجميع المسافرين.	7	6	5	4	3	2	1
	19.ساعات العمل و التسغيل مريحة لجميع	7	6	5	4	3	2	1

	المسافرين في المطارات المميزة							
	20.الموظفون في المطارات المميزة يبدون اهتمام بجميع المسافرين	**7**	**6**	**5**	**4**	**3**	**2**	**1**
	21.المطارات المميزة عادة ما تهتم بمصلحة المسافرين كهدف أول	**7**	**6**	**5**	**4**	**3**	**2**	**1**
	22.طاقم الموظفين في المطارات المميزة يبدون أهتمام باحتياجات المسافرين الخاصة	**7**	**6**	**5**	**4**	**3**	**2**	**1**

التالي مجموعة من المميزات التتي تتعلق بالخدمات المقدمة من المطارات. أرجو تحديد درجة أهمية كل ميزة بالنسبة لك عند تقييم خدمات أي من المطارات. يرجى وضع درجة (من 100) لأهمية كل ميزة بالنسبة لك على أن يكون مجموع النقاط كافة لخمسة مميزات 100 نقطة.

- المظهر العام للتسهيلات, طاقم الموظفين, المعدات و الاتصالات ---------- نقطة
- قدرة المطار على القيام بالمهمات على أكمل وجه و في الموعد المحدد --------- نقطة
- قدرة المطار على مساعدة الركاب و المسافرين بشكل فوري و سريع --------- نقطة
- درجة الكياسة و الاحترام الذي يتمتع به طاقم الموظفون في نقل الثقة و الاحترام ---------- نقطة
- قدرة المطار على توجيه الاهتمام و الرعاية الشخصية للركاب و المسافرين ---------- نقطه

مجموع النقاط ..... نقطة

- أهم ميزة لديك هي : ---------- (أذكر عدد الميزات)

- ثاني أهم ميزة لديك ----------
- الميزة الأقل أهمية لديك ----------

بناءاً على وجهة نظرك من حيث طبيعة الخدمات المقدمة في مطار الملك خالد الدولي, يرجى الاجابة على الجمل التالية عن طريق وضع دائرة حول الرقم المناسب و التي تعكس مدى ايمانك بوجود هذه المميزات في مطار الملك خالد الدولي . تحديد الرقم 1 معناه أنك غير موافق بشدة بينما الرقم 7 معناه أنك موافق بشدة أن هذه المميزات موجودة في مطار الملك خالد كما و يمكن أن تحدد الارقام الاخرى لتعكس مدى موافقتك على ما ذكر علما بأن هذه الاسئلة ليست مبنية على أساس نعم او لا انما على درجة الاعتقاد بوجود المميزات المذكورة.

التصورات

		أوافق بشدة						**أعارض بشدة**
–	**1.** المطارمجهز بأحدث التقنيات	7	6	5	4	3	2	1

	2.التسهيلات المادية في المطار جذابة بصرياً	7	6	5	4	3	2	1
	3.الموظفون في المطار مرتبو الهيئة و الهندام	7	6	5	4	3	2	1
	4.المواد التي تعرض الخدمات في المطار كالبروشورات و الكتيبات عادة ما تكون جذابة و ملفتة للنظر	7	6	5	4	3	2	1
الاعتمادية	5.الادارة في تفي بوعودها و تحترم المواعيد.	7	6	5	4	3	2	1
	6.ادارة المطار تبدي الكثير من الاهتمام بالمسافرين عند التعرض لأي مشكلة	7	6	5	4	3	2	1
	7.المطار يعطي نتائج ممتازة من أول مرة	7	6	5	4	3	2	1
	8.المطار يقدم خدماته بمواعيد معتمدة و محددة	7	6	5	4	3	2	1
الاستجابة	9.إدارة المطار تصر على الوصول الى درجة الخلو من الاخطاء في سجلاتها	7	6	5	4	3	2	1
	10.الموظفون في مطار الملك خالد يفون بمواعيد الخدمات المقدمة للركاب	7	6	5	4	3	2	1
	11.الموظفون في المطاريقدمون أفضل و أسرع الخدمات للمسافرين	7	6	5	4	3	2	1
	12.الموظفون في مطار الملك خالد يسارعون لخدمة المسافرين	7	6	5	4	3	2	1
	13.الموظفون في مطارالملك خالد لا ينشغلون عن خدمة المسافرين	7	6	5	4	3	2	1
الضمان	14.سلوكيات الموظفين في المطارتزرع الثقة في نفوس المسافرين	7	6	5	4	3	2	1
	15.المسافرين في مطارالملك خالد يشعرون بالراحة عند التعامل مع الموظفين	7	6	5	4	3	2	1
	16.الموظفون في المطار يتصفون بالكياسة في التعامل مع المسافرين	7	6	5	4	3	2	1
	17. الموظفون في مطار الملك خالد قادرون على الاستجابة لجميع استفسارات المسافرين	7	6	5	4	3	2	1
التعاطف	18.الموظفون في المطار بمنحون الاهتمام لجميع المسافرين	7	6	5	4	3	2	1
	19.ساعات العمل و التشغيل مريحة لجميع المسافرين في مطار الملك خالد	7	6	5	4	3	2	1
	20.الموظفون في مطار الملك خالد يبدون اهتمام بجميع المسافرين	7	6	5	4	3	2	1
	21. ادارة مطار الملك خالد عادة ما تهتم بمصلحة المسافرين كهدف أول	7	6	5	4	3	2	1
	22.طاقم الموظفين في مطار الملك خالد يبدون أهتمام باحتياجات المسافرين الخاصة	7	6	5	4	3	2	1

نقدم لكم خالص الشكر و العرفان على الوقت الذي خصصتموه للإجابة على اسئلة هذا الاستبيان. اجاباتكم ستساعدنا على تطوير الخدمات مستقبلاً

Appendix B: Structure interviews

- English and version
- Arabic version

Appendix B: Structure Interviews (English version)

Overview:

This research questionnaire aims to measure the quality of services provided at King Khalid International Airport (KKIA) by answering the following qualitative questions. All managers are kindly requested to answer all questions precisely so that we can achieve actual results for the evaluation of the KKIA services quality and to improve using lean management techniques.

Nationality: _____

How old are you?

- Under 25
- 26-35
- 36-45
- 46 and above

Gender

- Male
- Female

Job Title:_____

Question 1:

Are there any suggestion or complaint boxes in important areas in the airport (the passenger entrance, luggage area, market area or waiting hall)? Does the administration pay attention to complaints Please mention the policy followed in measuring and dealing with passenger complaints and suggestions.

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Question 2:

Have any operations been carried out to improve the quality of services in the airport? Please mention these in detail.

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Question 3:

Please mention the problems that passengers may suffer (or have suffered) and which reduce their satisfaction and the service quality. Please also mention the plan to solve these problems.

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Question 4:

After developments in the airport, have there been any evaluations of the service quality and passenger satisfaction? What is the policy followed to assess passenger satisfaction and service quality in the airport?

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Question 5:

Are there any manuals inside the airport to make passengers' movements easier and are the manuals updated? Please mention the policy used.

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Question 6:

From your point of view, can passengers differentiate between the services that the airport and the airway companies provide? Sometimes, a drop in the quality of services is caused by a malfunction on behalf of an airway company… Have such problems ever been noticed and what are the ways the airport deals with them?

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Question 7:

To what degree are service quality and passenger satisfaction prioritized? Please mention the reason for your answer.

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Appendix B: Structure Interviews (Arabic version)

قياس نوعية الخدمات في مطار الملك خالد الدولي –استبيان نوعي-

مقدمة:

يهدف هذا الاستبيان الى قياس جودة الخدمات المقدمة في مطار الملك خالد الدولي من خلال الإجابة على اسئلة الاستبيان النوعي التالية. يرجى التكرم من السادة المدراء الكرام الاجابة عن اسئلة الاستبيان بدقة وبشكل وافي حتى يتم الحصول على نتائج واقعية تفيد في عملية تقييم جودة الخدمات في مطار الملك خالد الدولي وتحسينها باستخدام تقنيات الادارة الفاقدة.

الجنسية: _____

العمر:

- ○ أقل من 25
- ○ 26-35
- ○ 36-45
- ○ 46 فأكثر

الجنس:

- ○ ذكر
- ○ انثى

المسمى الوظيفي: _____

السؤال الاول:

هل يوجد صناديق للشكاوي والاقتراحات في عدد من المناطق الهامة في المطار (منطقة دخول المسافرين, منطقة الامتعة والجوازات, منطقة السوق الحرة, وقاعة الانتظار) وهل يهتم بها من قبل الادارة؟ كما يرجى ذكر السياسة المتبعة في تقييم والتعامل مع الشكاوي المقدمة من المسافرين.

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السؤال الثاني:

هل تم القيام بعمليات تحسين لجودة الخدمات في المطار؟ يرجى ذكرها بالتفصيل

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السؤال الثالث:

يرجى ذكر المشاكل التي (كانت او ما زالت) يعاني منها المسافرون والتي تقلل من رضاهم وجودة الخدمات في المطار وما هي الخطط المستقبلية لحلها؟

السؤال الرابع:

هل تمت ملاحظة الانعاكاسات على جودة الخدمات ورضا المسافرين عقب اي عملية تطوير وما هي السياسة المتبعة لتقييم رضا المسافرين وجودة الخدمات في المطار؟

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السؤال الخامس:

هل يوجد كتيبات ارشادية داخل المطار لتسهل عملية انتقال المسافرين من مكان الى اخر وهل يتم تحديث هذه الكتيبات. يرجى ذكر السياسة المتبعة؟

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السؤال السادس:

من وجهة نظركم. هل يستطيع المسافرين التفريق بين الخدمات التي يقدمها المطار والخدمات التي تقدمها شركات الطيران.؟ يعزى سوء الخدمة في بعض الاحيان الى قصور من جهة احد شركات الطيران... فهل تمت مواجهة مشاكل من هذا النوع وما هي طرق التعامل معها؟

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السؤال السابع:

في اي درجة من الاولويات تقع اولوية جودة الخدمة ورضا المسافرين في المطار؟ ارجو التوضيح مع ذكر السبب.

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