DIMENSIONING PERFORMANCE ESTIMATION OF THE AIRLINE INDUSTRY: PATH-ANALYSIS BASED MODELLING

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**THESIS SUBMITTED IN FULFILMENT
OF THE REQUIREMENTS
FOR THE DEGREE OF DOCTOR OF PHILOSOPHY**

**FACULTY OF ECONOMICS AND ADMINISTRATION
UNIVERSITY OF MALAYA,
KUALA LUMPUR, MALAYSIA**

2013

UNIVERSITI MALAYA

ORIGINAL LITERARY WORK DECLARATION

Name of Candidate**: Hashem Salarzadeh Jenatabadi** (I.C/Passport No:) **X95386025**

Registration/Matric No: **EHA060004**

Name of Degree: **Doctor of Philosophy**

Title of Project Paper/Research Report/Dissertation/Thesis ("this Work"):

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Field of Study: **Applied Statistics**

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ABSTRACT

Estimating the performance of airline industries has always been of interest to airline management teams and researchers. In this regard, some researchers focused on financial performance, and some just focused on non-financial performance. There are also studies that considered both financial and non-financial performance in their models. The main objective of this research is to integrate the different dimensions of performance indicators in one latent construct as an overall performance. Latent variables are the proxies of measured phenomena reflected in observed variables, which cannot be directly measured. In other words, latent variables present a degree of abstraction that permit a researcher to illustrate the relationship among a class of variables that have common characteristics.

The main motivation of this study is to find a comprehensive model for estimating and improving airline performance based on internal indicators, including airline capacity and internal operation, and external indicators including the economic situation. The findings of this study provide a method for designing a simultaneous model for estimating global airline performance. To achieve the objectives of this study, research methodologies such as Structural Equation Modelling (SEM) and path analysis are employed. In path analysis, prior to model fitting, the measurement model is utilized to confirm and verify the reliability of the measurement indicators employed for indicating the latent constructs. In the structural model, only cross sectional data is applicable and longitudinal path analysis is not usable. In this study, 214 airline companies were selected using stratified sampling from a list of active companies in 2009.

The validity of the constructs and the constituent variables were verified with content and construct validity testing. The final model, which has the potential to be used in airline companies, is extremely close to the needs and the requirements of the industry as all redundant measures were eliminated.

ABSTRAK

Kajian terhadap prestasi industri penerbangan sangat diminati oleh pihak pengurusan syarikat penerbangan dan juga penyelidik-penyelidik. Kebelakangan ini, banyak kajian telah dijalankan terhadap prestasi industri penerbangaan. Ada dikalangannya mengkaji prestasi dari sudut kewangan, manakala ada juga yang mengkaji prestasi dari sudut bukan kewangan. Memang tidak boleh disangkalkan lagi bahawa terdapat juga kajian yang mengkaji kedua-dua sudut. Tujuan utama kajian ini adalah untuk menyatukan petunjuk-petunjuk prestasi yang sedia ada dengan menggunakan pembolehubah *latent* sebagai satu petunjuk prestasi yang menyeluruh. Pembolehubah *latent* adalah satu pembolehubah wakilan yang tidak boleh diukur secara langsung. Akan tetapi, pembolehubah *latent* ini membolehkan penyelidik menggambarkan hubungan antara satu set variabel yang mempunyai ciri yang sama.

Motivasi utama kajian ini adalah untuk mencari satu model yang komprehensif bagi menganggar dan meningkatkan prestasi syarikat penerbangan berlandaskan petunjuk dalaman, iaitu kapasiti penerbangan dan operasi dalaman, dan petunjuk luaran iaitu keadaan ekonomi. Kajian ini menyediakan satu pendekatan bagi pembentukan model persamaan serentak bagi menganggar prestasi industri penerbangan global. Untuk mencapai objektif kajian ini, kaedah Pembentukan Persamaan Struktur (*Structural Equation Modelling*, SEM) dan analisis lintasan telah digunakan. Bagi analisis lintasan, model pengukur digunakan untuk mengesahkan pembolehubah *latent* yang digunakan. Bagi model struktur pula, hanya data keratan rentas boleh digunakan dan bukannya data lintasan membujur. Dalam kajian ini, 214

syarikat penerbangan telah dipilih menggunakan persampelan berstrata dari senarai syarikat penerbangan yang aktif pada tahun 2009.

Kesahihan konstruk dan variabel konstituen disahkan menggunakan ujian pengisian dan kesahihan konstruk. Model akhir iaitu model yang akan digunakan oleh syarikat penerbangan adalah sangat sesuai dengan keperluan industri tersebut kerana semua ukuran yang tidak berkenaan telah dihapuskan.

ACKNOWLEDGEMENTS

I would especially like to acknowledge Prof. Noor Azina Ismail's help with understanding the process of analysis in this study. She has a gift for communicating complex ideas and was a tremendous help as I sorted through how I wanted to express the study results. Prof. Noor Azina Ismail was always available when I needed her and she always encouraged me to improve the quality of discussion and research model.

Next, I would like to thank the Department of Applied Statistics, Faculty of Economics and Administration, University of Malaya for gave me an opportunity to complete my Ph.D here.

I offer my deepest appreciation to my best friend Omid Behboodi for his constant support and encourage me during my education. Without his support, this study could not have been completed.

Finally, I am deeply grateful and thankful to my parents, Tuba shafee and mousa salarzadeh Jenatabadi, who passed away, and my sisters Tayebe salarzadeh Jenatabadi and Zahra salarzadeh Jenatabadi for their perseverance, support, and prayers. Thank you for reminding me that I have never been alone.

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List of Abbreviations

ADF	Asymptotically Distribution Free
ASL	Average Stage Length
ASM	Available Seat Mile
ASK	Available Seat Kilometre
ATW	Air Transport World
AVE	Average Variance Extracted
GDP	Gross Domestic Products
GLS	Generalized Least Squares
HDI	Human Development Index
IATA	International Air Transport Association
ML	Maximum Likelihood
OLS	Ordinary least square
PM	Performance Measurement
RPK	Revenue Passenger Kilometre
RPM	Revenue Passenger Mile
SEM	Structural Equation Modelling

CHAPTER 1

INTRODUCTION

1.1 Overview

An airline, in general, is referred to as a service of transportation for both cargo and passengers and airline performance comprises the results or actual output of an airline's activities including operations, finance, and customer service indicators.

One of the most important results of globalization has been the increase of the capacity and resources of airline companies, expanding the market areas, multiplying various destinations and business partners, and, consequently, enhancing the conditions for more competitiveness. Moreover, the survival of each company, especially in financial crises, depends on whether managers of the company can identify useful and potential ways to control and improve their performance given such a situation. Therefore, the estimating and measurement of performance and effective management of companies has constituted an important topic for studies in recent decades. This study intends to propose an appropriate solution and a comprehensive model for airline performance. The recognition of performance patterns of airline organization benefits these managers, as decision makers, by providing a basis to assist them in making correct and effective decisions in situations, such as the timing of new interventions and ending existing change programmes. In addition, the method used in this study can be helpful for researchers seeking to estimate the overall performance of the airline industry based on definitions of latent variables.

As such, measuring and estimating the performance of airline industries has always been of great value to airline directors and researchers. In this regard, some researchers focused on financial indicators to estimate performance in the airline industry (Wang, 2008, Riley et al., 2003, Flouris and Walker, 2005), some only dealt with non-financial indicators (Piga and Gaggero, 2009, Devriendt et al., 2009, Scheraga, 2004), while few of them concentrated on both financial and non-financial airline performance (Duliba et al., 2001).

Airline companies face many different challenges, some of which may affect their performance while others might result in their closure. For example, according to the report issued by the Airline Transport Association (ATA, 2008), at least two hundred commercial airlines have been obliged to merge with other airline companies, demand bankruptcy protection, and/or liquidate or terminate their operations since 1978. The report specifically highlights that 12 air carriers filed for bankruptcy protection during a period of three years from 2005 to 2008.

Due to the economic crises in the last decade, as far as the labour market in the airline industry is concerned, the period between 2000 and 2005 witnessed a 27% reduction in the number of employees in the six largest air carriers (Scovel, 2006). Figure 1.1 illustrates the Transport Service Index (TSI) for the period between January 1990 and July 2010. This report was provided jointly by the Bureau of Transportation Statistics (BTS), U.S. Department of Transportation (DOT, 2010). TSI includes measuring of passengers and freight movements. As Figure 1.1 displays, the transport service index in terms of passengers and freight has been increasing from 1990 until 2008. However, in 2009 obvious decline in the trend can observed and therefore it is chosen as the year where the analysis for this study is carried out to capture the performance of airline during the financial crises.

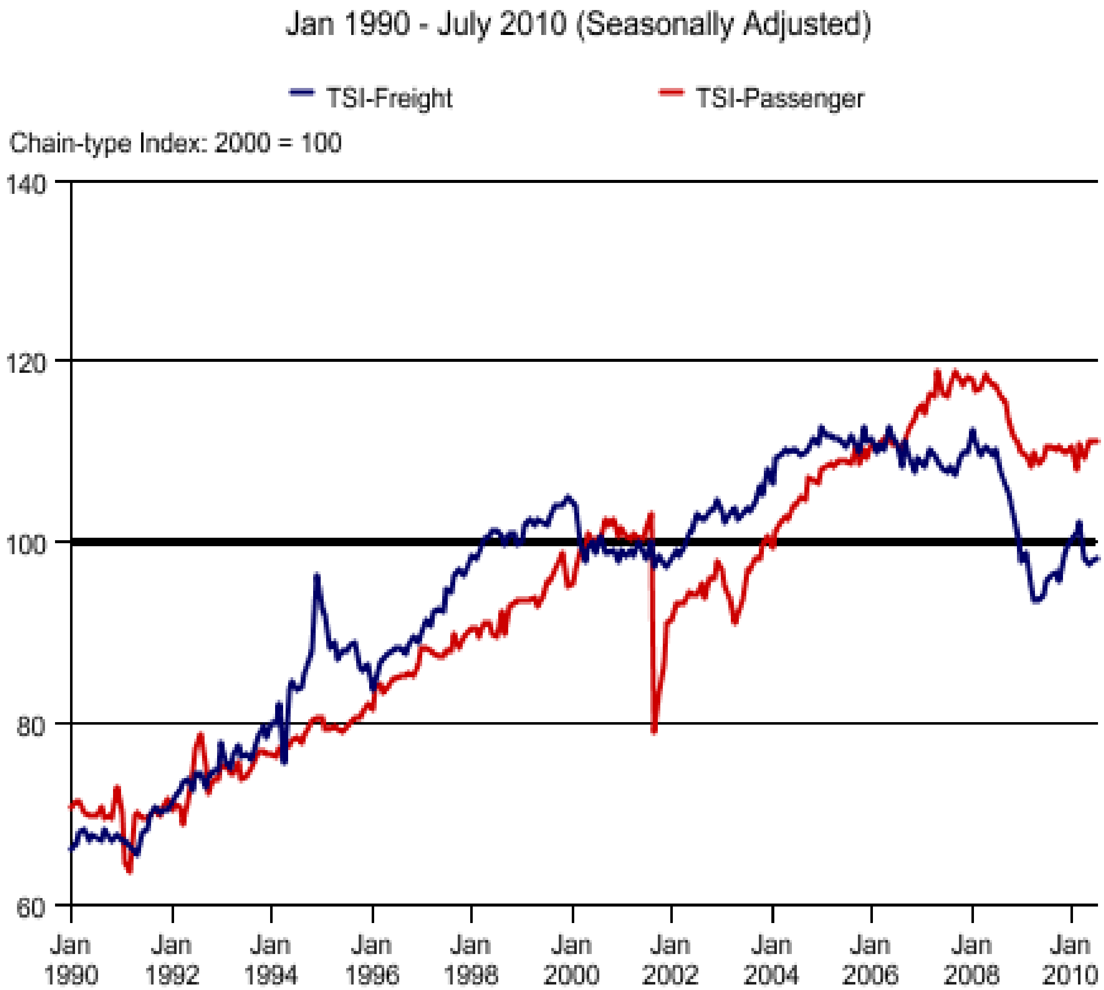


Figure 1.1: TSI-Freight and TSI-Passenger from 1990 to 2010
(Source: DOT (2010))

For estimating performance, several different models have been used in previous studies. These models have their own weaknesses in estimating performance. One of the aims of this study is to cover these existing gaps in the literature review and introduce an appropriate model. This new model represents the overall performance of the airline industry during the financial crises in 2009.

1.2 Research Background

Most of the important factors that affect performance of airline companies are within the internal operation, which is under the control of the airline management. Therefore, the earlier research and studies on the performance of the airline industry were mostly based on attempts to improve the internal operation, which generally includes the number of flights, flight time, block time, advertisement expenses, vehicle kilometres, and many other related indicators.

One of the pioneer academic studies was carried out by Caves et al. (1984). This study provided an estimation of total factor productivity as a measure of performance for 11 major airline companies. Four outputs (including Revenue Passenger Miles (RPM) for charter and scheduled, revenue ton miles of mail, and revenue ton miles of other freight), which were mainly associated with airline performance with five inputs (including ground equipment, flight equipment, fuel, ground property, and labour), were used to estimate the Index of total factor productivity for each airline company. They also analysed the airline's productivity differences and discovered that airlines with a higher load factor and longer average stage length (ASL) had higher productivity levels.

In another research, Sickles (1985) tested a nonlinear model as well as growth of specific factors of productivity based on sixteen local American airline companies, which included cases from 1970 to 1978, to estimate performance. Sickles' model included estimates of material, labour, capital, and energy inputs. He employed these variables to reach an estimated cost function that could describe a company's production technology. The mean of the growth in factor productivity was around 2.6% per year, in which the role of labour and capital as dominant causal factors were significant. Sickles concluded that the time-specific random effect insignificantly influences performance, while the firm-specific effects were significant.

In the following year, Sickles et al. (2012) used the same data to cover the figures reported quarterly between 1970 and 1981, which were considered for the evaluation and assessment of deregulation in the sample airline companies. For this purpose, the researchers initiated an airline performance model, which contained 13 airlines with material, labour, energy, and capital, as the input variables to be able to forecast passenger and cargo incomes. It was found that the application of deregulation reduced the total expenses of the airline industry and improved the allocative inefficiency of the airline. Cornwell et al. (1990) conducted another test with the same data collected by Sickles et al. (1986) for eight airlines, including seasonal dummies in their model. They added the measurement of quality, and ASL in their study. The study confirmed a 13 percent increase in the amount of efficiency from 1972 (82%) to 1980 (95%).

In the late 1970s, American Airlines and United Airlines launched their primary system invention based on computerized reservations. This type of reservation is able to enhance the productivity of the airline companies and minimize cost through a reduction in the workforce (Duliba et al., 2001). It was only in following years that innovations made through computerized reservation system technology created the opportunity to set up and enable revenue yield management systems for revenue-side productivity and also ticket price recovery. Therefore, with the implementation of computerized reservation systems, new variables were taken into consideration for the estimation of the performance of airlines companies by researchers. In other words, variables in connection with ticket selling through agencies using reservation systems were also added to the other internal variables of the companies.

The U.S. Transportation Department developed a model in 1988 in which data on an airline's revenue share were collected, during the year, from different airline agencies via their computerized reservation systems (Duliba et al., 2001). Commission override, money paid to book a seat on a flight in an airline company by the airlines, was also attempted in this model. Some of the dummy variables in the model were part of the scheduled flights of the agent in a given market, i.e., the vendor's portion of flights scheduled, and a number of other factors that show if a sales agent had received the commission override from other airlines in the model. In their model, they included vendors and agents in 57 merged metropolitan statistical regions including medium and large hubs, which employed a computerized system for reservation in 1986. The results of the study revealed the existence of a relationship between the revenue portion a vendor receives from travel agents that utilize the vendor's share and the computerized reservation system of scheduled flights. Commission overrides could be applied to both competing airlines with fewer bookings and airlines offering higher booking rates.

Another study conducted by Borenstein (1991) focused on the advantage of a selective air transport in a specific market. This research is a rare one concentrating on the market shares of an air transport in particular networks. The employed model suggested by Borenstein included variables, such as schedule convenience, tourist traffic, airport dominance, and share of computerized reservation system. The variable suggested in the model determined the proportions of revenue on computerized reservation systems that were running at the time of the research in specific cities on a carrier's system. The data required for this model were collected based on 1,200 agencies across America during the summer season of 1986. The market share measured by Borenstein was based on the share of the round-trip traffic of an airline connecting two specific networks. According to the results gained through this test, the market share could account for 15% of the total variance, which means that the coefficient of the computerized reservation system was not significant for the prediction of market share. Overall, more dominant airlines absorbed a larger number of passengers in an airport; however, as they report, the benefit is not large and it is hard to measure.

Lastly, applying a multiplicative competitive interaction model, Banker and Johnston (1995) modelled market share in specific distances. This model, representing the relative power of choices of competitors in the marketing mix to gain more of the share in the market, utilizes production function modelling and techniques of analysis. However, another parallel model used for this study investigated and tested the effects of a system of computerized reservation on its sponsor's expenses concerning the reservation services. The independent variables used in the study include the average fare per RPM, frequency of flights, the amount of airline agencies access to computerized reservation system, number of served destinations, advertising services, labour during reservation hours, and commission of airline agents. The data gathered for Banker and Johnson's study included 23 airlines and covered a period of various quarters from 1981 to 1985. However, in that period, the model of the multiplicative competitive interaction covered 95% of the total variance in the market share. The findings of their study supported that the system of computerized reservation provided was significant and made a positive contribution to the prediction of the share of the market.

The above-mentioned studies considered variables related to ticket sales and travel agencies as important factors of the research, which were generally used to enhance the overall performance of the airline. Most of these variables, such as number of agencies, number of systems for ticket sales and reservation, and even travel agent commission have been effective concerning performance. However, since 2000, due to the improvements in IT, most of the customers only book their flights through the Internet and the number of tickets sold by travel agencies has decreased. As a result, the variables relating to reservation and ticket selling have been discarded from their research. This industry change is a consequence of not only unexpected shock factors, such as 11 September 2001; other terrorist attacks; or the SARS (Severe Acute Respiratory Syndrome) phenomenon in China 2003; but also changes in macroeconomic indicators, such as Gross Domestic Products (GDP) growth in different countries and regions; fluctuations in exchange rates and oil price; and by the fact that the air travel industry has experienced a general modification in its trends and structure.

It can be concluded that the development of IT, on the one hand, by diminishing the importance of variables such as computer reservation system, and increasing the significance of the effect of economic variables on the performance of organizations and companies, on the other, have brought about deep modifications in the estimation methods of the performance of airline companies. Therefore, the studies conducted in recent years reveal the significance of the effects of the economic condition in the performance of the airline industry.

1.3 Problem Statement

There are certain problems in estimating airline performance techniques. In all the studies about performance, after introduction of the indicators, in order to evaluate the model, the researchers consider each of the performance indicators separately and provide different models for each indicator respectively.

For instance, a research by Rajasekar and Fouts (2009) used three indicators – RPM, passenger load factor, and market share – to estimate performance and presented a separate model for each indicator.

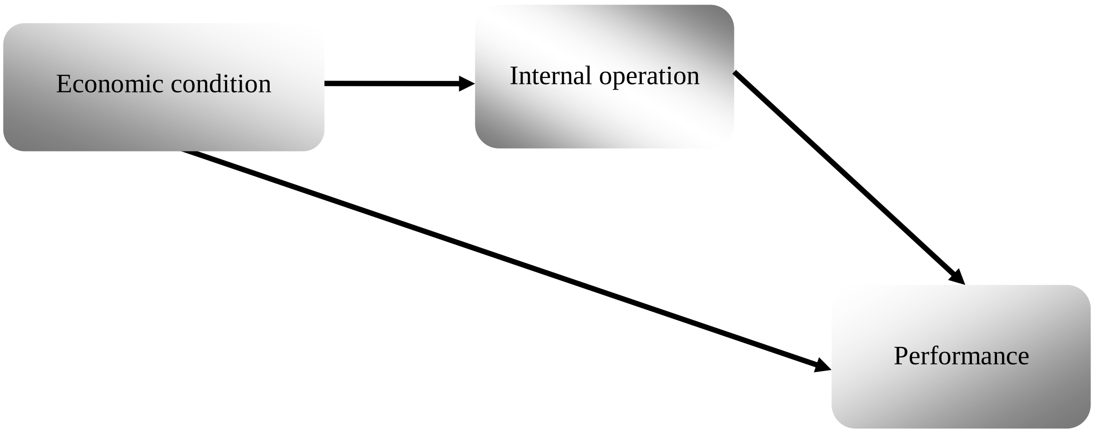
The first discernable gap in such studies is that these models are not able to introduce a general indicator for the introduction of performance, such as "overall performance", which is in itself a combination of other indicators, such as market share, operating profit, load factor, and RPK. However, these measurable indicators are in the same area of airline performance. It is clear that they are related, and, hence, a change in any of them causes changes in others. As a result it is reasonable to combine these indicators as one construct and call it “overall performance”.

Therefore, instead of concentrating on measurable indicators, this research focuses on the concept of immeasurable overall performance comprehensively. Consequently, it could be one model with an overall performance construct that is a combination of four performance indicators, such as load factor, operating profit, RPK, and market share. Thus, the current research intends to cover the gap with the introduction of latent variables instead of measurement variables.

All the research and studies that have assessed the performance according to the economic variables have considered these variables along with other internal variables of companies. In other words, they have taken into consideration indicators, such as GDP and inflation rate with other factors, such as flight number, etc., as independent variables.

(Internal operation + Economic condition) → Performance

However, it is obvious that if there is any economic change or global turmoil, such as 9/11 or SARS, managers can control the performance of the company through alteration of internal factors, such as number of flights, number of flight hours, and the like. Therefore, economic condition can affect internal operation. The second gap in the previous research models is that they cannot measure this impact. The present study intends to solve this problem by taking mediation analysis into consideration.



Most researchers have mainly focused on the estimation and measurement of performance without any in-depth research on airline capacity. In other words, there has never been a model specifically designed for the performance of airline companies with respect to airline capacity indicators. These types of capacities that airline companies need to carry out their daily activities. These indicators have ability to successfully apply resources and skills to improve the potential airline performance. Therefore, the third gap of the previous research and studies is that the suggested models are not able to estimate airline performance taking into account capacity and economic indicators.

1.4 Purpose of the Study

The most important purpose of this study is to determine a model that can estimate the overall performance of airline companies. In introducing overall performance, a latent variable is used for the first time. This variable is a combination of load factor, operating profit, RPK, and market share. There are three other latent variables. The first group includes inflation rate, HDI and GDP as economic condition. The second group consists of the number of departures, ASL, advertisement expenses, and vehicle kilometres as internal operation. The third group includes ASK, number of employees, and network size as airline capacity.

Therefore, the model has four constructs, which is justified according to organizational assessment theories (See section 1.7). The research also includes other variables that could be expected to have an impact on the relationship between the constructs. The additional single variable is firm age. Age normally comes out as a "predictor in life-cycle and ecological of organization" (Powell et al., 1999). A higher age of company indicates more extensive internal growth of experience and learning in knowledge, which might be helpful in facing the challenges in the airline market. Regarding the potential impact of firm age in moderating the relationship, this study aims to illustrate that this variable is able to control the linkage of the economic condition with other outcomes in the research model. Therefore, the model contains independent, mediator, moderator, and dependent latent variables.

For the estimation of global airline performance, Structural Equation Modelling (SEM) with a latent variable is employed. These statistical methods are often intended for data analysis and assisting the firms and companies to decide and plan in more effective ways. The collected data were based on the airlines annual reports issued for 2009.

1.5 Research Questions and Objectives

This thesis contains two research questions and four objectives, which are presented in the following classifications:

1.5.1 Research Questions

First question: Is there any significant relationship among internal operation, airline capacity, economic condition, and performance in the global airline industry?

Second question: Can firm age significantly affect the relationships among internal operation, airline capacity, economic condition, and performance?

1.5.2 Research Objectives

As mentioned in Section 1.3, in the previous research, there is no indicator based on a combination set of airline performance indicators like load factor, market share, and profit. Therefore, there is one model for every indicator. This attempt to introduce a unified construct that is combined with several dimensions of airline performance indicators. Therefore:

First objective is to determine an overall performance construct based on a combination of different dimensions of airline performance indicators.

Second objective is to identify the relationship among economic condition, internal operation, capacity, and performance in global airlines during the financial crisis 2009.

Third Objective is to establish that internal operation and airline capacity are both mediators in the relationship between economic condition and airline performance.

Fourth objective is to determine the impact of firm age on the relationship among economic condition, internal operation, capacity and performance.

1.6 Significance of the Problem

The primary implications of this study are two, namely, practical implications, which deepen the perception and understanding of the performance of the airline industry, leading to more effective change-intervention decisions, and theoretical implications, which helps bridge the gap between the established conventional airline industry organization and the emerging community of computational (using mathematics) and complexity theories.

The significance of this study resides in its attempt to bring about changes for practitioners and their decision strategies, which include managers and directors since it suggests that performance, viewed through a pattern-seeking lens, can provide sufficient insights that are not evident when viewing the affairs through more traditional lenses. The recognition of performance patterns of airline organization benefits these managers, as decision makers, by providing a basis to assist them in making right and effective decisions in situations, such as the timing of new intervention and ending existing change programmes.

The necessity for the recognition of predictive patterns, prior to any performance failures, authorizes decision makers to intervene with pre-emptive strategic modifications and changes before the actual failure occurs. In addition, the method used in this study can be helpful for researchers seeking to estimate the overall performance of the airline industry, because, based on the definitions of latent variables, the SEM method views performance, capacity, internal, and economic condition as constructs.

1.7 Theoretical and Conceptual Framework of the Research

The researcher has selected the Institutional and Organizational Assessment Model (IOA Model) (Figure 1.2), which was introduced and developed by the Canadian International Development Research Centre (IDRC) (Lusthaus, 2002), as the main theoretical framework for the current research, according to which, internal and external operating environments, organizational capacity are the three main factors affecting organizational performance.

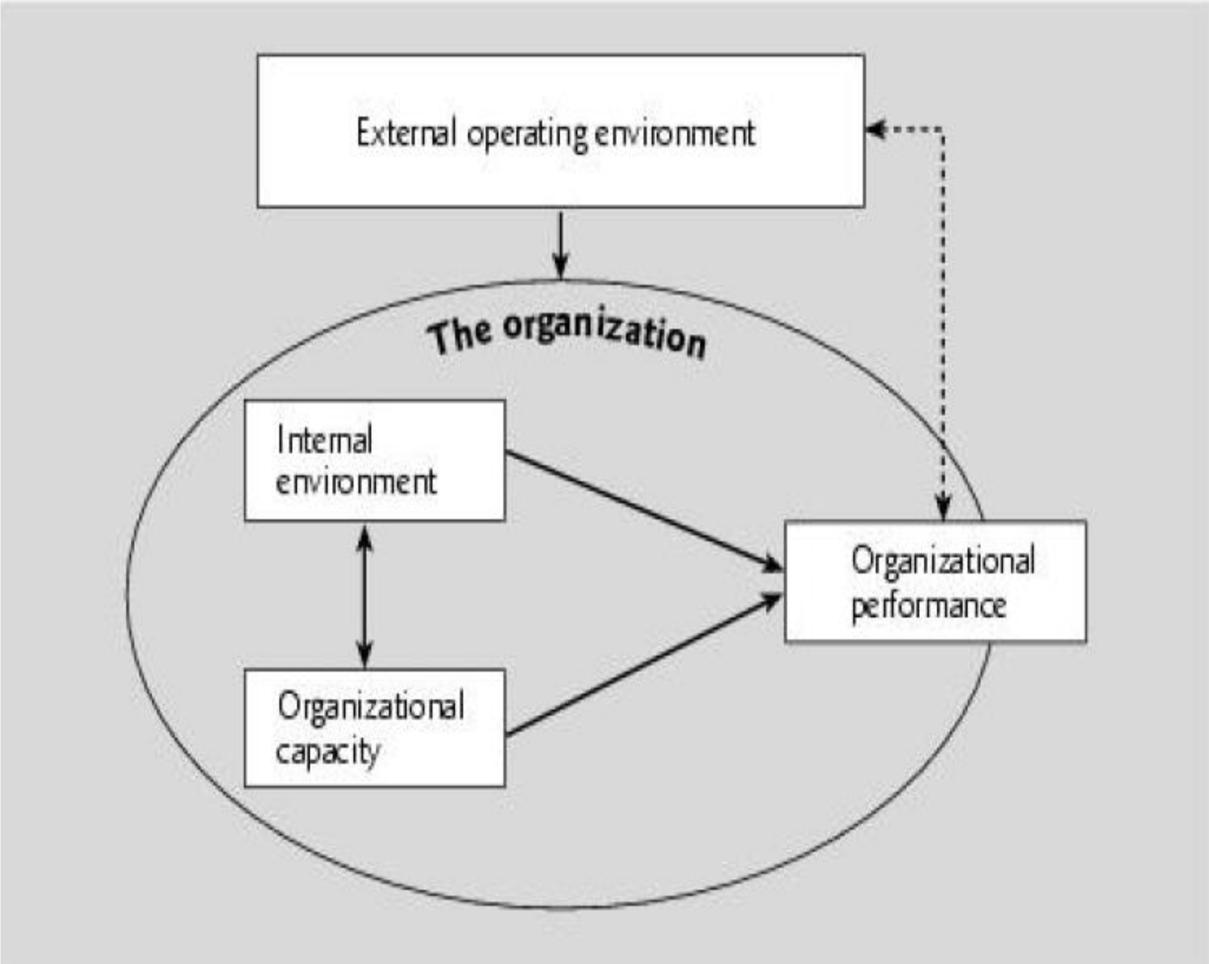


Figure 1.2: Framework for organizational assessment
(Source: Lusthaus (2002))

Organizational capacity includes the physical infrastructure, staffing, financial resources, strategic leadership, programme and process management, technology and IT, and its links with other business groups and companies. The management capacity covers managing processes and procedures for its programmes and resources as well as the external relationships of the organization with other firms and companies. These management capacities and resources together constitute the organization's overall capacity. External operating environment, which includes legal and administrative systems, economic conditions and trends, political environment, and the cultural and social contexts in which the company operates, also significantly impact on the organizational performance of the company. As an example, legal systems introduce and govern the policies, rules and regulations of the company. The political environment includes factors that have a vital impact on the existence and survival of the organization. These factors can be general political stability or political support of or hostility to a country by other political powers. The internal environment "refers to internal indicators that influence the direction of the organization and the energy displayed in its activities" (Metzger et al., 2007).

The conceptual framework used in this research is the same theory discussed above, which has been justified and applied to the airline industry. Therefore, according to the introduced theory and the gaps discovered in the previous studies, the final model suggested by this thesis includes four main constructs, namely: performance, internal operation, economic condition, and airline capacity, as illustrated in Figure 1.3.

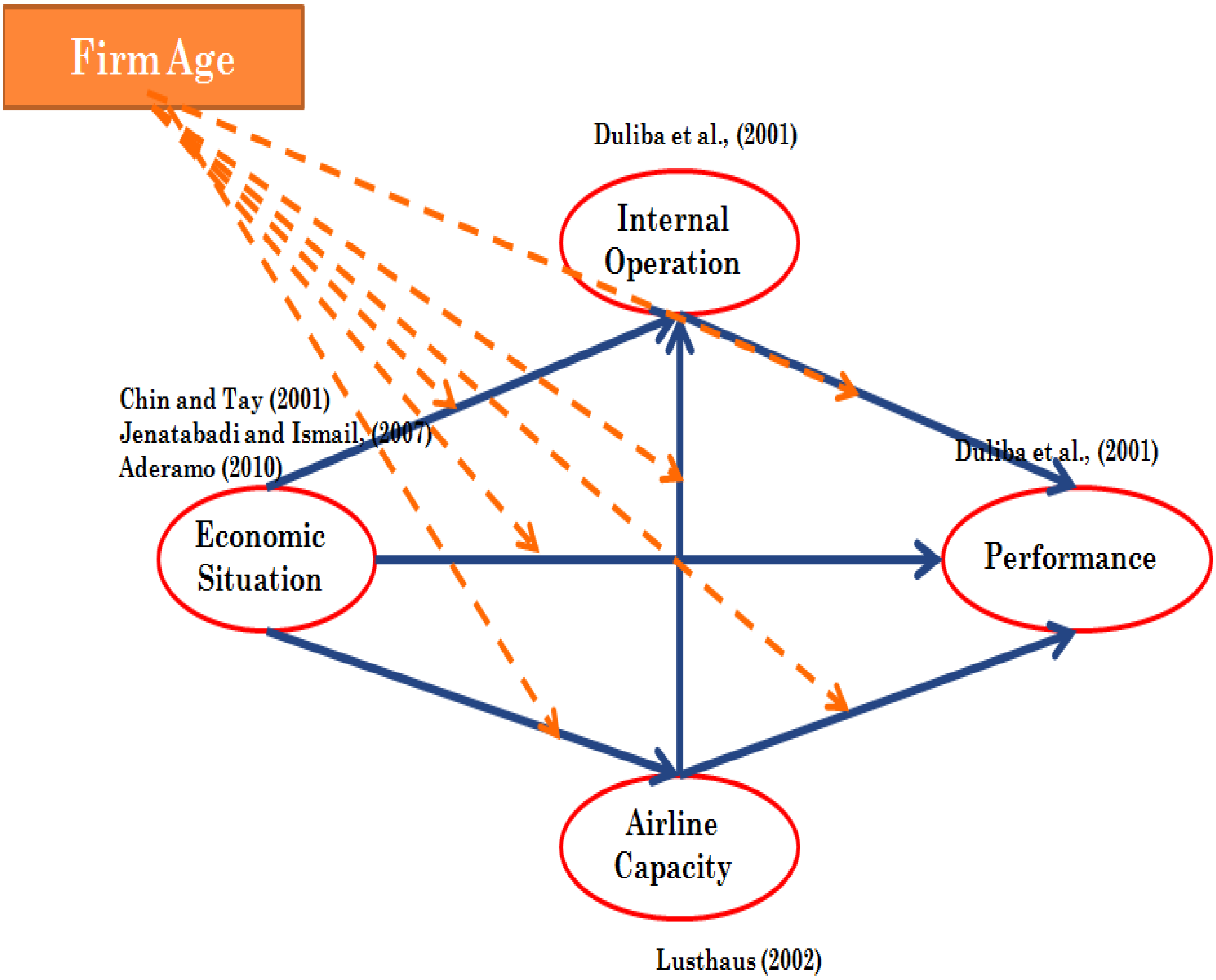


Figure 1.3: Research conceptual framework
(Source: Author)

1.8 Definition of Expressions

The expressions used in discussion in various sections, throughout this thesis are defined and clarified in this part to provide an opportunity for the readers to become familiar with the applied terminology to the expression of the ideas and procedures:

Airline performance, which is mostly used simply as ‘performance’ throughout the thesis, is a combination of financial and non-financial performance. Based on Duliba et al.’s (2001), four variables were taken into consideration for measurement of airline performance, these are load factor, market share, RPK, and operating profit. Airline capacity, used as capacity throughout the thesis, is also a combination of three factors, namely: network sizes, ASK, and number of employees. Internal operation is the main construct in the airline industry that can be changed by the management based on the company's strategies and policies. Four factors are contained in this construct based on Duliba et al. (2001) – number of departures, ASL, advertising expense, and vehicle kilometres. The economic condition cannot be controlled by organizations and their influence depends on the economic condition of the company. Variables included are inflation rate (Jenatabadi and Ismail, 2007), GDP (Gillen, 2010), and the HDI.

1.9 Organization of the Study

The present study concentrates on the current situation of performance in global airlines. This research is arranged into five chapters, a brief description of each is presented below:

This current chapter is the introductory chapter to this thesis and includes an overview and introduction to the issues concerned in the research. This chapter is organized in the following order: the first section presents a background to the study and an introduction to airline performance. Then an overview of the research, detailed background of the study, problem statement related to the performance of global airlines, purpose of the study, objectives, significance of the research, and definition of the expressions are presented in the following sections. Section 1.8 presents the expressions used throughout this study. The current section, with a summary of the whole chapter, concludes Chapter 1, and paves the way for the next chapter, which presents a detailed review of the literature on the performance of global airlines. In fact, Chapter 2 provides a comprehensive overview of the performance and capacity in the airline industry and its history. The chapter provides a background to performance, performance measures, performance measurement in organizations, and performance indicators in the airline industry. In Chapter 3, the theoretical foundation and research methodology are introduced. In this chapter, the variables, their structures, and the relationships among them are defined and elaborated. Chapter 3 further explains the path analysis, and SEM to estimating performance based on four constructs in a single model. Chapter 4 provides a relevant discussion on data analysis based on SEM methodology. Finally, in Chapter 5, a summary of the major findings is provided along with some suggestions for improvement of airline performance and possible ideas for future research on the topic.

CHAPTER 2

REVIEW OF THE LITERATURE

2.1 Introduction

There is no clear definition of airline industry performance. Performance of airlines is measured differently from one study to another. In this chapter, the organizational performance theories are used as the basis for the research framework of airline performance.

2.2 Organizational Performance

Performance is one of the most argued concepts about which there has never been an agreement among various researchers and theorists. Cameron (1986) refers to an absence of sufficient understanding or clarification in the definition of the concept of performance. In the absence of any operational definition of performance upon which the majority of the relevant scholars agree, there would naturally be different interpretations and inferences opined by various people according to their own perceptions. This discord and lack of agreement is partly due to the lack of a significant attempt to theoretically or practically account for and define the concept. As a result, a commonly accepted definition of the concept faces various problems, which means that the possibility of any definitions and deriving some norms to arrive at the desired definition is still questionable.

Organizations perform various activities to accomplish their organizational objectives. It is these repeatable activities that utilize processes for the organization to be successful that must be quantified in order to ascertain the level of performance and for management to make informed decisions on where, if needed, within the processes to initiate actions to improve performance. Therefore, it can be claimed that there is a close relationship between the organizational objective and the concept of organizational performance. Therefore, all companies probably attempt to achieve certain pre-determined objectives with the help of available resources. Hence, the two aspects of the concept, i.e., the organizational objective, and the organizational inputs or resources can be considered in the definition of organizational performance.

Some researchers, such as Thompson (1967), and Friedlander and Pickle (1968) consider performance as a theme that repeatedly occurs in paradigms of management. Strategic and operations management are also included in performance, a feature that attracts the interest of both practicing managers and academic scholars. Performance, therefore, can be defined as the evaluation of the constituents that try to assess the capability and ability of a company in achieving the constituents' aspiration levels using efficiency, effectiveness, or social referent criteria, which are briefly explained below.

Effectiveness, refers to the maximum extent production functions are able to fulfil and meet the demands and requirements of the customer. Efficiency, on the other hand, is assessing and evaluating how the resources of an organization are economically utilized through the accomplishment of functions to achieve its objectives. Quantitatively, performance and the dimension of scale are interrelated, i.e., it is generally quantifiable in different dimensions. As an example, the performance level can be expressed as a percentage or an absolute value in a way that makes it easy to understand for directors. According to Macleod et al. (1997), the quantitative expression of performance targets is the only way to render them meaningful. Furthermore, performance refers to the nature and quality of an action performed in an company to achieve the accomplishment in its primary functions and tasks to produce profit (Sink, 1991).

In this section, the history of performance is classified into six different subcategories. Various ideas and opinions on each of the performance subcategories are discussed in this part. A fairly clear statement on the concept of organizational performance was issued by Etzioni (1960), in which he believed that frequent assessments of organizations have been carried out in relation to the achievement or non-achievement of the set objectives and goals. However, in Etzioni's suggestion, the resources that an organization needs to achieve its objectives and aspirations were not taken into consideration. Some other researchers, such as Chandler (1962) and Thompson (1967) apparently nurtured an idea of organizational performance similar to that of Etzioni. Researchers like these argue that the ultimate criterion of organizational performance is its growth and long-term survival. In other words, continuous improvement of organizational performance forms its vital objective. What these definitions had in common was the "effectiveness" or realization of the objective component of organizational performance.

In contrast, Lorsch (1970) has a different suggestion for measuring organizational performance based on two factors, i.e., good fit between the organization and its environments; and good fit between the organization and its individual contributors. Lorsh believed that the performance of an organization is expected to be more successful if there are efficient operations between the organization and its environment and its staff are content with and aspire to contribute to its success and development.

However, the statements of Lawrence and Lorsch (1969) do not answer whether there is confusion concurrently between the organization and its environment and between the organization and its staff, and in case of the existence of such a confusion, how the company is able to retrieve its workable balance. The arguments of the above researchers provided the organizational performance concept with a new dimension, i.e., "relevancy" (client satisfaction), despite its inability to resolve the discord in the concept.

Some researchers believe that in the 1970s the concept of performance dealt with both organizational means and ends (Georgopoulos and Tannenbaum, 1957). Performance is defined as the extent to which a company, as a social system with certain resources, is able to fulfil its goals without being obliged to incapacitate its resources and means or putting excessive strain on its employees. Lupton (1977) treated the concept of organizational performance in the most careful and explicit manner in comparison with other researchers in the same period. According to Lupton, in an effective organization, the productivity rate and levels of satisfaction and motivation of its members are high, while rates of turnover, costs, labour unrest are low or absent. However, according to Katz and Kahn (1978), the efficiency (ratio of outputs to input) and effectiveness of an organization were parallel, both vital components of the overall organizational performance, which can be assessed through maximizing the total returns of all kinds. In summary "*effectiveness*," "*efficiency*," and "*relevancy*" are three dimensions of organizational performance that have been used as common elements in the above-mentioned definitions.

In the 1980s, performance is defined as the extent to which an organization, as a social system, could consider both its means and ends (Robbins, 1987). This definition is in line with the earlier one suggested by Georgopoulos and Tannenbaum

(1957). Nevertheless, Cherrington (1989) defined organizational performance as a concept of success or effectiveness of an organization, and as an indication of the organizational manner that it is performing effectively to achieve its objectives successfully.

In the following decade, the 1990s, Adam (1994) considered organizational performance as heavily dependent on the employees' performance quality. He believed that in order to ensure a high quality organizational performance, it is vital to have regular exposure of the staff of the company to new and up-to-date knowledge and skills, which would, in turn, help them keep up with the new changes happening in the market, and, ultimately, enhance the quality of organizational performance. In a "Note on Organizational Effectiveness", Harrison and Freeman (1999), and Adam (1994), confirmed that an effective organization with high standard of performance level is the one that keeps its stakeholders' (shareholders, customers, and its own) demands satisfied. These definitions also support the "relevancy" dimension of organizational performance stated in the earlier definitions above.

In the first decade of the twenty-first century, the definition of organizational performance mostly focused on the capability and ability of an organization to efficiently utilize the available resources to achieve accomplishments consistent with the set objectives of the company, as well as considering their relevance to its users (Peterson et al., 2003). In this definition, the three general elements of organizational performance, i.e., "efficiency," "effectiveness," and "relevancy" have been taken into consideration. Conversely, the performance of an organization is believed to be able to cover broader areas including the connection between performance and organizational goals (effectiveness); organizational resources (efficiency); and, satisfaction of the stakeholders (relevancy).

Performance Measurement

Organizational performance has always had a significant influence on the actions of companies. One of the consequences of this influence is the increase in the number and variety of the means and methods to accurately measure the performance and, gradually establishing an important research field for both companies and academics. The last twenty years have, in effect, witnessed performance measurement (Metzger et al., 2007) gaining the interest of the academics in an ever-increasing number of research fields (Folan and Browne, 2005). Neely (1999) believed that in the two years between 1994 and 1996, the number of the published academic articles on PM amounted to about 3,615, which, ultimately, resulted in the appearance of one relevant book on the topic every fortnight in the US alone in 1996. Some researchers' attempts, like Marr and Schiuma (2003), in different functional fields, have made available a wide variety of basically different information on PM, which has contributed to the field being well known as a vital part in the literature of the manufacturing strategy (Dangayach and Deshmukh, 2001). However, PM does not specifically belong to any specific discipline or academics. This feature of PM has rendered the researchers from various backgrounds and disciplines to be reluctant in removing and widening the traditionally set functional boundaries in their studies on the topic (Neely, 1999).

Facing new conditions and organizational realities and due to the upcoming challenge for industrial supremacy, the concept of PM has been developing and evolving drastically in recent years. However, the new environment is apparently turning into a new frontier for PM. More expectedly, in the near future, inter-organizational PM will experience a significant development in fields, such as supply chain as well as extended enterprise. Jagdev and Browne (1998) described the extended enterprise PM to be a closer formation of co-ordination in the design, development, co-ordination of the relative plans of manufacturing and co-operating independent manufacturing enterprises and related suppliers schedules, and costing. This can also be regarded as a consequence of a deviation from the traditional perspective of manufacturing firms that operate within specific and pre-set boundaries, being restricted to limited connection areas and relationships with other organizations and firms, and the excessive focus on internal effectiveness and efficiency of the company alone (Browne and Zhang, 1999). This trend is expected to have a significant impact on the PM practices in different companies in the near future. The depth of such an influence is sensible in the literature on PM.

Despite the popularity of the topic of PM and its wide fame among relevant scholars and researchers, very few of them have ever attempted to define it in practice (Neely et al., 1995). Some researchers defined PM as the process of evaluating performance "relative to a defined goal" (Rose, 1995a), "in terms of explicit short-, medium-, and long-term objectives and reporting the results to management" (Cook et al., 1995), and "efficiency and effectiveness" (Neely et al., 1996). In the words of Gunasekaran et al. (2001), PM is the process of transferring the complex reality of performance into a sequence of limited symbols that can be communicated and reproduced under similar circumstances.

From the above definitions and the ones suggested by some other researchers, it can be concluded that PM is a progressive language that classifies the current and future status of performance. PM allows a continuous advancement towards the established goals and identification of the stagnations and shortcomings (Rose, 1995b). Concisely, it can be claimed that PM is a progressive and steady movement towards the achievement of the set objectives. However, observation of PM is not only on the past performance, but it also concentrates on the realization of collective aspirations and the assurance of an effective and efficient future performance.

PM is also considered as a metric employed to measure performance. Therefore, it can be regarded as an analytical tool that records measures, shows outcomes, and determines subsequent actions in the process of the PM (Rose, 1995a). Overall, Man (2006) determined that measures of performance are divided into four categories, i.e., financial; non-financial; tangible like quality (Tangen, 2004); or intangible like experience (Delios and Beamish, 2002). The focal point of financial performance measures is generally on the resulting impact on production activities and financial characteristics, such as logistics activities. Non-financial performance values, however, have their focal point directly on actual production activities, such as defect ration, investment turnover, and lead time (Polakoff, 1992).

Business PM has attracted increasing attention both among managers and academics, and has always been a managerial priority. Measuring business performance, as well as asking for information related to performance, forms one of the major responsibilities and requirements of various managers in different companies. PM can be claimed to be an integral and essential requirement for the achievement of success in executive managerial tasks. As Lebas puts forth, in effect, PM can be defined as the complex reality transferral of performance into a range of communicable symbols that are reproduced in similar conditions (Lebas, 1995).

As mentioned above, performance itself is composed of two essential parts, namely, one part tends to deal with achievements and accomplishments in the past resulting from past actions, while the other looks at the predictions or inferences of future performance based on current actions. The role of PM is connecting these two parts through discovering accomplishments and measurements from which future performance can be inferred or predicted (Meyer, 2002).

Sink (1991) believed that “measurement is complex, frustrating, difficult, challenging, important, abused and misused,” nevertheless, in the words of Das (1994) “if we cannot measure it, we cannot manage it”. Since the 1980s, when literature on PM first emerged, it has been continuously evolving and expanding. In the traditional context, small companies’ operations were simple and the most important PM focused on cash flow. As a result of the expansion of the size of organizations during the post-Industrial Revolution, the measures of productivity were extensively used in various production phases. In a span of time from the late nineteenth-century to the 1930s, both practical and theoretical management accounting methods were set up and widely used (Maskell, 1991). Later, traditional management accounting was included as part of PM for distribution operations and their manufacturing plants. As research on PM developed and expanded more, some scholars, like Pursell (1980), shifted their focus on the PM of the whole business unit (typically plant level and division level) and attempted to investigate the standards, criteria, and measures of performance. Nevertheless, after all these studies, there seems to be no cohesion in the traditional literature on PM (Lockamy and Spencer, 1998).

Some drastic and dramatic changes have occurred in the corporate world in the past few decades in terms of the introduction of national and international awards, improvement initiatives organizational roles, work maturity, external demands, increased competition and advanced technology. These changes have resulted in companies encountering dramatic competition resulting from the improvements occurring in product quality, enhancement of flexibility and reliability, the expansion of product variety, and emphasis on innovation (Fry et al., 1993). The critical business features for corporate success are emphasized more than mere financial reporting (Hazell and Morrow, 1992). In view of the new challenges and changes happening in the corporate world, organizational managers are required to consider appropriate PM paradigms if promotion of managerial improvement is desired.

Roles of Performance Measurement

Management can hardly exist without PM (Lebas, 1995). However, a poor methodology of measurement can be a major factor that contributes to frustration of the advancement of a firm (Maskell, 1991). In contrast, a well-designed performance management system is an essential and fundamental factor contributing to the enhancement of effective planning and control of management. In fact, it can be claimed that PM allows business management to excel through motivation enhancement, performance monitoring, improvement of communication, and problem diagnosis (Rolstadås, 1995, Waggoner and Neely, 1999). Furthermore, PM can provide an effective approach to study and identify the management strategy, as well as enabling a proper perception of prosperous and present circumstances that influence the progress of a company. The significant roles of PM are briefly presented in the following subsections.

Monitoring business progress: this can be done using the output to observe the progress of a firm in respect of the achievement of its set goals, which makes identification of the future and current status of the company possible. PM can generate a shared understanding, and demonstrate the extent to which the planned expansions have essentially taken place.

Monitoring the effect of strategies and plan: outputs enable testing the impact and possibility of strategies and plans. It is through them that the implementation can be observed and controlled. Therefore, the successful achievement of long-term goals can be ensured by the choice of right measures.

Diagnosis: if a business fails or is in decline, the output can show the failure symptoms, and encourages identification of the probable causes that have led to the failure (Rolstadås, 1995). As a result, a company can search for the problems and their reasons to enhance their protection against the potential future misfortunes and failings.

Supporting decision making: PM enables an organization to search and identify the causes that have led to its success and the potential chances that the company can use for further development and advancement in future. Moreover, PM enables the organization to determine whether it has been able to gain the satisfaction of its customers and achieved its desired goals. Actually, in addition to indicating where and how to act, these measurements also monitor the performance efficiency. Further details of identification of potential and actual problems are provided by feedback. PM is also an essential requirement for the justification of more investment of effort by companies. PM ensures that the decisions are made on the facts instead of assumptions and suppositions. Consistent objective-oriented operations and timely corrections can only be achieved through a direct guide to operations and accurate and timely feedback on operational performance.

Facilitation of motivation and communication: PM indicates the rate of progress of a company and highlights its present and future performance status. The motivation and clarity of the PM provides the company with an increase in the overall rate of operation including communication among its staff and managers. Performance management both precedes and follows PM in a virtual spiral in order to establish a suitable setting for measurement (Lebas, 1995). In brief, PM is claimed to be a vital and powerful tool for effective management. In the case of supply chain management, PM significantly leads to the development and improvement of performance and feedback of comprehensive performance supports the design and improvement of the supply chain systems.

2.3 Organizational Capacity

Organizational capacity does not have clear and specifically defined literature (Rashman, 2008). Organizational capacity covers the study of the capacity within the organizational level (Child and Faulkner, 1998, Finger and Brand, 1999), shares the collective knowledge (Beeby and Booth, 2000), and makes productive utilization of the organizational knowledge (Cohen and Levinthal, 1990). These features include the absorptive capacity concept (Cohen and Levinthal, 1990). However, potential capacity can be distinguished from realized capacity (Zahra and George, 2002, O'Connor et al., 2007) which deals more with anticipations of future requirements and the resources and relationships management (O'Connor et al., 2007), to enhance future capacity.

Innovative organizational capacity (O'Connor et al., 2007, Newman, 2000) and improvement capacity (Sanderson, 2001) in organizations are normally related to strategic contexts (Hou et al., 2003), which makes improved performance a necessity. Capacity is defined as the managerial and strategy system required for realization of performance improvement (Jas and Skelcher, 2005a). However, a more comprehensive definition of organizational capacity is suggested by Osborne and Flynn (1997) who introduce innovative capacity, as defined by culture, structural patterns, institutional norms and rules, and the organizational contexts.

The creation and development of capacity within the private sector are urged by the necessity of adaptation to the environment and survival against the external threats (Child and Faulkner, 1998) as well as the achievement of commercial advantage (Cohen and Levinthal, 1990) even under competitive pressure. Organizations in the public sector, also encounter similar challenges to those in the private sector. Organizational capacity in the public sector is essential for the creation of adaptive organizations, mobilization of organizational and cultural modification processes (Martin, 1999, Hartley et al., 2002), development of local, resources, skills and capacity (Martin, 1999, Harrow, 2001), distribution and share of knowledge (Hartley and Rashman, 2007, Hartley and Allison, 2002, Rashman and Hartley, 2002), as well as providing, high quality, efficient and fair service standards (Unit, 2006).

Martin (1999) believed that public services improvement would depend on the scale of the capacity of local agencies to implement needed reforms and that local government should have sufficient capacity to manage the inherent tensions and barriers to policy change, which include: inconsistencies and discrepancies within policy reform, concentrated obligatory performance control, and the potential conflicts of different stakeholders interest. For example, cultural, structural and skill based capacity limit the needed capacity building projects that will develop the capacity and capabilities to reforms implementation (Martin, 1999). However, there is relatively little empirical research into the drivers, processes and outcomes of capacity building programs (Rashman, 2008). Managers of the public sector usually encounter the concurrent demands of both short-term and long-term priorities to maintain and improve service performance, as well as implement shifts in national policies (Schall, 1997). Public service managers, unlike some private sector managers and leaders, need to expect the long-term outcomes that affect the public value for future generations (Rashman, 2008). Therefore, public organizations need both realized and potential capacity (Zahra and George, 2002). Schall (1997) believed that public managers have to improve the capacity to build a long-term strategic agenda while simultaneously undertaking short-term crisis management.

Sanderson (2001) suggested that modifications in organizational culture are required to embed and ensure the capacity for learning and evaluation during the working practices of the local authorities which include: critical reflection, questioning and challenge; effective dialogue, collaboration and communication; research and analysis to provide evidence for decisions; action planning and effective implementation. Furthermore, Sanderson believed that a supportive system infrastructure and processes are able to transfer these capacities to daily routine activities, which include: political leadership and management that make use of the available evidence to inform decisions; framework for leadership and strategic direction; systematic challenge; and reinforcement of improved ways of thinking and working (Sanderson, 2001). The approach that Sanderson argued is that organizational culture is a prerequisite for learning and assessment; defining the collaborative, analytical and planning components of capacity; and that the mental models and strategic leadership moderate the embedding of capacities and their effects on central government reform implementation. Specific essential variables are identified that provide the possible operationalization of the concepts. Apparently Sanderson's framework is based on a study carried out in the 1990s, before the current stage of the public service reformation, and, therefore, lacks more recent empirical evidence.

Some researchers have studied the components of capacity in connection with governmental organizations and public service. Regarding the organizational learning capacity, as stated by Finger and Brand (1999), the capacity of an organization can be taken as "its ability to learn individually and as a collective unit". Six dimensions have been distinguished in evolving the learning capacity of public organizations in a market and customer environment orientation. The six dimensions are the various organizational capacity, structural and cultural features, each relating to some potential actions orientated indicators used to measure progress, of which the examples are presented; individual learning capacities (individual ability for critical reflection and integration of new information); collective learning capacities (interaction, conflict management, and diversity); structural learning capacities (flat hierarchies, decentralization, and integration); cultural learning capacities (trust, risk taking, concern for openness); capacities resulting from the organization of work (experimentation, monitoring feedback loops, self-correction); and the leadership capacity to learn and to promote the learning process (reward, critical analysis, question dominant norms) (Finger and Brand, 1999). The six dimensions are able to combine various levels – individual, collective, and organizational levels as well as the internal organizational context features, which are the structural, cultural, organizational, and systemic leadership. It is, however, believed to be insufficient to concentrate on only one dimension since the combination of the six capacities make up the learning capacity of an organization in a continuous manner. An approach to organizational learning capacity that considers the political environment appropriate for the strategic objectives of a public service is a topic that is much argued among researchers and scholars. The six dimensions indicators provide potential operationalization of the concepts. Nevertheless, some weaknesses exist, namely: the indicators are open to interpretation, tentative and need more development; the way the learning capacities are able to collectively combine is unclear; and empirical evidence testing the indicators is lacking (Rashman, 2008). However, another approach to components concentrates on the capacity of change. The capacity of change in a local government is dependent on effective governance components, business results, accountability, and cultural capacity for the future (Newman et al., 2001). Newman et al. (2001) identified six component areas used to evaluate internal corporate capacity, which include: finance (capital and revenue; current and future), systems and processes (contribution to continuous improvement), people (volume of staff), skills (technical ability of partners and staff), knowledge (understanding of managing change and improvement), and behaviour (accordance with stated values and objectives).

2.4 Performance and Capacity

In this section the relationship between organizational capacity and performance are addressed. A study by Sanderson (2001) concluded the existence of a relationship among organizational capacity, organizational culture and performance within local authorities. According to Sanderson, evaluation capacity development can seriously and critically “question and challenge existing practices, beliefs and values”, to enable continuous learning and a distinction between the capacity for modification and its nature in local governments, namely: 1) the capacity for achievement of modification and improvement within the local governments needs to be based on performance evidence generated through evaluation systems, and 2) the nature of the organizational modification must be in line with the key objectives and results.

Evading the public sector performance studies in general and turning to research under the performing councils, Turner and Whiteman (2005) discovered significant differences among local authorities. In this research they identified various factors leading to poor performance that block the extent of “capacity to improve” including culture, socioeconomic and historical contexts.

Capacity antecedents influencing the performance networks include employment policies structural reorganization, “adverse” aspects of organizational concern about recovery sustainability, and organizational innovation (Turner and Whiteman, 2005), which make a wider definition of capacity more possible than political and managerial systems.

Poor performance can be a result of absence or insufficiency of particular features of the organization (Jas and Skelcher, 2005a). Capacity absence can be displayed in "gaps in support systems" of financial and performance management, as well as in the failure to lead the organization in accordance with the leadership objectives. However, this is regarded as limited operationalization concentrated on internal leadership variables and implementation systems.

2.5 Airline Performance Metrics

In past studies, the performance of the airline industry has usually been measured in terms of various characteristics. Research on performance normally considers financial, operational, marketing factors, factors such as customer satisfaction, and cost function. However, there are also other studies in which the estimation model used several factors simultaneously, without focusing on a specific factor.

The focal point of the studies mentioned below is particularly positioned on the commercial airline industry and the indicators that were employed to evaluate and measure the performance level of both the overall airline industry and individual airlines. The specific performance metrics of airlines have been scrutinized from different perspectives. These studies are divided into two main groups in the following discussion – financial performance metrics and non-financial performance metrics – each providing information about the manner, time and objective in which the indicators are utilized.

Financial and accounting indicators have been concentrated on by much research across many industries. The indicators stand for one of the most essential communicational means applicable to senior management (Craig and Amernic, 2008). According to this concept, evaluation of the performance is necessary, particularly in the financial field, and, as expected, considerable capital is vital for the survival and development of these airlines. Financial performance has an especially critical role in the survival of an airline. Therefore, the airline needs to assess and measure the financial performance to determine its financial status between the competing firms and companies.

The most widely used financial indicator in research for the estimation of the financial performance of the airline industry is profit, which has been used by many studies for modelling purposes. Some of the other indicators used include financial ratio, total revenue, operating income, cost function, and ticket price.

Non-financial performance measures have been widely utilized by a good number of corporations since the early 1990s to measure current performance and identify requirements needed to enhance performance, and make the achievement of far-fetched strategic goals possible (Liedtka et al., 2008). Recently, Non-financial performance measures have been able to gain a global prevalence as myriad companies and organizations around the globe have shifted their interest and reliance from the traditional approach based mainly on financial performance measures to a range of non-traditional quality metrics (Carastro, 2011).

According to Ittner et al. (2003), as stated in the Harvard Business Review (2003), in the last ten years "increasing numbers of companies have been measuring customer loyalty, employee satisfaction, and other performance areas that are not financial but that they believe ultimately affect profitability". Sometimes Non-financial performance measures involve quantitative data gathering, whereas others are naturally qualitative derived from reports that are subjectively made by stakeholders, such as employees, customers, and suppliers, and, consequently, evaluated directly or following quantification by decision-makers. It was in 2002 that the "American Accounting Association's Financial Accounting Standards Committee" received demands from lenders, investors, and other interested groups or individuals for compulsory disclosure of data on non-financial performance (Maines et al., 2002). However, the Committee turned down this approach although it asked publicly-traded companies to voluntarily prepare their reports on Non-financial performance measures outcomes.

Revenue Passenger Kilometre (RPK)

RPK is one of the most important indicators in non-financial performance in the airline industry since the revenue of the airline and RPK levels are most closely interrelated (USGAO, 1995). As Youssef and Hanson (1994) opined, the change rate in RPKs can serve as a criterion to display whether a carrier is losing or gaining market. RPKs are used as the industrial yardsticks to measure the level of the non-financial performance evaluation of airlines. One of the main advantages RPKs have over other financial and accounting statements is their capability to provide unbiased information on performance without being affected by techniques of creative accounting (Guzhva, 2008). Therefore, this variable has critical significance in the assessment of the non-financial performance in the airline industry.

Guzhva and Pagiavlas (2004) studies the significance of the impact of the 11 September terrorist act on the performance of the airlines in the USA, which were performing in the general economic environment before and after the catastrophe. In this study, the authors employed an objective performance indicator, i.e., series of RPM investigated by the "vector auto-regression model" (Cook et al., 2004), incorporating data for Real Gross Domestic Products (RGDP) as the main macroeconomic index. In this model, quarterly RPMs were used as an industrial criterion against which the performance of airlines could be measured and compared with a series of individual RPM for US regional and major airlines at the level of aggregate industry. The analysis of their auto-regression reveals that even adjustment of the US general economic conditions could not avert the negative outcomes of the terrorist act in an economically and statistically significant level. The magnitude of evaluated losses totally matches the evaluation results carried out by the federal government concerning the initial effects of the attack, which resulted in compensation of $5 billion in cash to the airlines that had experienced a loss.

However, the results of analyses of individual RPM series for the US regional and major airlines confirm that not all airlines suffered in the same manner. The studies support that four major airlines in the USA bore more than 63% of the total decline resulting from the 11 September 2001 terrorist attack. The four major airlines, together with three other regional airlines, were responsible for 65% of the total decline in the aggregate industry performance. Although VAR is very effective in temporary removal of the impact of the attack from macroeconomic effects, it is unable to offer a long-run impact, which can be estimated through analysis of intervention as the mean of a series of financial data of change in the long-run.

Guzhva (2008) conducted a second study on RPK in which he investigated a series of monthly RPMs to objectively evaluate the impact of the terrorist attack on the US airlines financial performance. Guzhva's study further focused on analysis of interventions with the data of aggregate industry and the US major and regional airlines series of individual monthly RPM to identify whether the terrorist act had different impacts on individual air carriers. As was expected, the industry data's intervention analysis shows an economically and statistically significant influence of the attack on the US airlines performance. However, the losses reported by the US airline industry are much larger than the magnitude of the effect. The initial assessment of the impact of the attack was estimated to be around $1.5 billion in a month, while the long-term impact was believed to be over $5.13 billion.

The investigation of effects of the attack at the level of individual air carriers reveals that not all of the US airline companies were significantly affected by the attack. The impact was minimal for two of the seven major airlines and eight of the ten regional airlines. In addition, three of the regional airlines showed significant improvements in their organizational performance in the post 11 September attack period.

Operating Profit

Operating profit is an important indicator of financial performance (Duliba et al., 2001), and is one of the most important financial variables. This variable has also been used by researchers in organizational financial performance in the airline industry. An airline's profitability as an indicator has been adopted by some researchers and theorists, such as Oum and Yu (1998), Bruning and Hu (1988), Antoniou (1992), and Bailey et al. (1985) to study and assess operating performance. It was assumed by most of the above authors that profitability was correlated with some specific variables, and correlation was tested through regression analyses. However, applying profitability to assess the operating performance of an airline has its shortcomings. Therefore, some airlines did not yield any profit for a long period of time although they were not allowed to quit the unprofitable market. Thus, judgment on the financial performance of this kind of airline companies is not fair.

Load factor

Load factor is the main indicator utilized in the airline industry to measure performance. Nearly every aspect of the operations of an airline has been permeated by the load factor used by the airlines. Dai et al. (2005) examined in their study the load factor evolution as part of the efforts of revenue management between 1992 and 2002. The conclusion of this study revealed that the application of the load factor resulted in successful improvement in earnings and revenue. In this study, it was also revealed how this concentration on load factor encouraged many carriers to marginalize their operations, while trying to keep their returns at the maximum. Nevertheless, the small airline companies that preferred to operate at the margins were mostly to be among the airlines whose operations would be overwhelmingly affected by shocks from external sources, such as economic downturn. The finding of the above study was that airlines of small-efficiency, trying to maximize their returns through marginal operations, are more likely to expand considerably although they are unable to absorb shocks to their operations.

Another research on the performance of the load factor was jointly carried out by Davila and Venkatachalam (2004). The conclusion of this study, an accurate non-financial gauge of the performance of company, was that the relationship between passenger load factor and CEO compensation is positive. The authors suggested that load factor could provide a considerable source of incremental information that is able to measure the outcomes of the actions of management with higher validity and provide a more immediate performance indication than that of accounting and measures of other market-based performance.

Market share

Market share is the best variable to determine the market share of each company in the competitive market of the airline industry. Administrators always use these indicators for comparison, in other words, the market shares of airlines represent a wide range of the problems that occur in the competitive market of the airline industry (Ceha and Ohta, 2000). It may be thought that profitability is the ultimate goal of most airline companies; however, in the economics literature, usually, profitability is believed to increase as market share increases (Kurtz and Rhoades, 1992). Furthermore, Adrangi et al. (1991) supported that profitability of international airlines also increases with market share.

Airlines market share rate is associated with the variables of the frequency ratio and the seat ratio. Neither shuttle service nor distance shows a significant influence on the market share demand. However, local and trunk routes display a significant effect on the market share demand (Ceha and Ohta, 2000). The formation of an alliance among firms can lead to the formation of a partial offensive strategy through connection with a rival airline company to exert on the market share and profits of a common competitor (Contractor and Lorange, 1988). In order to gain a higher share of the market, airlines can further control the demand-side (Clougherty, 2002).

Hansen's (1990) definition of the flight alternatives selected by passengers as elemental alternatives and the airline flight services as aggregate alternatives was based on Ben-Akiva and Lerman's (1985) concept of elemental aggregate alternative hierarchy. The competing airlines market share was modelled by Hansen as a logit model with aggregate alternatives. A model of airport-airline choice based on a nested model, multinomial logit, was developed by Pels et al. (2000) to investigate airline competition in airports of an area with multiple airports. Later, the model of airline market-share was incorporated into the logit model by Adler (2001) who also restricted the model to allow both business and non-business passengers to choose their preferred airline in an origin-destination market.

An essential component in forecasting a particular firm's income by an analyst is the airline company's expected sales percentage in the industry or industries in which the company operates in relation to its rival airline companies. This is commonly referred to as the anticipated or projected market share (Kuhn Jr et al., 2010). Kuhn Jr et al. used an illustrative case study method to guide the reader through developing stages of an agent-based modelling intended especially to explain the macro-level factors that affect one particular agent's future performance through market simulation and developing an anticipated market share for the future. Their study presented a case study of an agent-based modelling, which is developed to contribute to analysis of the market share for Frontier Airlines, allow-fare airline. This model also included agents representing the consumer passengers for the services of routes Frontier; an agent used by both United and Frontier; a collective group proto-agent of other airlines serving on the same routes; and three fuel cost proto-agents, federal regulation, and credit availability, to represent essential environmental factors. This model further focuses on the potential market share for 2007 in different conditions, i.e., possible system states, to contribute to the investment and earnings forecast for the upcoming years.

For air carriers, the quality of customer service and passenger demand are critically interrelated since managers of airlines are able to come to strategic decisions concerning the service level and the related resources required to achieve the objectives of the market share (Suzuki et al., 2001). Suzuki et al. used a set of data consisting of 40 consecutive quarterly observations of the ten largest US airlines (America West, American, Delta, Alaska, Northwest, Continental Southwest, United, TWA, US Air), the first quarter of which was from 1988 to 1997 the time of the fourth quarter. Therefore, the total sample size is 400. The 10 airlines considered represent more than 90 percent of the domestic passenger revenue of the industry. The resulting outcomes show that an airline's market share will decrease with a decrease in the quality of service from the reference point. However, the market share may not increase with an increase in service. Conversely, the response of the market is strongly negative in front of the negative changes that occur in the quality of service quality although it shows no, or an insignificant reaction to positive changes, i.e., loss averse.

The main question the managers of various airlines, governmental policy makers and manufacturers of aircraft have been asking is whether or not the airlines need to increase the aircraft volume in their fleets instead of the number of flights to provide sufficient accommodation for the increasing number of passengers and travel demands. They have also voiced concerns, such as the impact of airlines' choice of aircraft size on service demand, profit, and market share (Wei and Hansen, 2005). To answer these questions, there has been numerous studies on aircraft size and service frequency in respect of airline demand and market share.

Concerning the demand, there have been different studies by researchers, such as Eriksen (1977), Abrahams (1983), Viton (1986), Russon and Hollingshead (1989), and Coldren et al. (2003), who have investigated the significance of aircraft volume and frequency of offered services on market share and airline demand. Later, some other scholars, such as Wei and Hansen (2005), employed a model of nested logit to investigate the significance of aircraft size, frequency of services, fare and availability seats in market share of airlines as well as total demand of air travel in non-stop duopoly markets. Their finding supported that "airlines can obtain higher returns in market share from increasing service frequency than from increasing aircraft size". Furthermore, Wei and Hansen's research based on their model concluded that airlines could achieve higher returns in market share as a result of increasing frequency of offered services rather than increasing aircraft volume.

2.6 Internal Operation Metrics

Internal variables are the most influential factors for assessing organizational performance and with the changes in these factors the performance of companies can be altered. These internal factors are subject to change based on the type of organization or company, and manufacturing companies use a series of factors that are different from service providing companies. The airline industry as a service providing company in the industry of air transportation of passengers through air routes has its own specific factors to estimate the quality of its performance. These factors are based on the internal variables of an airline. These factors include number of sorties, length of flight time per hour, length of flight distance per kilometre, rate of advertisement, etc. In addition to these variables, there are also other variables that have been taken into consideration for the first time with the arrival of the first generation of computerized reservation systems in the US in 1970. These variables gained more ground with the application of IT to the airline industry. Along with them, the role of airline agencies in respect of reservation, tickets selling, etc., were realized.

It was during this time that, in addition to the internal variables of companies, other variables, such as number of systems in agencies, hours of reservation labour, and commission of travel agents gained sufficient significance in the assessment and evaluation of airline performance. Nevertheless, these factors, in front of unprecedented and drastic progress in IT, like other fields, lost their significance in industries, especially, in the airline industry. With the arrival of other services, such as e-ticketing, e-banking, and the like, more of the customers prefer to purchase their tickets through the Internet without personally referring to airline agencies and ticket vendors. Since 2000, these variables were also less used and have been largely ignored in recent studies. During this period, there were also other factors that changed the course of the assessment in studies. Some of the most important of these factors include the financial crisis in 1997 and the 11 September disaster in 2001, which had influential roles in changing the economic structure of the world. Many researchers have studied the effects of such variables on organizational performance and airline performance during and after this time. The variables altered from internal variables to internal and external variables. In other words, in recent research, in addition to internal variables in the airline industry, other economic variables, such as GDP and inflation rate can also be used. Furthermore, this study also intends to use internal operation and economic condition to evaluate and assess the performance of airlines.

Number of Departures

The number of departures indicates the accessibility of an airline to their customers. Providing more departures normally results in better satisfaction and convenience for passengers. This, in turn, increases the attractiveness of the airline in the market. In the section of data analysis departure stands for the number of departures.

Average Stage Length

Average Stage Length (ASL) can simply be defined as the length flown divided by the number of the departures (Doganis, 1991). This factor indicates the average length in miles, or kilometres, of the flight of an airline between the departure point and destination, which can refer to two cities or routes, in the case of transit flights. The ASL measurement can result in better financial performance of company. Financial performance is enhanced with a longer ASL. In addition, the value of a longer ASL is related to the number of landings and take-offs in a time period, which, ultimately, can be reduced. Furthermore, with a long stage length, through changing the number of landings and take-offs, the RPK can be decreased or controlled. Therefore, a longer stage length between two cities can result in a reduction of costs in the total flight cost, which, in turn, contributes to higher revenue (Duliba et al., 2001). The stage length or ASL, have been used for the assessment of airline performance in many studies (Duliba et al., 2001, Cornwell et al., 1989, Caves et al., 1981). However, in this study, the measure of ASL for each airline is based on kilometres as the main unit although in some annual reports quoted from various sources miles are used as the main measurement unit for stage length. Therefore, in order to synchronize miles with kilometres, the mile unit used in some sources has been changed into kilometres in this study. Furthermore, length stands for the ASL throughout the whole part of the data analysis.

Advertising Expenses

Advertising expenses can also be considered as a variable affecting the improvement of organizational performance, especially, in the airline industry. This variable can contribute to improvement of the market share among competitors.

Advertising expenses were applied to estimation of the performance by Duliba et al. (2001). Squalli (2009) also used it as the dependent variable in the airline industry.

In data analysis, advertising represents advertising expenses, which are measured in US dollars. However, it should be noted that some annual reports have used different monetary units than the US dollar for measurement of the advertising expenses. In this research, all other currencies have been converted into US dollars as the main currency unit used in this study.

Vehicle Kilometre

It is very commonly used measure of air travel and computing by multiply each weighted airplane trip by the distance. One vehicle kilometer is the movement of one airplane for one kilometer, regardless of the number of passenger in the airplane.

2.7 Airline Capacity Metrics

Lusthaus (2002) mentioned organizational capacity, which includes management (networking and linkage, programme and process management, and leadership) and resources (physical, human, technological, and financial). Due to the data structure, number of employees is an indicator of measuring human resources, available seat kilometre (ASK) for physical resources and also a kind of financial, and network size for networking, technological, and financial resources. Therefore, the capacity indicators presented in this study as airline capacity are network size, number of employees, and ASK.

Available seat kilometre (ASK): is mentioned in some studies as ASK and in some others as available seat miles (ASM). Bhadra (2008) is one of the researchers who used performance factors to estimate the ASM. ASM is utilized as airlines' output. Airlines can weather difficult conditions through seats inventory adjustment. ASM adjustment has been performed frequently by airlines immediately since 9/11 up to the present. In the case of ASM, unlike other business aspects, such as RPM or load factor, the decision-making authority of airlines is greater; therefore, it can be regarded as an optimal choice for airlines' output. The airlines' inputs are jet fuel, number of fulltime employees, ratio of flight stage miles to trip stage miles, time and duration of employment of aircraft in hours, number of available seats per aircraft, and number of aircrafts available for flight. For this information, annual data for the period of 1985–2006 was employed for a total factor productivity based structure for tactical cluster assessment: empirical investigation in the airline industry.

Network size: Adding new routes to companies' airlines increases their attractiveness to their customers. Fare is not the only factor that influences customers' decisions about the carrier they want to choose for their flight. Total travel time is also a decisive factor in their decisions (Salgado and Romero-Hernández, 2006). The current structure of the airline market is based on a hub-and-spoke design. As a result, the number of trips that require passengers to take multiple flights for one final destination is not small. Flying with the same company can reduce the time passengers spend for connections than between two flights with two different companies. Therefore, even in the case of constant returns to scale for airlines, the social cost function average falls with rising airline output (Mohring, 1972).

Deregulation in the US airlines market resulted in a decreased number of longer routes and an increased number of shorter ones (Borenstein, 1992). In 1977, the production of the eight largest companies accounted for 81% of the total and in 1991 this percentage rose to over 90% (Salgado and Romero-Hernández, 2006). The hub-and-spoke structure enables airline companies to provide services in more airports that have higher loads. Companies' competition is not limited to fare and service price, and they also need to be alert in marketing issues. Larger companies are enjoying the advantages of the hub and spoke networks through increasing the number of the provided destinations, which, in turn, results in a reduction of connection costs, especially in cases where the passenger needs to change flight.

Finally, in this research, the number of routes served by each company is used as an indicator of Network Size. Employment of this variable has two main advantages, namely: 1) generating a more accurate Network Size measurement in comparison with the number of served points, mentioned earlier in the literature, for example, two airlines with the same production vector, number of served points, and input prices but with a different number of provided routes. Even if both airlines have the same number of airports, their network is not the same.

Number of employees: Total number of manpower is one of the important indicators in some of the researches on airline industry used to estimate different variables, such as Performance and productivity (Gittell et al., 2003, Wang et al., 2004, Wang et al., 2011b, Gitto and Minervini, 2007), delay modelling (Bhat, 1995), Cost Function (Parast and Fini, 2011, Tatalovi et al., 2009), and benchmarking (Mason and Morrison, 2008). In this study, as stated in the literature, a development factor has been used since human resources need to be increased in cases, such as purchasing new aircraft, expansion of other sections such as maintenance, employment of stewards, pilots and co-pilots for flights.

2.8 Economic Condition Metrics

One of the most important economic variables used in a variety of economic research and studies is GDP, which, as mentioned earlier in this thesis, has been treated as an effective factor concerning the performance of airlines since 2000. For example, the study conducted by Ramanathan (2001) is among the first research attempts that investigated the performance of the airline industry according to the economic variable of GDP and other internal variables of the company. The sample population in this research was the airline industry in India for which the researcher used the concepts of error correction and cointegration for the data analysis.

The overall results demonstrate that, in India, the passenger-kilometres (PKM) are likely to rise faster than GDP, and even much faster than urbanization. The ton-kilometres are significantly associated with industrial growth, and are likely to increase more quickly than the industrial production index. This factor also affects the demand rate in the airline industry, i.e., when the GDP increases, the number of people's travel increases accordingly, which can be attractive to entrepreneurs coming into the business (Hanpobamorn, 2007). Therefore, air travel demand is generally based on GDP although the growth of demand is faster than GDP (Hanlon, 2006).

Certain research papers have attempted to assess the extent to which airlines may be affected by the present economic indicators. For example, Oum et al. (2009) estimated a model that included variables such as fuel prices, GDP, and some other dummy variables to reflect influential events, such as SARS, 11 September 2001, and the Asian financial crisis which rocked the world in all arenas, especially, economics. They used aggregated data collected for the years between 1980 and 2008 to determine how these indicators affected total air passengers – domestically and internationally. They discovered that the flexibility of air passengers with respect to GDP equals 1.58. However, they argued that this value was inflated due to the influence of some factors not contained in the model, such as increased new routes, services, and changes in air fares, which could have significant effects, especially, on the domestic air traffic rate.

Similarly, in another research, Gillen (2010) employed the data gathered from 1996 to 2008 to study international traffic, specifically, in eight regions around the globe. In this study, the dependent variable was Revenue Passenger Kilometre (RPK), and the independent variables were total trade in merchandise and services, GDP, fuel price, foreign direct investment into the region, variables, such as 11 September and SARS, and a connectivity variable. Two recent studies by Oum et al. (2009) and Gillen (2010) examined the performance impact on the GDP variable considered as a global factor in the aviation industry. Another research that looked into the impact of GDP on the performance of the airline industry is a study by Hourani and Helander (2009) conducted for the European region. The economic variable has also been examined in smaller research regions in various countries, e.g., a research done by Guzhva and Pagiavlas (2004), Pierson (2009) and Cosmas (2009) for the United States and Bettini and Oliveira (2008) for Brazil.

The inflation rate indicator is another economic factor that has a significant impact on the economy of countries as well as the organizational performance based on which consumer purchasing power can be assessed and evaluated. This economic factor has also been employed for assessment of the performance of the airline industry by various researchers. However, another indicator that has proven its importance among other factors during recent decades is the Human Development Index (HDI). However, this factor has never been used in relevant research and studies related to the airline industry. The present research intends to use HDI along with both the Inflation Rate and GDP as economic condition.

Table 2.1 shows some studies that have used economic condition to estimate the airline industry's performance. The conclusions of previous studies and their relationship with the present research are illustrated below:

Table 2.1: Summary of impact economic indicators on the airline performance (Source: Author)

Study	Economic Indicator	Airline Performance	Area
Ramanathan (2001)	GDP	Passenger Kilometre	India
Guzhva and Pagiavlas (2004)	GDP	RPK	America
Jenatabadi and Ismail (2007)	Inflation Rate	Load Factor	Iran
Bettini and Oliveira (2008)	GDP	Seat Capacity	Brazil
Oum et al. (2009)	GDP		Global
Pierson (2009)	GDP	RPK	America
Cosmas (2009)	GDP	Departure, Passenger, and Destination	America
Hourani and Helander (2009)	GDP	ASK, RPK, Load Factor	Europe
Aderamo (2010)	GDP, Inflation Rate	RPK, Aircraft Kilometre, Cargo Ton Kilometre	Nigeria
Gillen (2010)	GDP	RPK	Global

2.9 Firm Age

Firm age is a variable that has been used in estimating organizational performance as an independent (Wang et al., 2011a, Powell et al., 1999, Hmieleski et al., 2010), control (Wang et al., 2010, Carmeli et al., 2011, Ling, 2012, LiPuma et al., 2011) and moderator (Onyango et al., 2012, Anderson and Eshima, 2011, Jiménez-Jiménez and Sanz-Valle, 2010) variable. However, this variable has been used once in airline performance as an independent variable with route frequency, route length, passenger growth, and aircraft size (Malighetti et al., 2011). Although firm age is a variable that can be used to show the experience of a company, it cannot be used as the only independent variable that directly affects performance. This variable is only used to produce the knowledge that can be applied by managers in planning and performing flight strategies and programming. The fourth gap is that this variable has never been used as a moderator between variables and airline performance.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

As the objectives of this study require, the employed research methodologies are SEM and path analysis with variables of mediation and moderation, which have been used for data analysis in this chapter. As Chou and Bentler (2002) support, in data analysis, SEM is frequently used in conditions of model estimation for alternative modelling, generating model, and strict confirmatory. According to Byrne (2010), “SEM is a statistical methodology that takes a confirmatory (i.e., hypothesis-testing) approach to the analysis of a structural theory bearing on some phenomenon”. Hence, SEM was employed for testing the hypothesized models fit on the appropriate data in accordance with the objectives of this thesis. As a result, the data have been totalled to the level of unit for analysis. In path analysis, the researcher, prior to model fitting, utilized measuring model to confirm and verify the reliability of the measurement indicators employed for indicating the latent constructs.

The present study uses cross-sectional and correlational research designs. A cross-sectional research design uses any given sample of research population at one point in time to obtain the required data (Malhotra, 2008, Cresswell, 1994). In a cross-sectional research design, the researcher is not able to focus on issues of development or provide unsystematic interpretations. A correlational research design, however, assesses the relationships between the variables without changing their naturally occurring states. However, unlike an experimental research design, in correlational design no control over the independent variable is required (Judd et al., 1991).

The two major limitations and restrictions of the cross-sectional research design and correlational research design are that conclusive inferences on causal relationships among the variables of interest is denied by one-time variable measurement, and the internal validity of the results may be affected by the potential of common method variance (Judd et al., 1991). However, these limitations do not have any significant influence on the analysis of data in the present study due to the fact that the current research has used documental data rather than data based on questionnaire survey, which often suffer from the above limitations, and, hence, are a potential problem (Jaw et al., 2010).

3.2 Research Variables

As stated in the discussion of the conceptual framework in Section 1.7, the research model will exploit four constructs: economic condition, internal operation, airline capacity, and performance. The economic condition is considered as independent, internal operation and airline capacity as mediator, performance as dependent and firm age as moderator. Furthermore, some measurement variables are also included in every construct. Three measurement variables were considered for economic condition, i.e., first construct or first latent variable, which are: inflation rate, GDP, and HDI. In the case of the internal operation, i.e., second construct or second latent variable, four measurement variables were considered, namely: number of departures, ASL, advertising expenses, and vehicle kilometres. Four measurement variables were considered for performance, which are: load factor, market share, RPK, and operating profit. Finally, the fourth construct, airline capacity, has three measurement variables, i.e.: network size, number of employees, and ASK. The latent variables and their measurements are presented in Table 3.1 below.

Table 3.1: Latent variables, indicators, and indicators' unit (Source: Author)

Economic condition	**Internal operation**	**Performance**	**Airline Capacity**
Inflation Rate (%)	Number of Departure (number)	Load Factor (%)	Network Size (number)
Gross Domestic Product ($ US)	Average Stage Length (Kilometre)	Operating profit ($ US)	Number of Employee (number)
Human Development Index (%)	Advertising Expense ($ US)	Revenue Passenger Kilometre (passenger*Kilometre)	Available Seat Kilometre(seat* kilometre)
	Vehicle Kilometre (vehicle*Kilometre)	Market Share (%)	

3.2.1 Performance

In the present research, the functions of performance can be grouped as dependent variable. The four variables of measurement applied to this study, as discussed below, are based on Duliba et al.'s (2001) research.

Load Factor

Load factor is the most essential function of operational performance in the airline industry. It is the main and important objective of all airline managers to improve the value of this factor. Therefore, this research has also taken the load factor as one of the most important factors to evaluate the measure of performance in every airline company. In the model employed in the present study, load factor is considered as a measurement of the performance construct. In some sources on the airline industry, load factor is referred to as passenger load factor, which is calculated by extracting the total number of the transported passengers as a percentage of the available seats for one route and by extracting the total passenger kilometres travelled as a percentage of total ASK for mixed routes (Petrick, 2007). It can be said that load factor represents the value of the rate of employment of the total availability of capacity of a marketable transportation vehicle. Therefore, estimation of occupancy, or the amount the passengers on a number of routes would be helpful in assessment of the overall performance in the airline industry since through this data airline companies are able to make decisions concerning the profitability and potential income of various routes. Technically defined, load factor refers to the value of passenger kilometres transported as a percentage of the total ASKs. The mathematical definition of load factor would be as follows:

$$Load\ Factor = \frac{\sum(Number\ of\ Passengers\ Carried * Distance)}{\sum(Number\ of\ Avalable\ Seats * Distance)}$$

In the above equation,

- *Number of Passengers Carried* represents the number of the transported passengers on a route between two stations, departure point and destination.
- *Station* refers to two flight points, either two cities within the borders of a country, or two cities in two different countries.
- *Distance* stands for the variable of distance between departure station and destination, which is gauged in kilometres in this study.
- *Available Seats* represents the number of available seats on board an aircraft and changes from one aircraft to another according to the type.

As shown in the above equation, the value of load factor depends on a variety of indexes, such as number of passengers carried, number of available seats and distance, distance between the two stations, and the stations between which the flight is performed. The value of load factor is between 0 and 1, i.e., the closer the value to one, the better the operational function of the company would be, and zero represents the weakest operational function of the company. In order to have a profitable flight, the value of load factor needs to be greater than 55% (Vogel, 2001).

Market Share

Market share refers to a percentage or proportion of the available market or its division that is covered by the service a company offers. Market share is also known as the sales income of a company earned from the same market divided by the total profits coming from sales within that market. It may also be known as the unit sales volume of a company in a market divided by the total amount of units sold in the same market. Concerning the common definition of Market Share in the airline industry, Ceha and Ohta (2000) have presented a mathematical definition as follows:

$$Market\ Share_i = \frac{PAX_i}{\sum_{i=1}^{n} PAX_i}$$

In the above formula, PAX_i represents the number of passengers transported by i^{th} airline and *n* refers to the number of airlines available in the market.

Finding the value of market share helps airline companies to be able to evaluate their situation in the competitive market in the airline industry to find an effective and efficient marketing strategy. Information illustrating a company's competitive status and its relative market share can be incorporated into the information on the attractiveness and development rate of the airline industry to obtain the best picture of the company's future situation in the market. Attractiveness of an industry can contribute to discovery of the opportunities and threats through analysis of information on an industry or organization. Consequently, in the level of collective industry, the higher the market share the stronger the airline performance is supposed to be.

Revenue Passenger Kilometre (RPK)

According to Petrick (2007), "RPK is a measure for passenger traffic, obtained by multiplying the number of paying passengers on a flight by the distance of the flight". RPK is similar to operating profit in contributing to growth of the company in the market. RPK is calculated using the number of passengers and the covered distance; therefore, it can be applied to the analysis of organizational performance.

Operating Profit

Operating profit refers to growth in business activities in favour of the business owners in a market. “Profit” is originally a Latin word which means "to make progress". In this study, operating profit was based on the annual reports of airline companies in US dollars. Furthermore, in the current research, the effect of the model of economic condition was evaluated based on four dependent measurement indicators, i.e., market share, load factor, RPK and operating profit. Although the variables of load factor and market share are considered as performance relative measures, they suit this study since they are based on absolute production measures. As an example, it can refer to market share based on airline ticketing revenues, which can be influenced by different options in pricing and production intended for enhancement of returns to maximum while reducing the expenses and costs to minimum.

Load factor is also based on ticketed seats related to the capacity of the airline. Moreover, airline companies attempt to achieve the most possible profit via ticketing revenue, while simultaneously diminishing the surplus capacity to minimum. As a result, the profit factor can be considered as another type of output variable. Load factor, operating profit or any other kinds of profits have been utilized by many researchers to evaluate the performance of airlines (Jiang and Hansman, 2006, Hong Jiang and Hansman, 2004, Melconian and Clarke, 2001, Waldman, 1993).

3.2.2 Economic condition

Economic condition is considered, which consists of three measurements as follows:

Inflation Rate

Generally, the most important and direct impact of inflation rate is on people's lives as well as the performance of the organization (Wimmers et al., 2009). According to the research of Smith and Searle (2010), "the inflation rate is the year-on-year growth rate of the consumer price index". The inflation rate can be mathematically defined as follows:

If $Price_t$ represents the average price during year t and $Price_{t-1}$ is the average price in year t-1, the resulting inflation rate for year t will be obtained through:

$$Inflation\ Rate_t = \frac{Price_t - Price_{t-1}}{Price_{t-1}} \times 100\%$$

Therefore, inflation rate should be utilized as one of the research variables that may have an impact on the performance of the airline; however, this factor is not applicable to the management of airlines. This economic factor, i.e., inflation rate, enables prediction of the ticket price in the airline industry in the US (Bachis and Piga, 2006). Hence, this study considered inflation rate as a measurement in the construct of the economic condition.

Gross Domestic Product

According to Bernold and AbouRizk (2010), GDP "is equal to the total expenditures for all final goods and services produced within a country during a given year". The following equation displays the components of equation that results in GDP:

GDP=government spending + gross investment + private consumption + (exports-imports)

GDP has been an important factor in many researches on estimating organizational performance and evaluating the profit (Chin and Tay, 2001) and RPK (Hanlon, 2006, Guzhva and Pagiavlas, 2004) in studies on the airline industry. Since any modifications in the GDP are symptoms of the changes that occur in the macroeconomic environment, the resulting differences expected in natural logarithms have also been incorporated into the model (Guzhva and Pagiavlas, 2004).

Human Development Index

According to Avakov (2010), the HDI is the "average of the level of income per capita in purchasing power parties, level of education, and level of the health care". This value ranges between 0 and 1. The countries that depend on their HDI are classified into three categories, namely: the countries with their HDI below 0.500 (countries with low rate of HDI), those with their HDI ranging from 0.500 to 0.800 (countries with medium HDI), and countries with over 0.800 HDI (countries with high HDI) (Gachino, 2006). This variable has not yet been used for the assessment of performance in airline companies. Therefore, one of the novel contributions of the current research is the employment of this important economic condition in the proposed model.

3.2.3 Internal operation

In this research, based on Duliba et al. (2001), the five main independent variables used for assessment of performance are: number of departures, ASL, advertising expenses, vehicle kilometres, and system locations. System location has been defined as the number of agencies that have computerized services, such as ticket and seat reservation. However, in the current study, the system location was discarded from the employed model due to the following reasons:

a) As mentioned in Section 1.2, nowadays, nearly all the airlines companies utilize the Internet through which their customers can purchase or reserve their tickets and seats through online booking. As a result, overall, the personal relationship between air travel agencies and their customers for booking or purchasing tickets has been minimized.

b) Since all air travel agencies are connecting to all airline websites, there is no difference among agencies in the number of their interconnections with the airline companies for services, such as purchasing or booking.

3.2.4 Airline Capacity

There are three measurements included in development of structure, i.e., ASK, network size, and number of employees.

Available Seat Kilometres

Available Seat Kilometres is the result of the capacity of passengers on an aircraft multiplied by the route distance (Beaver, 2005). In other words, one unit of ASK is one seat over one kilometre on the route. It is obvious that the definition of ASK is a result of a combination of distance between routes and number of available seats on a flight on the same route. These variables, i.e., number of seats and distance, reflect the number of airplanes and the distances the airlines transport passengers. Hence, in this study, ASK can be considered as a measurement of airline capacity.

Network Size

According to Brueckner et al. (1992), the size of a network can be calculated by the number of station pairs between which the airline can transport passengers. The role network size plays in transporting passengers between various stations is vital since there is a direct relationship between the network size of an airline industry and the number of carried passengers, which, ultimately, affects the load factor, operating profit, etc. Therefore, growing network size contributes to enhancement of the overall performance of the airline industry. Nevertheless, this variable has been rarely used in the airline industry. As an example of the few researchers who have taken network size into consideration, It can refer to Hansen et al. (2001) who employed this variable as an independent variable to calculate the cost function in their research on airline transport.

Number of Employees

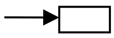
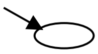
Number of employees refers to the number of part time or full time employees hired yearly by an industry. This variable has been used in this study as an independent variable for assessment of RPK and airline returns (Ito and Lee, 2005).

3.3 Overview of SEM

SEM is a strong statistical methodology that combines statistical data and qualitative causal assumption to assess and evaluate the causal associations. SEM can effectively replace multiple regressions, covariance analysis, time series analysis, factor analysis, and path analysis, which means that it is possible to consider the said procedures as special cases of SEM. In other words, SEM is considered as an extension of the general linear model (GLM) of which multiple regression modelling is a part.

The current study is based on a special case of SEM, which was used as path analysis through which the research hypotheses were examined and evaluated. The application and role of the SEM technique, i.e., path analysis, are explained in detail in the following section. Furthermore, in the following section the two-steps process, which is one of the most commonly used, is elaborated upon. However, the limitations and shortcomings of the said process will be determined and analysed, and, in the end, path analysis will be suggested as the recommended and commonly used technique employed for analysis of the data.

To describe SEM schematically, it can be portrayed as a model that uses particular configurations of the structures of four graphical symbols, that is, an ellipse (or circle), a rectangle, and a single or "double-headed arrow". Generally, squares (or rectangles;) and circles (or ellipses;) show observed and unobserved (latent) variables respectively, "single-headed arrows" (→) represent the direction of the impact of one factor on another, and "double-headed arrows" (↔) display correlations or covariance that take place between the variable or indicator pairs. The four symbols mentioned are utilized by researchers within the four basic configuration frameworks to create a specific structural model. Each of the four basic configurations is a vital component in the analysis process. A brief description of each of the four configurations is presented below:

-  Shows an observed factor's regression path coefficient onto an unobserved or latent factor.
-  Represents a regression model's path coefficient of one factor or variable onto another factor or variable.
-  Displays the term of measurement error connected to an observed factor.
-  Represents the residual error term in an unobserved or latent variable's prediction.

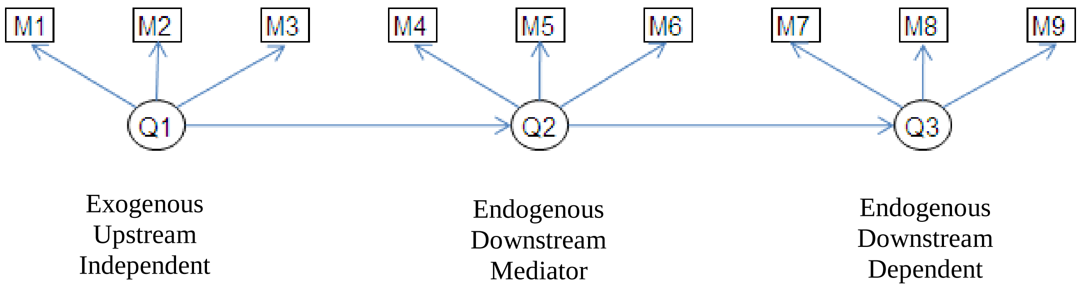
3.4 Key Concepts in SEM

This section defines some essential terms and concepts that have been used or referred to in this study. For the presented definitions the researcher has used a variety of resources, which have been included in the list of references used in this thesis.

Indicators (manifest or reference variable) are an observed variable like items used in a survey. Unobserved (latent) variable/factor/construct is an unobserved (latent) variable that is measurable by its respective indicator. The unobserved variable can be a dependant variable or mediator. An exogenous variable is a totally independent factor without any prior causal factor, which might be associated with the exogenous variable. This association is graphically displayed with a double-headed arrow. The endogenous variable is a completely dependent factor and mediator, which is both the effect of other exogenous factors and cause of other endogenous factors. The mediator is both the effect of other exogenous factors and cause of other dependent factors.

The variables of a model, based on the role of their effects and causes can be categorized into upstream and downstream variables, respectively. The unobserved variables representation depends on their relationship with the observed indicator variables, which is regarded to be one of the essential characteristics of SEM.

The following diagram shows the observed variables or indicators with M1 to M9, and the latent variables with Q1 to Q3:



3.5 Why the SEM Method?

As introduced and discussed in Chapter 1 of this thesis, the relationship between constructs were tested and checked through path analyses. Path analysis is a particular type of SEM that is itself a GLM development. GLM is a second generation of the method of data analysis, which depends on a structural relationship existing among variables of interest. SEM can be carried out using software – AMOS (Analysis of Momentum Structures), LISREL, Mplus, EQS – that are available and accessible to the researcher. These software packages were employed to evaluate and assess the relationship among the collected data, manifest, i.e., conceptual model including observed variables and latent hypothetical factors, i.e., latent constructs or unobserved variables (Hoyle and Smith, 1994).

In recent years, SEM has attracted the attention of many researchers and organizations as a commonly adopted method used for tasks like data analysis in various disciplines (Garver and Mentzer, 1999), such as accounting (Smith and Langfield-Smith, 2004), logistics (Garver and Mentzer, 1999), education (Teo, 2010, Chen et al., 2010), strategy management (Shook et al., 2004, Williams et al., 2003), marketing and business management (Baumgartner and Homburg, 1996, Steenkamp and Baumgartner, 2000), and Management Information System (Chin and Todd, 1995). Nevertheless, the popularity of SEM relies on some of the advantages that form part of the features of this method. Some of these properties are reviewed below:

The first and the most significant of SEM advantages is its ability to enable the researcher to simultaneously model and examine the indirect and direct interrelationships that exist among multiple dependent and independent (Gefen et al., 2000). This feature is a vital ability in the current research in which the model has an essential factor of mediation, i.e., a dependent variable, such as internal operation or performance, which, in the subsequent independent relationships, changes into an independent variable. After the effects of all other paths are taken into consideration, SEM assesses and evaluates each path coefficient separately. This feature makes SEM the most appropriate means for testing and estimating the role of the variables. As a result, the impact of a predictor factor is conveyed to a standard playing the role of a mediator. In fact, SEM is an effective and optimal technique for checking and testing the relationships among mediator variables (Dhanaraj et al., 2004, Steensma and Lyles, 2000).

Another characteristic that makes SEM the preferred model compared to methods of conventional multiple regressions is its typically piecemeal nature in generating separate and individually distinct coefficients. The SEM technique permits the researcher to check and examine a complete model generating goodness-of-fit statistics and assessing the overall fit of the complete model (Ho, 2006). The next feature of SEM allows the expansion of statistical estimating by the researcher through assessing and estimating terms of error for observed variables. In the traditionally and conventionally employed multivariate processes, such as multiple regression modelling, the error rate of variables measurement and the between variables residuals or their observed variables, i.e., indicators, are null (Goldberger, 1973, Pedhazur, 1997). However, this sort of assumption does not look realistic because the gauged variables usually have some measurement errors, even if small. Consequently, biased coefficients are expected to result from the utilization of these kinds of measurements, which is usual in conventional multivariate methods. Nevertheless, SEM enables the researcher to apply terms of measurement error to the process of estimation, which, ultimately, contributes to the improvement of the structural path coefficients reliabilities (Chin, 1998).

Yet another feature of SEM, which distinguishes it from other available models is its ability to allow the researcher to incorporate both observed (manifest) and unobserved (latent) variables into the process of the same analysis. As a result, the created incorporation provides a stronger analysis of the suggested model as well as a better evaluation of the study (Chin, 1998, Gefen et al., 2000). Furthermore, SEM has the ability to assist researchers in two more ways, i.e., handling complicated data (with non-normality and multi collinearity) and use of modelling of graphical interfaces (Garson, 2007).

Concisely, the important characteristics that make SEM more preferred in comparison with other available conservative multivariate methods, such as multiple regression modelling, is its ability to allow researchers to model the mediator variables to check and test the models with multiple dependent and independent indicators; to model mediator factors, and to analyse whole systems of indicators that enable the researcher to simultaneously establish models with a more realistic nature that need simultaneous analysis (Kline and Klammer, 2001, Tabachnick and Fidell, 1996).

3.6 Procedure of SEM

SEM has a two-step procedure, first of which concerns the measurement model validating and the second step is about the assumed structural model testing (Anderson and Gerbing, 1988). The first step, measurement model, deals with the relationships between unobservable (latent) and observable (measurement) factors (Garson, 2007). In other words, the measurement model concerns one part or all parts of an SEM relating to the unobservable variables and their indicators. However, confirmatory factor analysis (McFatter, 1979) is utilized for primary operation of the measurement model. Therefore, it can be easily said that the CFA model is a pure measurement model containing un-gauged covariance between each of the possible latent variable pairs.

The outcome from this procedure is goodness of fit values applicable to further enhance the measurement scales level, that is, indicator variables, through gauging the related latent constructs (Hair et al., 1998). If the measurement model's goodness of fit measures are satisfactory, i.e., where the measurement model can provide the required data with a goodness of fit, then it can be concluded that the indicators' targeted constructs can be measured adequately. However, if the measurement model is not able to provide a sufficiently powerful fit to the data, it can be then concluded that, at least some of the observed factors are unreliable. In this situation, prior to structural model analysis, it is required to refine the scales of the measurement anew (Anderson and Gerbing, 1988). Otherwise, moving to the structural model will not be of any use unless the model is confirmed as a valid model with satisfactory results.

The structural model also specifies the structural relationships, that is, indirect and direct impacts among unobservable constructs. As stated earlier in this chapter, for testing the structural model, some statistical software and packages, such as AMOS, LISREL, Mplus, and EQS are applicable. Nevertheless, the structural model, also known as the default model, can be contrasted against the measurement model.

A set of endogenous and exogenous factors, the direct effects (arrows with single-head) linking these variables together, and the error terms for these factors (reflecting the unmeasured factors effects that are not included in the research model) are contained in this model. The statistics of goodness of fit is another outcome of this analysis. The goodness of fit statistics can be employed to evaluate and judge the whole model and the hypotheses, as well as measure how much the expected covariances can be adjusted to the observed covariances in the data. In addition, other productions of this analysis are Modification Indices (MIs) that can be applied to improvement of the model fit, i.e., to fit the model to the observed research data. However, application of MIs is based on hypothetical considerations (Garson, 2007).
In summary, the SEM technique is normally carried out in two phases, namely: 1) validating the factors of the latent indicators construct, i.e., the scale of measurement, (CFA evaluated the measurement model; and 2) the structural model procedure is

evaluated to judge the whole fitting model as well as the individual structural models hypothesized among the unobservable (latent) indicators.

3.7 Path Analysis

The analyses of path and factors are both integrated and incorporated into SEM analysis forming a hybrid equation with both multiple factors for each specified variable, i.e., latent factors or variables, and paths joining the latent indicators together (Garson, 2007). If the factors composite scores (or index items or composite) replace the unobserved (latent) variables and their indicators, and in case the observed (manifest) items are connected together through arrows, the resulting model is named as the path model. Therefore, it can be concluded that path analysis is a specific type of SEM method (Garson, 2007).

According to Garson (2007) and Kline (1998), SEM with a single indicator (observed variable) is also considered as a path analysis. Using the software for SEM as a model in which each indicator has multiple variables without any direct effects (arrows), attaching the indicators is considered as a kind of factor analysis. Nevertheless, Garson believes that using SEM software with each factor containing only one measurement indicator is also a sort of path analysis. In a path analysis the observed (manifest) variables are typically used to form a composite of sum scores of the factors or variables of each scale in order to gauge an unobserved (latent) construct (Colak, 2008).

Single-indicators (observed indicators) are graphically specified by squares and unobservable (latent) indicators represented by ovals. A variables model represented solely by squares is known as a path model. However, a model with variables indicated by squares instead of ovals attached to the variables through arrows is called a structural model.

Accordingly, the differences between path analysis and SEM analysis can be summarized as below. It should be highlighted that path analysis is considered to be a specific form of SEM analysis. SEM analysis utilizes unobserved (latent) indicators gauged by many observed indicators, while path analysis employs just observed measurement generated by the sum scores of the multiple factors, which are utilized to compute the unobserved (latent) constructs. Nevertheless, SEM and path analyses have a common feature that makes them similar, i.e., both are utilized to determine whether or not the overall model is fit to suit the gathered data and investigate the individual hypotheses.

The main trend of the current research was elaborated upon in the previous section in which indication of the path analysis, a particular sort of SEM technique, was attempted. This indication is also applicable for analysis of the hypothesized links within the model. AMOS (Arbuckle, 2005), a convenient graphical SEM software program, was used for this analysis. AMOS routinely creates equations for the model after a diagram is drafted on the computer.

3.8 Sample Size, Outliers, Normality in SEM

Some of the assumptions that SEM makes are: a) a considerably large size of sample, b) normality, and c) absence of effective outliers. For obtaining reliable estimates, the first assumption supposes the requirement of large sample size for SEM (Jöreskog and Sörbom, 1996). According to Kline (1998), the size is classified as small if it is less than 100, medium if the sample size is between 100 and 200, and large if the sample size is bigger than 200. In addition, the sample size and the amount of estimated limitations (parameters) need to be in the right proportion. Hair et al. (1998) and Bentler and Chou (1987) suggested that if the obtained data are well-behaved, i.e., evenly and normally distributed, do not have outlier or missing data records, etc., a ratio of minimum five cases per each parameter estimate is required.

According to the second assumption, occurrence of multivariate normality depends on the normal distribution of each variable in regard to every other variable (Garson, 2007). In cases like this, normality of the data should be assessed. Data normality can be checked by kurtosis and skewness; West et al. (1995) suggested if Skewness>2 and Kurtosis>7, and Kline (1998) suggested if Kurtosis>10 and Skewness>3. Regularly the concern of Kurtosis is greater than that of Skewness. Since univariate normality does not make certain multivariable normality, in cases of multivariate kurtosis and skewness, examination of data is also required, for which Mardia's statistics can be used (Mardia, 1974). The acceptability of the assumption of multivariate normality distribution is based on Mardia's kurtosis statistics, which are supposed to be smaller than 10 (Kline, 1998).

The power of the robust method is unnecessary for the normality. In this method, the chi-square and standard errors are corrected to the non-normality situation. The chi-square test is corrected in the conceptual method based on the descriptions of Satorra and Bentler (1994). In addition, robust standard errors developed by Bentler and Dijsktra (1985) are provided as an output of the robust analysis. Despite the computational demand of these robust statistics, their performance has been proved to be better than the uncorrected statistics in which the assumption of normality fails to hold and performs better than Asymptotically

Distribution Free (ADF) estimation (Chou et al., 1991, Hu et al., 1992). However, it should be taken into consideration that robust statistics can be computed from raw data (Byrne, 2006). The choice of method of estimation depends on the data distribution and sample size. Therefore, a quick assessment of non-normality and sample size needs to be covered at this stage.

There is another factor that can make radical alterations to the results of the analysis. This factor is the outliers, which are also a representation of violations of normality assumptions. Outliers can be classified into two categories: simple and multivariate. Simple outliers have the highest values in connection with a single variable whereas multivariate outliers only possess extreme values of a multiple variable on the surface. Mahalanobis distance is an extremely general measure that is utilized for measurement of multivariate outliers. If the Mahalanobis D-squared values, which can be calculated using AMOS or SPSS, are the highest, they tend to be the most probable significant outliers, that is, the outliers cause the analysis outcomes to reduce (Hair et al., 2006, Garson, 2007). The impacts of the significant outliers on the analysis need to be assessed and investigated carefully and closely to find out whether they can be retained.

The possible outcomes of violation of the mentioned assumptions are: no solution, like underestimated fit indexes (CFI, TLI, etc.), overestimated χ^2 (chi-square) values, and underestimated parameters standard errors. These problems together can cause:

- Researchers to suspect the effectiveness of their employed models thinking that they need to be modified more to be more effective. This suspicion may result in unnecessary and inappropriate alterations to the model,

- Regression paths to statistically appear as significant even if they are not in actuality (West et al., 1995).

SEM is stronger and more effective in comparison to multiple regression modelling in controlling and resolving these problems since it enables the researchers to work with various techniques of estimation in regard to non-normal data. As an example, we can refer to Maximum Likelihood Estimation (MLE), which is used as a default for the estimation procedure of SEM, unlike other estimation methods, such as the Ordinary Least Squares (OLS) employed in multiple regression (Byrne, 2001), which is sufficiently powerful to moderate or reduce the deviation level from multivariate normality distribution (Bollen, 1989). Nonetheless, if multivariate non-normality were used, the parameters produced with MLE would be unreliable. In such cases, other techniques of estimation, such as ADF estimation, can be employed. However, the samples used for ADF need to be larger than 1,000 to achieve optimal performance because estimates of moderate or small sample sizes are unreliable (Muthen, 1997).

In order to be able to work with the problems connected to non-normality and small sample sizes, the researchers can utilize another approach called the bootstrap (West et al., 1995, Byrne, 2001). This technique, bootstrap, allows the researcher: 1) to extract multiple (usually 250 to 2000) sub-samples from the main data; 2) to assess and check the goodness-of-fit indexes constancy compatible with the overall model; and 3) to check the parameter distributions constancy related to each of the generated samples (Byrne, 2001). The said procedure is known as Bollen Stine Bootstrapping, which can create fit statistics called the Bollen Stine p-value (Bollen and Stine, 1993). The Bollen Stine p-value is used to replace, substitute, or complement the fit statistics of the chi-square utilized to evaluate the fitting and compatibility of the model under the assumption of normality distribution.

3.9 Construction of the Path Model for Estimation

The above-mentioned phase is followed by another step, which concentrates on the formation and construction of a path model based on the outcomes resulting from the multiple regression analyses. In the path model "double-headed or single-headed arrows" and squares represent the structural relationships and their directions among the variables. The squares represent the observed (manifest) variables, while unobserved (latent) indicators are indicated by ovals (which in structural model were represented by squares). The single-headed arrows show the causalities or the structural relationships between the dependent (mediating) and independent variables, and double-headed arrows show the correlations that exist between the independent variables.

The variables that ensued from the regression analyses were also employed in the path model as endogenous (dependent), exogenous (independent), and mediating (intervening) variables. In a path model, the variables that do not have any obvious causes, i.e., there are no arrow signs directed to them, are considered as exogenous variables. However, if there is a correlation between the exogenous variables, a double-headed arrow is used to indicate the correlation between them. There are also variables that are indicated by single-headed arrows directed to them, which represent a regression (causal) relationship with an exogenous variable. These kinds of variables are endogenous in fact although it is possible to use mediating variables as both endogenous and exogenous ones. Therefore, they both have outgoing and incoming causal arrows in the graphical path diagram (Garson, 2007, Ridgon, 2006).

Furthermore, this step of the path model deals with terms of disturbance or residual error for each observed endogenous variable. For the endogenous factor, the error term represents unexplained variance, i.e., the unmeasured items effects, and the resulting measurement error. The paths from endogenous variables, also known as regression paths, towards their term of disturbance are also indicated by single-headed arrows. These regression paths are shown by 1, which indicates their "initial values" allowing SEM (AMOS) to assess and evaluate the term of the disturbance variance (Garson, 2007, Byrne, 2001).

3.9.1 Testing Model Fit

The fit index statistic tests the consistency between the predicted and observed data matrix by the equation (Keith, 2006). One of the differences that exist between the SEM technique and regression method is that the former one does not have any single statistical test applicable for evaluation of model predictions "strength" (Hair et al., 1998). In this regard, Kline (1998) believed that there are "dozens of fit indexes described in SEM literature, more than any single model-fitting program reports". However, according to Hair et al. (1998) and Garson (2007), the chi-square fit index, also known as chi-square discrepancy test, is considered as the most fundamental and common overall fit measure. Thus, in a good model fit the value of chi-square should not be very significant, i.e., $p>0.05$ (Hair et al., 1998). However, one problem usually experienced through this test relates to the rejection probability of the model having direct interaction with the sample size. Moreover, the sensitivity level of chi-square fit index is very high, especially, towards the multivariate normality assumption violations (Garson, 2007).

Many indexes have been introduced and developed to avert or reduce the problems related to the chi-square fit index. Some of the indexes included in the absolute fit indexes are as follows:

a) Normal Chi-Square Fit Index (CMIN/DF):

Normal chi-square fit index, χ^2/df, serves to adjust the testing of chi-square according to the sample size (Byrne, 2001). A number of researchers take 5 as an adequate fit value, while more conservative researchers believe that chi-square values larger than 2 or 3 are not acceptable (Garson, 2007).

b) *Goodness-of-Fit Index (Smith and Langfield-Smith)*:

GFI is utilized for gauging the discrepancy level between the estimated or predicted covariances and resulted or observed ones (Jöreskog and Sörbom, 1993).

$$GFI = 1 - \left[\frac{\max[(\chi^2 - df)/n, 0]}{\max[(\chi^2_{null} - df_{null})/n, 0]}\right]$$

The allowable range for GFI is between 0 and 1, where 1 indicates a perfect fit, which demonstrates that measures equal to or larger than 0.90 signify a 'good' fit (Garson, 2007).

c) *Adjusted Goodness-of-Fit Index (AGFI)* (Jöreskog, 1993):

AGFI is utilized for adjustment of the GFI relating the complexity of the model.

$$AGFI = 1 - \left[(1 - GFI)\frac{d_{null}}{d}\right]$$

The measuring of AGFI is between 0 and 1, in which 1 or over 1 (AGFI>1.0) signifies a perfect fit, nevertheless, it cannot be bounded below 0, i.e., (AGFI<0). As in the case of GFI, AGFI values equal to or bigger than 0.90 signify a 'good' fit (Garson, 2007).

d) *Root Mean Square Residual (RMR)*:

RMR shows the mean squared amount's square root, which distinguishes the sample variances and covariances from the corresponding predicted variances and covariances (Hu and Bentler, 1995). The assessment relies on an assumption that considers the model to be correct. The smaller the RMR, the more optimal the fit is (Garson, 2007).

e) *Root Mean Square Error of Approximation* (RMSEA) (Steiger, 1990):

RMSEA is employed to gauge the approximation error in the population.

$$RMSEA = \left[\frac{(\chi^2 - df)}{(n-1)df}\right]^{1/2}$$

In cases where the RMSEA value is small, the approximation is believed to be optimal. An approximately 0.05 or smaller value of RMSEA means a more appropriate and closer model fit in connection with the degrees of freedom. Nevertheless, between 0.05 and 0.08 displays the most preferable status and the more optimal fit results (Browne and Cudeck, 1993).

In addition, the following indexes are also included in the incremental fit measures:

a) *Normed Fit Index or Bentler Bonett Index* (NFI):

Normed Fit Index or Bentler Bonett Index or NFI is applicable to contrast and compare the fit of a suggested model against a null model (Bentler and Bonett, 1980).

$$NFI = {\left[\chi^2/df_{(Null\ Model)}/\chi^2/df_{(Proposed\ Model)}\right]}\Big/{\left[\chi^2/df_{(Null\ Model)}\right]}$$

This index defines all the observed variables as uncorrelated. The values of NFI range between 0 and 1, where 0.90 signifies an optimal fit (Garson, 2007).

b) *Tucker Lewis Index or Non-Normed Fit Index* (TLI or NNFI):

The TLI or NNFI index is used to gauge parsimony, which is applicable through the evaluation and assessment of the degrees of freedom of the suggested model to the degrees of freedom of the null model (Bentler and Bonett, 1980).

$$NNFI = {[\chi^2/df_{(Null\ Model)}/\chi^2/df_{(Proposed\ Model)}]}\Big/{[\chi^2/df_{(Null\ Model)} - 1]}$$

However, it is not certain whether TLI can vary from 0 to 1. A fit of model is required to possess a TLI that is larger than 0.90 (Tucker and Lewis, 1973, Bentler and Bonett, 1980).

c) *Comparative Fit Index* (CFI) (Bentler, 1990):

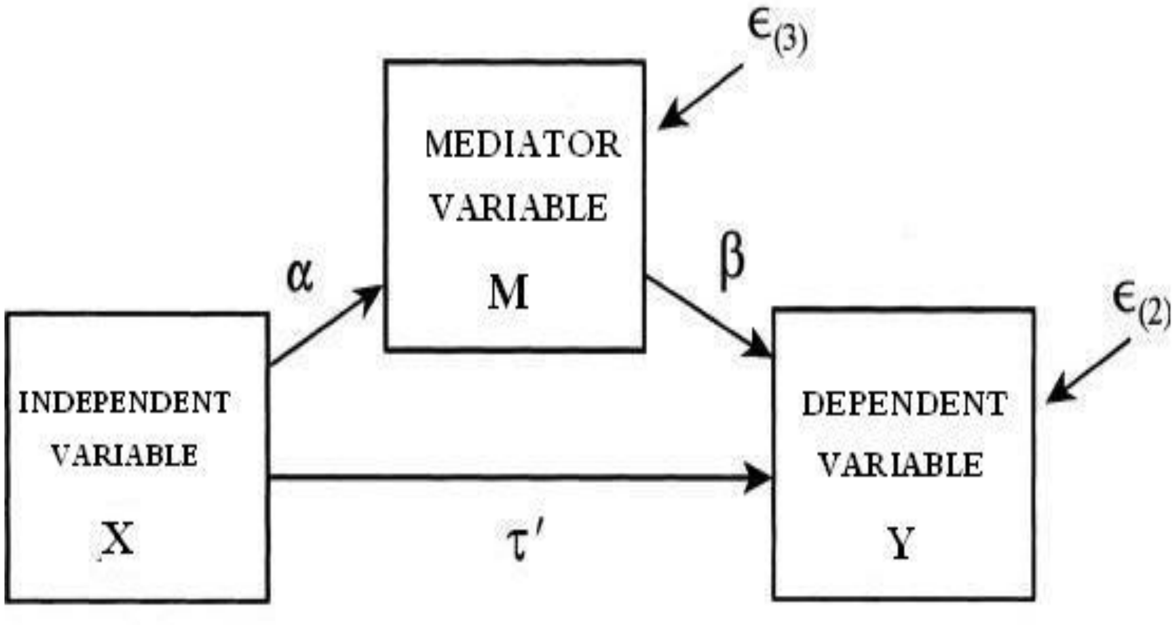
CFI is not only less affected by the sample size, but also based on comparison of the hypothesized model to the null model (Kline, 1998).

$$CFI = 1 - \left[\frac{\max[(\chi^2 - df), 0]}{\max[(\chi^2 - df), (\chi^2_{null} - df_{null}), 0]}\right]$$

The values of CFI range between 0 and 1. However, its values need to be a minimum of 0.90 to be usable for a model fit (Garson, 2007).

3.9.2 Mediation Model

Most studies focus on the relations that exist between two variables, X and Y, which have been generously dealt with in various writings concerning the conditions under which Y is possibly affected or caused by X. Randomizing the units to X value and units independence within and across X value are also contained in these conditions.



The mediation model seeks to discover and explicate the underlying mechanism of an observed relationship existing between a dependent and an independent variable through including a third explanatory variable, which is normally known as a the mediator variable. However, the hypothesis of a meditational model is not related to a direct causal relationship between the dependent and independent variable, but the hypothesis assumes that the independent variable as the main cause of the mediator variable, which, consequently, results in the dependent variable. Therefore, it can be claimed that the mediator variable seeks to explain the nature of the relationship between the dependent variable and the independent variable (MacKinnon, 2008).

Direct effect= τ'

Indirect effect= $\alpha \beta$

Total effect= $\alpha \beta + \tau'$

The above figure displays a simple Mediation model. The simplest Mediation model indicates the addition of a third variable to the independent variable and dependent variable relationship, which enables the independent variable (X) to cause the mediator (M), and the resulting mediator variable (M) to cause the dependent variable (Y), namely:

Independent variable → Mediator variable → Dependent variable

It should be noted that the relationship between X and Y is via the direct and mediated effect indirectly causing X to affect Y through M. The mediation model can be dichotomized into two more models: theoretical model, corresponding to unobservable relationship among indicators, and empirical model, corresponding to statistical analysis of actual data (MacCorquodale and Meehl, 1963). The relevant study tries to infer the true state of mediation from observations. However, some qualifications are attributable to this simple dichotomy, which is, generally, interested in justification of a research program to conclude that a third variable is mediating in the relationship.

3.9.3 Mediation Regression Equations

There are three main approaches that are commonly employed for analysis of the statistical mediation model. These approaches are: 1) causal (first) step; 2) difference in coefficients (second step); and 3) product of coefficients (third step) (MacKinnon, 2000). The required data used in these three approaches is mainly obtained from the three regression equations, displayed below:

$$Y = \alpha_1 + \beta_1 X + \varepsilon_1 \qquad (3.1)$$

$$Y = \alpha_2 + \beta_2 X + \beta_M M + \varepsilon_2 \qquad (3.2)$$

$$M = \alpha_3 + \beta_3 X + \varepsilon_3, \qquad (3.3)$$

In the above equations, Y is considered as the dependent variable; α_1, α_2 and α_3 are intercepts; and M indicates the mediator; X represents the independent variable; β_1 indicates the coefficient related to the dependent and independent variables; β_2 shows the coefficient connecting the dependent variable to the independent one, and, ultimately, adjusting them for the mediator; β_M represents the coefficient linking the mediator indicator to the dependent variable adjusted for the independent one; β_3 indicates the coefficient connecting the independent to the mediator variable; and, finally, ε_1, ε_2, and ε_3 indicate the residual terms. Nevertheless, it is noteworthy to mention that the mediation functions can be modified to produce both nonlinear and linear effects as well as M and X interactions in Equation (3.2).

The most common approach employed for the assessment and evaluation of the Mediation model is the first or causal steps approach. The causal steps approach has been delineated in the works of some researchers, such as Baron and Kenny (1986); Kenny et al. (1998); Judd and Kenny (1981b); and Judd and Kenny (1981a). For establishment of the mediation model, the Baron and Kenny approach suggests four steps, namely, in the first step, a strong relation between the dependent and independent variables is required for Equation (3.1). In the second step, Equation (3.3) requires a significant relationship between the hypothesized mediator and the independent indicator. Next, a significant mediator variable is required to be related to the dependent variable. However, both mediating and independent variables are predicting the dependent variable in Equation (3.2). Finally, in the fourth step, the coefficient connecting the dependent variable to the independent one is required, which needs to be greater (in absolute value) than the coefficient connecting the dependent variable to the independent one in the regression analysis in which both the mediating and independent variables, in the unique equation, are predictors of the dependent variable.

The causal steps approach, mentioned above, is the most common method utilized for assessment of the mediation model. However, this approach has a number of limitations, which are elaborated upon in this part. In the single-mediator model, the mediation effect can be computed in two ways, namely, $\widehat{\beta_3}\widehat{\beta_M}$ or $\widehat{\beta_{1-}}\ \widehat{\beta_2}$ (MacKinnon and Dwyer, 1993). The indirect or mediated effect value, calculated through the coefficient difference,$\widehat{\beta_{1-}}\ \widehat{\beta_2}$, in equations (3.1) and (3.2), adjusts with a decrease of the independent factor effect on the dependent factor while corresponding to the mediation factor.

The product of coefficients are generated from the mediated or indirect effect, which involves assessment of the product of $\widehat{\beta_3}$ and $\widehat{\beta_M}$, $\widehat{\beta_3}\widehat{\beta_M}$ and estimation of Equations (3.2) and (3.3) (Alwin and Hauser, 1975). This is due to the fact that mediation depends on the modification extent made in the mediator,$\widehat{\beta_3}$, by the programme as well as the extent of the effect of the mediator on the produced variable, $\widehat{\beta_M}$. Next, the significance is checked through dividing the result by the standard error of the ratio, which is compared and contrasted to a standard normal distribution.

MacKinnon et al. (1995) presented the algebraic equivalence of the $\widehat{\beta_{1-}}\ \widehat{\beta_2}$ and $\widehat{\beta_3}\widehat{\beta_M}$ measures of the mediation for normal theory OLS and MLE of the mediation regression models. Concerning the multilevel modelling (Krull and MacKinnon, 1999), probit or logistic regression modelling (MacKinnon and Dwyer, 1993), and analysis with survival data (Tein and MacKinnon, 2003), the estimators of the mediated effect, $\widehat{\beta_3}\widehat{\beta_M}$ and $\widehat{\beta_{1-}}\,\widehat{\beta_2}$, are not always equivalent, and the two similar yields need to undergo some transformation (MacKinnon and Dwyer, 1993).

3.9.4 Standard Error of the Mediated Effect

The multivariate delta method can be used as a common formula to find the standard error of the mediated effect (Sobel, 1986, Sobel, 1982). The indirect effect asymptotic standard error can be obtained through Equation (3.4) below (Bishop et al., 1975):

$$\sigma_{\widehat{\beta}_3\widehat{\beta}_M} = \sqrt{\sigma^2_{\widehat{\beta}_3}\hat{\beta}_3^2 + \sigma^2_{\widehat{\beta}_M}\hat{\beta}_3^2} \tag{3.4}$$

Another formula that can be utilized to obtain the standard error of $\widehat{\beta_{1-}}\,\widehat{\beta_2}$ and $\widehat{\beta_3}\widehat{\beta_M}$, has been elaborated and delineated by MacKinnon et al. (2002a). However, the research that is based on simulation shows that the standard error of estimator in Equation (3.4) reveals that the sample size low bias should be a minimum of 50 in models of single-mediation (MacKinnon et al., 1995). In case a model's mediator number is more than one, the standard error of at least 100-200 sample size is accurate (Stone and Sobel, 1990). The resulting outcomes with similar features can be applied to positive and negative path values standard errors as well, while larger models contain multiple dependent, independent, and mediating indicators (MacKinnon et al., 2004).

3.9.5 Confidence Limits for the Mediated Effect

The standard error of $\widehat{\beta_3}\widehat{\beta_M}$ is also applicable for examining the statistical significance of it as well as constructing confidence for the mediated effect restrictions, as shown in Equation (3.5) below:

$$\widehat{\beta_3}\widehat{\beta_M} \pm z_{1-w/_2} * \sigma_{\widehat{\beta_3}\widehat{\beta_M}} (3.5)$$

Some scholars who support bootstrap analysis and simulation studies of the mediated effect reveal (Lockwood and MacKinnon, 1998) that confidence limits based on the mediated effect normal distribution (MacKinnon et al., 1995) can hardly be precise and errorless. The confidence intervals of the mediating effect strongly lean to move towards the left side of the true value of the mediating effect for mediating effects that are positive. They also have a strong tendency towards the right of the negative mediating effects (Bollen and Stine, 1990, Stone and Sobel, 1990). The limits of asymmetric confidence based on the estimation of bootstrap and product distribution can contribute to the process in a more effective fashion than the afore mentioned tests (MacKinnon et al., 2004).

3.9.6 Distribution of the Product

The outcome produced by two random variables normally distributed will be normal distribution in particular cases alone (Springer, 1979, Glen et al., 2004). This clarifies and makes clear the inaccuracy of assessing the statistical significance techniques of the normal distribution based mediation. As an example we can refer to two standard normal random variables with a zero mean, for which the excess kurtosis equals six (Meeker et al., 1981) in comparison with an excess kurtosis of zero mean for a normal distribution. An experiment by Mackinnon et al. (MacKinnon et al., 2002a, MacKinnon et al., 2004) revealed that compared to common methods, the results of significance tests done for the mediated effect according to the product distribution contained more accurate statistical power and especially type-I error rates.

3.9.7 Assumption of the Single-Mediator Model

According to MacKinnon et al. (2006), there are several significant assumptions that can be used for mediation tests. In the case of the effect of the estimator mediated by $\widehat{\beta_3}\widehat{\beta_M}$, the model supposes the residuals that are in Equations (3.2) and (3.3) are independent, while in Equation (3.2), the residual and M are considered as statistically independent (McDonald, 1997). The presence of XM interaction in Equation (3.3) is to be tested for approval; nevertheless, such an interaction is assumed to be in the Equation. If model assumptions are correctly specified, there may not be causal order misspecification, such as $Y \rightarrow M \rightarrow X$ instead of $X \rightarrow M \rightarrow Y$. Causal direction misspecification like mutual causation between the dependent variable and the mediator, misspecification ensued from unmeasured variables, which prompts factors in the mediation study, or misspecification resulting from inaccurate and imperfect and inaccurate measurement (Holland, 1988, James and Brett, 1984). As a result of the impossibility or improbability of carrying out testing these assumptions in most conditions and situations, the approval of the mediation relation does not appear to be possible (MacKinnon et al., 2006).

3.9.8 Complete Versus Partial Mediation

An important task of a relevant researcher is to test to find out whether the mediation is complete or partial. This task is normally done to see if the $\widehat{\beta_2}$ is significant. In reality, this testing is to identify whether the relationship between the dependent and independent variables is comprehensively explicable of a mediator (James et al., 2006). If the $\widehat{\beta_2}$ and the mediation are statistically significant, a partial mediator indicator may exist (MacKinnon et al., 2006).

3.9.9 Inconsistent and Consistent Models

Inconsistent mediation models are those in which there is at least one mediating effect with a different sign in comparison to other direct or mediated effects in the same model (Davis, 1985, MacKinnon et al., 2000). The relation of X to Y should be significant for interpretation of the outcome; however, there may be other cases in which the overall relation of X to Y is not significant despite the existence of mediation. Mcfatter (1979) explained the widgets hypothetical pattern, which makes labourers. In this example X indicates intelligence, M represents the rate of boredom, and Y shows production of the widget. Intelligent labourers are likely to be bored, which, ultimately, leads to a reduction of their production rate. Nevertheless, workers who enjoy higher intelligence are more likely to produce more widgets. As a consequence, it is possible to actually have zero level of the overall relation between the number of the produced widgets and intelligence. However, it is possible that two opposing meditational processes exist concurrently in a model. Several other examples like the one presented above, provide sufficient demonstrations of such inconsistent effects (Paulhus et al., 2004, Sheets and Braver, 1999). Nonetheless, inconsistent mediation is applied more commonly in multiple mediator models, in which various mediated effects have different symptoms. Inconsistent mediator effects are possible to be specifically critical in assessment and evaluation of counterproductive effects of tests, the manipulation of which can lead to mediated effects with opposing features (MacKinnon et al., 2006).

3.9.10 Moderator Analysis

The mediated effects form and strength may be dependent on some other factors and variables that can affect the hypothesized relationship existing among a group of variables. In this case, they are called moderators, which can usually be tested as effects of interaction (Aiken et al., 1991). A non-zero interaction of XM in function (2.3) is also a pattern of a moderator effect, which shows the β_M coefficient as different in all X levels. It is possible that various β_M coefficients across levels of X represent the mediation indicator as a manipulation indicator and change the M relation to Y. The existence of moderator effects shows the alterations that occur in the modelled function across various moderator variable levels, in which moderators are possibly either a natural variable like gender or a manipulated factor in a setting of experiments. Testing these variables and their effects on models of mediation helps a study focus on the way the effects of an experiment can be achieved. Nevertheless, examining the moderator effects enables a researcher to see if the effects of the experiment on individual subgroups are different (Donaldson, 2001, MacKinnon, 2001, Sandler et al., 1997).

3.10 SEM Software Packages

Various software packages are available that are compatible with SEM that can be executed on home or office PCs. Some of these programs are the CALIS procedure of SAS/STAT, AMOS, EQS, MPLUS, LISREL, the RAMONA module of SYSTAT, MX GRAPH, and the SEPATH module of STATISTICA. The main difference among them is in their ability and capability to back more sophisticated analyses and interaction methods with the program. The specifications and capabilities of such programs, like any other computer program, are likely to alter with the release of their newer versions; hence, the computer programs cannot be easily described save for the analysis outcomes of the model and a short explanation of the output and its description. In the current study, AMOS and SPSS are the selected programs for the statistical analysis of performance data.

3.11 Conclusion

This chapter presented an outline of the research methodology and the elaboration of the ideas and notions connected to the main topic of the current thesis. During the present chapter the proposed SEM was explained and compared with other systems while mentioning the differences and similarities between them. Then the shortcomings and defects of the other techniques were discussed in contrast with the expected advantages of the proposed model. In this chapter, various methods used for collecting data were introduced and discussed. The different types of research and the kinds of research category the current study falls into were also mentioned in the process of this chapter. The next chapter will analyse the collected data to arrive at a valid conclusion. The following chapter will deal with the data analysis to come to a more definite conclusion concerning the proposed model in respect of its benefits and specific features that distinguish it among the other available models.

CHAPTER 4

DATA ANALYSIS

4.1 Introduction

To analyse the performance in the airline industry different statistical methods such as ANOVA (Gilbert and Wong, 2003), regression (Ater and Orlov, 2010, Clougherty and Zhang, 2009), data envelopment analysis (Gramani, 2011, Gillen and Lall, 1997, Assaf and Josiassen, 2011, Cheng, 2010), technique for order preference by similarity to ideal solution (TOPSIS) (Feng and Wang, 2000), and Fuzzy (Tsaur et al., 2002, Liou and Tzeng, 2007, Shipley and Coy, 2009, Kang et al., 2004) have been employed. In this study, for estimation of performance, the SEM method was used, which has not been employed for airline performance estimation. The only case in which SEM has been used for is in the assessment of service performance while customer satisfaction (Chen, 2008, Chenet et al., 2000) and cost function in the airline industry are not covered by the discussions dealt with in this research. In this study, financial and non-financial variables have been used for PM.

This chapter discusses the research findings as well as the specific models that were used to take into consideration the different aspects of performance indicators and measures of the airline industry. As Chapter 3 of this thesis discussed, the CFA model can be utilized to determine the degree required for the fitting model. In the current study, the variables are measured using different units of measurement. For this reason, the standardized estimates of AMOS software are considered for data analysis.

The present chapter is divided into five sections, each of which deal with different discussions. Section 4.2 presents the sampling procedure for analysing the research based on the SEM method. Section 4.3 shows descriptive statistics of research variables. Section 4.4 gives SEM analysis including the measurement model, structural model, mediation, and moderation analysis. Finally Section 4.5 gives an overall view of the analysis results.

4.2 Sampling Procedure

The airline industry has two main organizations, i.e., Air Transport World (ATW) and International Air Transport Association (IATA). The total number of members of IATA in 2009 amounted to 230 airlines while ATW had 437 members for the same period of time. The population of this study has been taken from ATW since the number of ATW airlines is greater than the number of the airlines in IATA.

Nevertheless, it is notable to mention that airline companies are classified as a service-providing sector whose main task includes service provision to their customers, i.e. passengers. These sorts of companies are grouped into three categories based on the kind of service: airline companies specializing in transfer of passengers, airline companies specializing in cargo transfer, and airline companies specializing in both passenger and cargo transfer. The current study; however, only focuses on the airline firms specializing in passenger transfer although they also concurrently provide services for cargo transfer. Moreover, the cargo transferring aspects of the case have been excluded from the present research domain.

Due to budget limitation and availability of data, only 214 airlines were selected. The size of sample is selected based on the requirement of the statistical analysis used in this study.

According to ATW, airline areas are categorized into five regions, namely: a) the Middle East and Africa b) Asia and Pacific, c) Latin America and the Caribbean, d) Europe, and e) North America. Therefore, the ATW regions can be stratified into five levels accordingly, as illustrated in Table 4.1, which shows the number of airlines and population samples in each region.

Table 4.1: Number of total airlines and sampling (Source: Author)

Area	Number of airline	Percentage	Number of sample
Africa/Middle east	42	9.6%	21
Asia/Pacific	91	20.8%	45
Europe	168	38.4%	82
Latin America/Caribbean	52	11.9%	25
North America	84	19.3%	41
Total	**437**	**100%**	**214**

As per reports issued by ATW, in December 2009, as well as the Research and Innovative Technology Administration, and Bureau of Transportation, the four indicators – ASMs (mil.), RPMs (mil.), number of passengers (Passenger (000)), and passenger load factor (%) – decreased during the period from 2008 to 2009 in three regions, i.e., Europe, the USA, and Asia Pacific (See Table 4.2).

Table 4.2: Comparing RPM, ASM, Passenger, and Load Factor between US, Europe, Asia Pacific, and Latin America (Source: ATW (2009))

Area	Factor	2009	2008	%Change
Asia Pacific	RPKs (mil.)	553,187	591,942	-6.5
	ASKs (mil.)	741,431	789,312	-6.1
	Passenger. (000)	132,931	140,897	-5.7
	Load Factor (%)	74.6	75.5	-0.4
Europe	RPKs (mil.)	747,935	783,178	-4.5
	ASKs (mil.)	983,720	1,026,848	-4.2
	Passenger. (000)	325,952	346,021	-5.8
	Load Factor (%)	76.0	76.3	-0.3
US	RPKs (mil.)	1,238,126	1,307,152	-5.3
	ASKs (mil.)	1,540,135	1,643,272	-6.3
	Passenger. (000)	703,900	743,300	-5.3
	Load Factor (%)	80.4	79.5	-0.1
Latin America	RPKs (mil.)	178,699	173,571	3.0
	ASKs (mil.)	253,452	243,769	4.0
	Passenger. (000)	123,455	119,193	3.6
	Load Factor (%)	70.5	71.2	-0.7

In the case of airline performance, only cross sectional data are applicable in the structural model and longitudinal path analysis is not usable. Airline companies always tend to change the variables, such as number of departures, stage length, buy or rental of aircraft and number of employees, according to the economic condition. Since all the above mentioned variables affect the performance simultaneously, the measurement of these variables at different times will not reflect the correct image of the real performance of the airline company.

Given the above discussion cross-sectional analysis is employed in this study. As a result, the data are collected from the annual report of each of the airlines under study in 2009. Jöreskog and Sörbom (1996) believed that in order to gain reliable estimations, SEM requires a large sample size. According to Kline (1998), the reliability level of estimation depends on the number of the selected samples. If the number of sample cases is below 100, it is considered to be of small reliability, between 100 and 200 is regarded average, and above 200 is considered as large with a higher reliability level. Nevertheless, the size of the sample should be proportionate to the number of estimated parameters. Hair et al. (1998), and Bentler and Chou (1987) proposed a ratio of a minimum of five observations per parameter estimate if the data are well-behaved, which means that data are proportionately distributed with no data missing or outlying cases.

Therefore, the research data must have three characteristics: 1) the sample size should be made up of at least 200 companies, 2) there is no missing information in the research data, and 3) there is no outlier in the data. Outliers are deleted using the Mahalanobis Distance method. Therefore, for having high reliability, covering missing data and outliers, more than 200 airlines is required. In this study 214 companies were selected using stratified sampling during which one company was deleted from the list due to missing data. Moreover, based on Mahalanobis Distance testing, four observations (observation number; 205, 85, 110, and 5) were removed from the list because they were considered as outliers, which could affect the model fit, R^2, and the size and direction of parameter estimates (see Table 4.3). Therefore, the number of companies included in the study is 209, which forms 48% of the total number of airlines listed in ATW (See Table 4.1). According to Gay (1996), this number is 20% higher than the other comparable studies required for statistical significance.

Table 4.3: Mahalanobis Distance (Source: Author)

Observation number	**Mahalanobis d-squared**	**p1**	**p2**
205	33.114	0.0032	0.043
85	27.348	0.0231	0.007
110	22.287	0.0481	0.052
5	20.012	0.0621	0.041
18	18.821	0.0788	0.101
147	17.281	0.0908	0.072
…	…	…	…

Note: If p1 or p2 less than 0.05 then the observe is outlier

4.3 Descriptive Statistics

Table 4.4 presents descriptive statistics of research variables. The first construct is called performance and include load factor (Min=50.3%, Max=96.6% and Mean=74.3%), market share (Min=0.03%, Max=12.5%, and Mean= 0.22%), RPK (Min= 1.2, Max=304, and Mean=7.4 billion), and operating profit (Min=0.3, Max=28.1, and Mean=2.8 billion US Dollar). The second construct is called economic condition and include inflation rate (Min= -4.8%, Max=15.8%, and Mean=4.9%), GDP (Min=1,350, Max=19,959,032, and Mean=2,583,159 million US Dollar), and HDI (Min=0.353, Max=0.941, and Mean=0.625). The third construct is called internal operation include (Min=5.4, Max=728.5, and Mean=24.9 thousands flights), average stage of length (Min=528, Max=985, and Mean=729 kilometre), and advertisement (Min=0.8, Max=16, and Mean=3.8 million US Dollar). The fourth construct is called airline capacity and include ASK (Min=12.8, Max=265, and Mean=29.6 billion seat kilometres), network size (Min=47, Max=897, and Mean=85 routs), and number of employee (Min=0.8, Max=68.1, and Mean=6.7 thousands).

Table 4.4: Descriptive statistics of research variables (Source: Author)

Latent Variable	Item	Min	Max	Mean
Performance				
	Load Factor (%)	50.3	96.6	74.3
	Market Share (%)	0.03	12.5	0.22
	RPK (billion)	1.2	304	7.4
	Operating Profit ($, billion)	0.3	28.1	2.8
Economic condition				
	Inflation Rate (%)	-4.8	15.8	4.9
	GDP	1,350	19,959,032	2,583,159
	HDI (0,1)	0.353	0.941	0.625
Internal Operation				
	Departure (thousands)	5.4	728.5	24.9
	Average Stage of Length (kilometre)	528	985	729
	Advertisement ($, mil)	0.8	16	3.8
Airline Capacity				
	ASK (billion)	12.8	265	29.6
	Network Size	47	897	85
	Number of Employee (thousands)	0.8	68.1	6.7

4.4 SEM Analysis

This phase of the study consists of four steps, i.e., 1) determining the model of research based on the conceptual framework and elaboration of the relationship between various constructs and their measures, 2) correlation between variables and between constructs, 3) determining the measurement model, which includes convergent and discriminant validity, examining normality, and procedure of confirmatory factor analysis, and 4) describing the estimated model coefficients through the structural model.

4.4.1 Research Model

For the second objective, the researcher needed to find the relationship between internal operation, economic condition, capacity, and performance in the global airline industry. Figure 4.1 illustrates the path diagram research model for the second objective; stated in Section 1.5. The description of each variable can be found in Section 3.2.

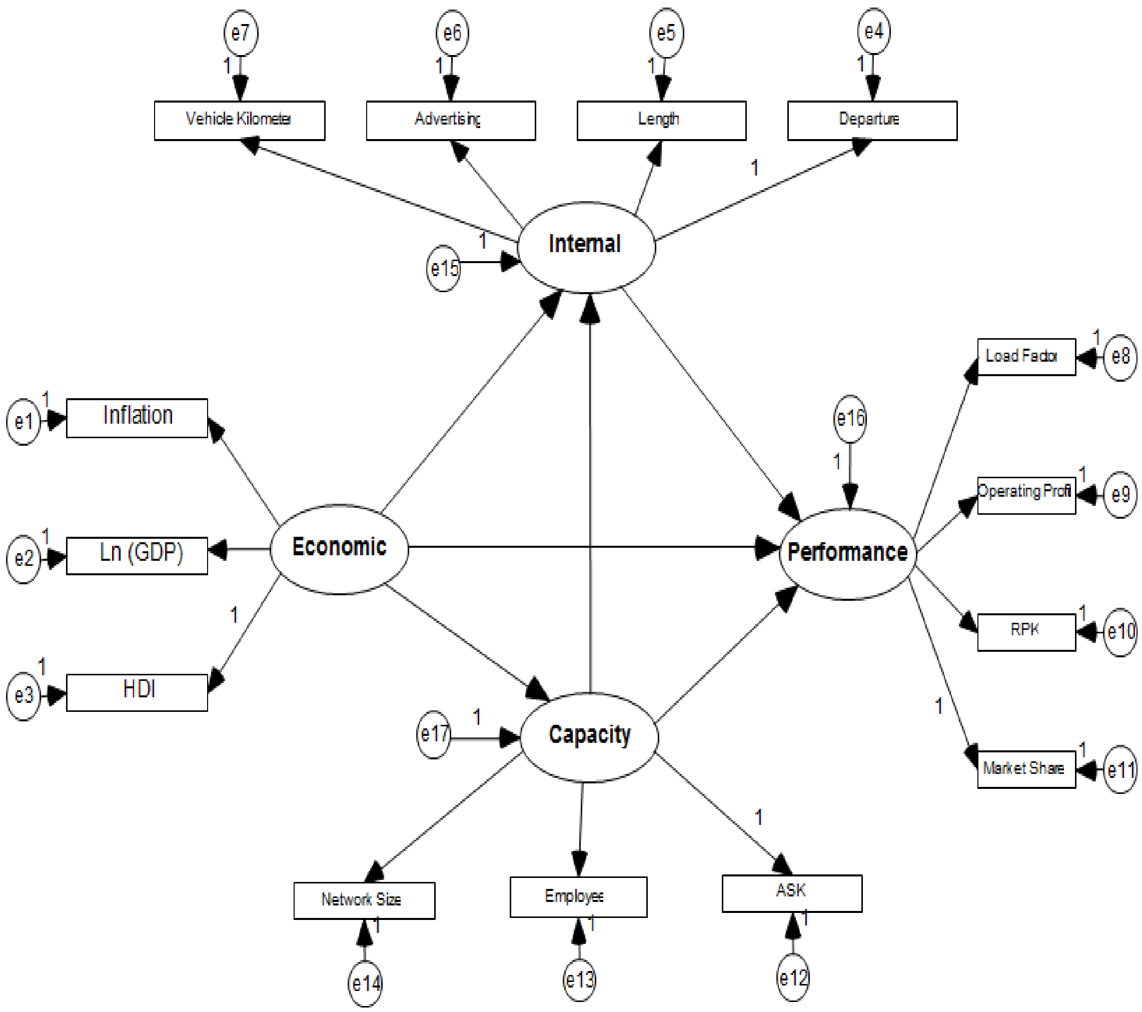


Figure 4.1: Path diagram research model (Source: Author)

The following types of variable are included in the above-mentioned model and used for the first objective:

Observed, endogenous variables form all 14 indicators; Inflation, Ln(GDP), HDI, Market Share, RPK, Departure, Length, Advertising, Vehicle Kilometres, Operating Profit, Load Factor, ASK, network size, and number of employees. Unobserved, endogenous variables include performance, internal operation, and capacity. Unobserved, exogenous variables include economic condition and error terms e1-e17. Therefore, as Table 4.5 illustrates, the observed variables amount to 14, unobserved variables equal 21, endogenous variables is 17, and exogenous variables amounts to 18.

Table 4.5: The structure of variables for performance model (Source: Author)

<u>Observed, endogenous variables</u>

Inflation	Operating Profit
Ln(GDP)	RPK
HDI	ASK
Departure	Network Size
Length	Number of Employee
Advertising	
Vehicle Kilometre	
Load Factor	
Market Share	

<u>Unobserved, exogenous variables</u>

e1-e17

Economic

<u>Unobserved, endogenous variables</u>

Internal Operation

Performance

capacity

Number of variables in the model:	35
Number of observed variables:	14
Number of unobserved variables:	21
Number of exogenous variables:	18
Number of endogenous variables:	17

In SEM analysis the covariance matrix for indicators constituted the input. In practice, although correlation and covariance matrices can be utilized as the input for SEM analysis, Kelloway (1998) believed that matrix of covariance is better. In AMOS software, the default of the package is the covariance matrix.

4.4.2 Correlation Analysis

In SEM, the first step after introducing the model is to realize the relationship between these variables. This process includes investigation of the relationship between constructs or measurements and the interaction effects that may exist. Such relations for the underlying model are given in Appendix A. In connection with the result of Appendix A, it can be deduced that the correlation between all constructs are positive. Furthermore, it is seen that the correlation between the components of the pairs (performance, internal operation), (performance, capacity) and (capacity, internal operation) are, respectively, equal to 0.932, 0.872 and 0.836, which are of higher value compared to the others. The correlation among measurements and between constructs and measurements are all positive except the inflation rate, which has a negative relation with the rest.

Correlations can only describe the strength of linear relationships and the direction of the relationship among constructs. Further analysis using SEM is needed to be able to better understand the indirect, direct, and mediating impacts among constructs.

4.4.3 Measurement Model

AMOS's 16 maximum likelihood program was utilized to examine the hypothetical model proposed, as presented in Figure 4.2. One of the major characteristics of the approach of this structural equation model is flexibility in interplaying between data and theory, and its capability to bridge the gap between empirical and theoretical knowledge to better understand the realistic perception of the real world (Fornell and Larcker, 1981). This kind of analysis enables researchers to design modelling that is based upon both manifest and latent variables, a feature suitably fitting for the model that has been hypothesized, in which the major portion of the constructs are made up of abstractions composed of unobservable phenomena. Moreover, in SEM, measurement errors are considered as multiple-group comparisons and variables with multiple indicators.

As presented in Figure 4.2, the measurement model in the graphically designed structure diagram shows the existence of a relationship between the latent variables and their measurement. Figure 4.2 also presents the association that exists between a pair of latent variables. This information in connection with the measurement model includes: estimate of standardized regression weight, estimate of squared multiple correlation, and estimate of correlations.

The estimate of standardized regression weight is measurable between every latent variable and its measurement, for example, when the inflation rate increases by one standard deviation, the economic condition decreases by 0.62 of the standard deviation. The estimate of squared multiple correlation exists between the latent variables and their measurements, for instance, the predictors of market share are estimated to explain 88% of its variance. Conversely, the market share error variance is about 12% of the market share variance itself. The estimate of correlation is detectable between latent variables; for example, the correlation between internal operation and capacity is 0.83.

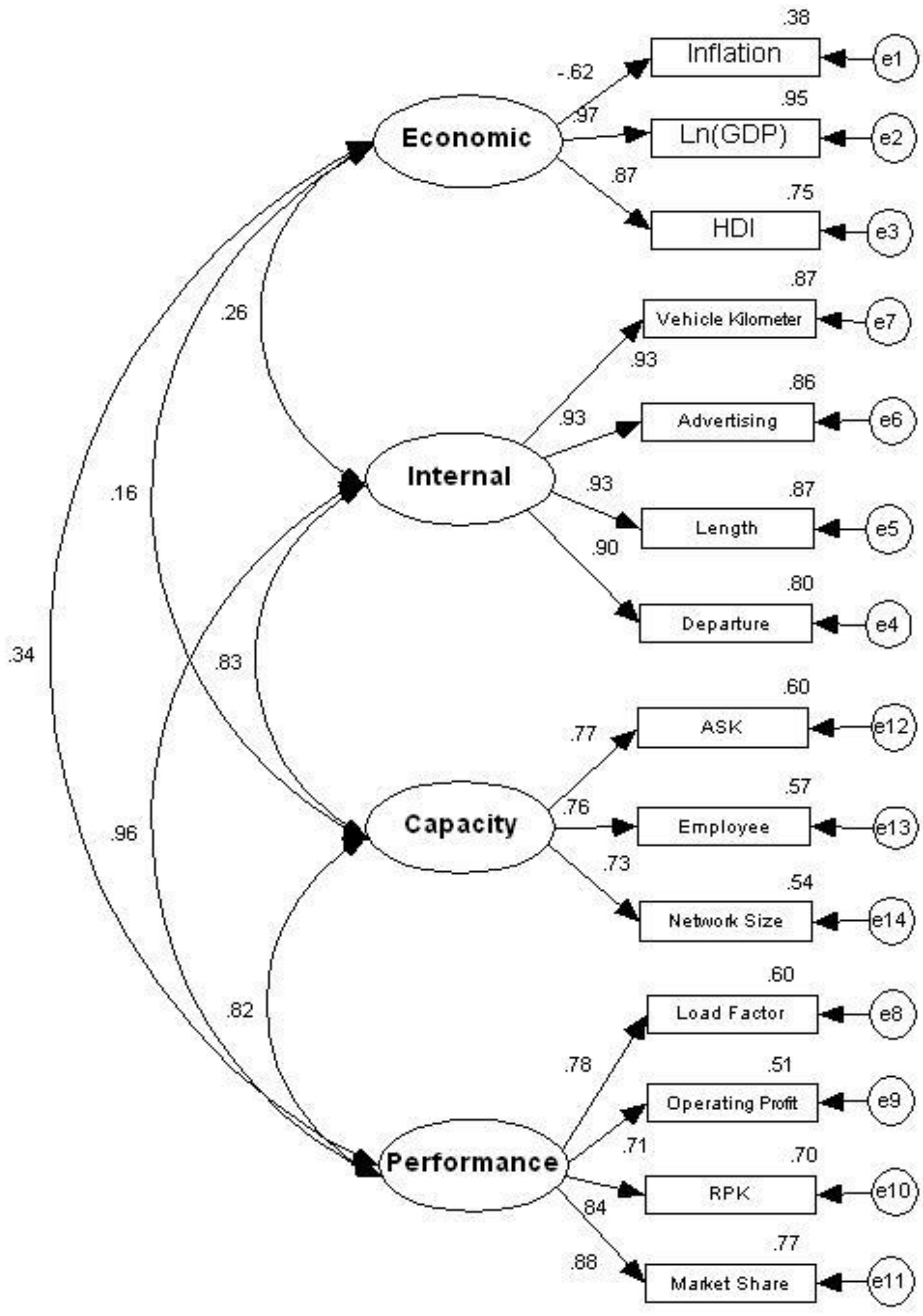


Figure 4.2: Measurement model (Source: Author)

4.4.4 Normality Testing for MLE

The employment of MLE in this study used the SEM procedure. The main essential assumption for the employment of MLE is that the data are required to follow normal distribution and the scale of observed variables need to have be continuous (Byrne, 2010). The normality testing that should be utilized in SEM is based on the value of skewness and kurtosis (Byrne, 2010).

Table 4.6: Normality test for performance model (Source: Author)

Variable	Skew	C.R.	Kurtosis	C. R.
HDI	.561	3.311	-.752	-2.220
Ln(GDP)	.133	.785	-1.418	-4.184
Network Size	.784	4.629	-.449	-1.325
Employee	.547	3.226	.566	1.670
ASK	-1.478	-8.723	1.053	2.978
Load Factor	.266	1.570	-1.007	-2.971
Operating Profit	1.052	6.208	.374	1.104
RPK	.875	5.166	-.319	-.941
Market Share	.355	2.098	-.395	-1.165
Vehicle Kilometre	.210	1.237	-1.186	-3.501
Advertising	.342	2.021	-.224	-.660
Length	-.527	-3.108	-.201	-.594
Departure	.662	3.907	-.352	-1.038
Inflation	1.088	6.420	.571	1.684

In case the absolute kurtosis value is less than 7 and the value of skewness is between -2 and +2, the endogenous variables normality will be acceptable (West et al., 1995, Byrne, 2010). As Table 4.6 displays, the variables kurtosis ranges between -1.418 and 1.053; the skewnessis between -1.478 and 1.088; the absolute value of kurtosis is less than 7 and the absolute value of skewness is less than 2; hence, the endogenous variables normality would be accepted. As a result, the MLE method was applied for the measurement model analysis.

4.4.5 Convergent validity

Three procedures have been proposed by Fornell and Larcker (1981) to evaluate the convergent validity of the measure in a research model, namely, reliability of measures, each construct’s composite reliability, and the Average Variance Extracted (AVE). An item’s reliability was assessed through the factor loading of that item onto the underlying construct. According to Hair et al. (2006), a factor loading of 0.7 indicates that the validity of an item is acceptable. The researcher has utilized the composite reliability in this study instead of Cronbach’s alpha since the latter one, as Hair et al. (2006) believe, has a strong tendency to understate the level of the reliability. Nunally and Bernstein (1994) recommended a value of 0.7 or higher for the composite reliability to be considered as adequate. For the third index of convergent validity, AVE, Fornell and Larcker (1981) suggested that it “measures the overall amount of variance that is attributed to the construct in relation to the amount of variance attributable to measurement error”. According to Segars (1997), convergent validity is considered as adequate if the AVE is 0.50 or higher. As illustrated in Table 4.7, all factor loadings were higher than the minimum and could meet the guidelines recommended by relevant researchers, with the exception of inflation rate. However, inflation rate can be included in data analysis due to its significant correlation (Teo, 2010) i.e., (r = -0.601), with other items, ln(GDP), in the same construct.

Table 4.7: Results of measurement model (Source: Author)

Latent Variable	Item	Factor Loading (>0.70)*	Average variance extract(>0.50)*	Composite reliability (>0.70)*
Airline Capacity			**0.57**	**0.71**
	ASK	0.77		
	Network Size	0.73		
	Number of Employee	0.76		
Airline Performance			**0.65**	**0.81**
	Load Factor	0.78		
	Market Share	0.88		
	RPK	0.84		
	Operating Profit	0.71		
Internal Operation			**0.85**	**0.88**
	Departure	0.90		
	ASL	0.93		
	Advertisement	0.93		
	Vehicle Kilometre	0.93		
Economic condition			**0.57**	**0.78**
	Inflation Rate	0.62		
	Ln(GDP)	0.97		
	HDI	0.87		

4.4.6 Discriminant Validity

Fornell et al. (1982) said "there is discriminant validity when the variance shared between a construct, and any other construct in the model is less than the variance that constructs shares with its indicators". The assessment of this relationship was carried out based on the comparison between the AVE square root for a construct and the correlations that relate that construct to other ones. When the AVEs' square roots for the off-diagonal elements in the columns and rows that correspond is bigger than the correlations that relate a construct to other constructs in a given model, it can be strongly claimed that the correlation between a construct and its indicators is stronger than the correlations between the other constructs available in the model. Table 4.8 shows replacement of the diagonal elements in the matrix of correlation with the AVEs' square roots. As the table conforms, discriminant validity seems to be quite satisfactory for all the constructs in the model.

Table 4.8: Discriminant validity test (Source: Author)

Factors	AVE	r^2			
		1	**2**	**3**	**4**
Economic condition	0.69	1			
Internal operation	0.85	0.068	1		
Capacity	0.57	0.025	0.532	1	
Performance	0.65	0.115	0.532	0.504	1

4.4.7 Confirmatory Factor Analysis

As mentioned earlier, CFA is one of the data analysis procedures applied to the measurement model. In CFA, the researchers attempt to identify the degree of model fitting and resolve the gap of the fitting model with modification indices (MI). In this regard, Kline (1998) suggests that researchers should report a minimum of four of the variable tests, which must be acceptable for and compatible with the fitting model. These tests include the chi-square, GFI, RFI, NFI, IFI, TLI, CFI, and RMSEA.

Table 4.9 clearly shows that only two of the statistics. i.e., CFI=0.904 and IFI=0.905, follow the model fitting, but as noted earlier, at least four model fitting tests are needed to be accepted. In order to solve this issue, modification indices can be used. Modification indices are used to create alternative models to improve fitting, however, they must be supplemented with sufficient reason based on theoretical justification (Garson, 2007). In addition, it should be minimized to avoid over-fitting in the research (Silvia and MacCallum, 1988).

Table 4.9: Model fitting test and modification indices (Source: Author)

Fit Index	Before MI	After MI	Critical (Acceptable) Value	Acceptability
Chi-square Fit (p-value)	0.000	0.000	>0.05	-
Goodness of fit index (GFI)	0.832	0.850	>0.9	-
Relative fit index (RFI)	0.848	0.871	>0.9	-
Normed fit index (NFI)	0.881	0.901	>0.9	+
Incremental fit index (IFI)	0.905	0.924	>0.9	+
Tucker Lewis index (TLI)	0.877	0.901	>0.9	+
Comparative fit index (CFI)	0.904	0.924	>0.9	+
Root Mean Square Error of Approximation (RMSEA)	0.132	0.118	<0.08	-

The results of the modification indices are displayed in Table 4.10. The maximum covariance belongs to e4 and e16, 38.983. However, the modification indices between the pair of errors, and between the errors and dependent variables should be taken into consideration. As shown in Figure 4.1 of the path model, e4 is the error term for the number of departures and e16 is the error term for the performance; therefore, the relationship between departure as a measurement and performance as a dependent latent variable for four measurements mentioned in the model structure is higher than the other relationships. Here, it can be strongly claimed that there is theoretical reason between internal operation and the related variables on residual e11.

Table 4.10: Modification Indices (Source: Author)

Relationship	M.I.
e14 <--> e16	24.783
e12 <--> e16	13.757
e10 <--> e14	32.272
e10 <--> e8	13.107
e11 <--> e9	17.011
e4 <--> e16	38.983
e4 <--> e8	15.347
e4 <--> e11	29.569

There is an obvious relationship between the number of departures and market share or load factor. For further explanation it can be said that if the number of departures increases, the number of passengers will increase accordingly. As a result, the number of passengers carried by the airline in the network will be greater than before, and, hence, the market share of the airline will also increase. The findings of Duliba et al. (2001) also confirm this relationship with empirical data.

Therefore, any changes in the number of departures will result in changes in the market share (one of the performance's indicator) of the airline. Theoretically, these variables are interrelated, which means that there should be a connection between them, which is shown with a double arrow. After applying modification indices, they should be re-analysed for the model fitting. Therefore, as Table 4.9 shows, after using modification indices, the model fitted well.

4.4.8 Structural Model

After accepting the modified model of measurement, the next step is evaluation of the structural path model (Ho, 2006). Therefore, subsequent to testing the reliability, validity, normality, modification indices, and model fitting in CFA, structural modelling procedure should be used for estimating coefficients, examining internal operation and capacity as mediator, and testing firm age as a moderator in the research model. Therefore, path analysis with the mediator and moderator factor is utilized for data analysis in this part of the current study. Figure 4.3 displays the outcomes of the full structured path model with standardized parameters. The relationship between one predictor, i.e., economic condition as independent variable, internal operation and airline capacity as mediators, firm age as moderator, and performance as dependent variable are determined by the proposed model. Fourteen indicators and four latent variables have been accepted in CFA.

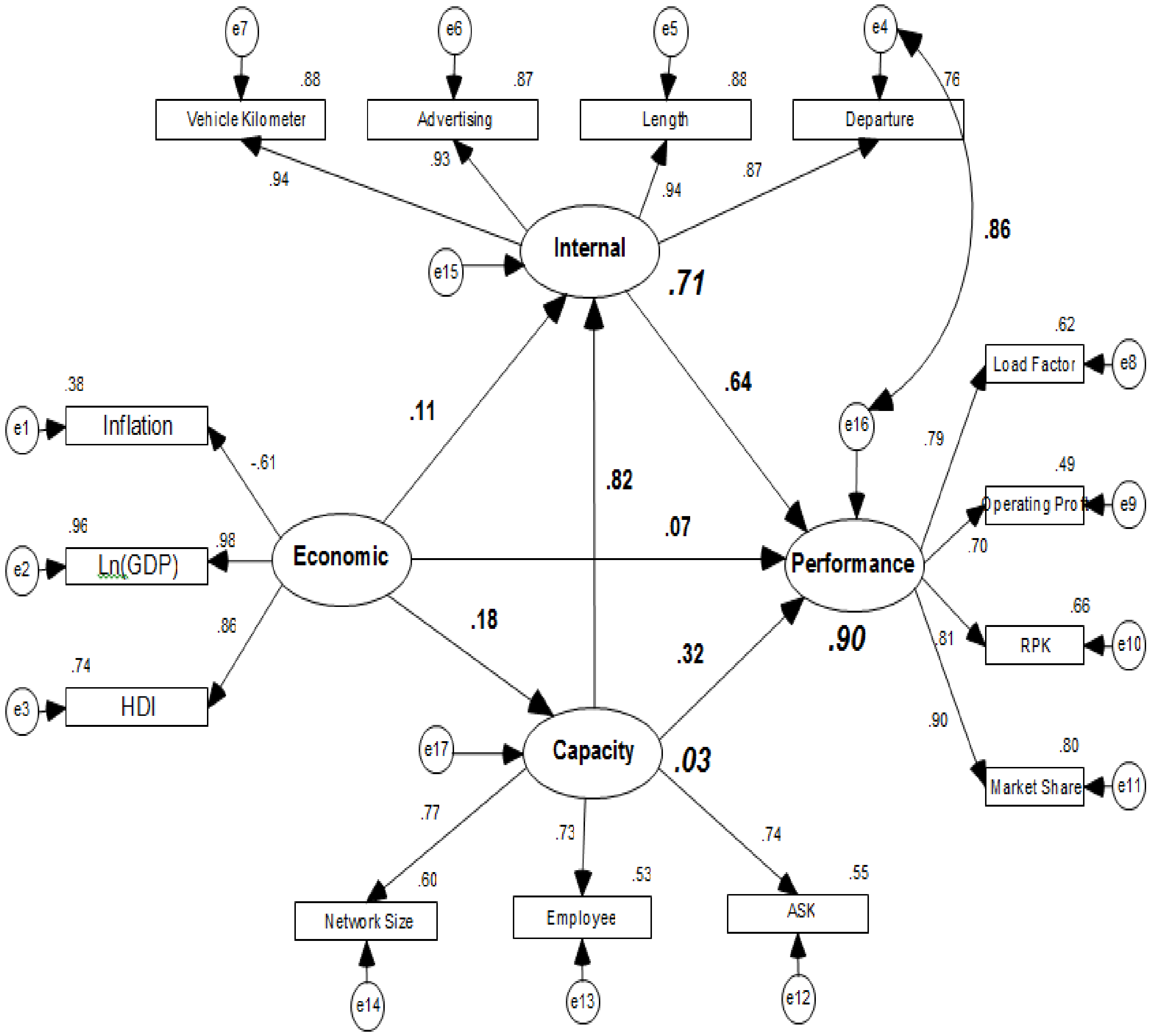


Figure 4.3: Structural model (Source: Author)

Figure 4.3 shows that the economic condition is an exogenous upstream and an independent unobservable variable, which has three indicators. The standardized regression weight estimate for inflation rate has lowest factor loading equalling -0.61, i.e., when the economic condition increases by one standard deviation, the inflation rate decreases by 0.61 standard deviation. Therefore, there is a significant negative relationship between the inflation rate and economic condition. This value for ln(GDP) is 0.98 with a high factor loading. The economic condition is the independent variable for performance, internal operation, and capacity. The estimated value of standardized regression weight to performance is 0.07, to internal operation is 0.11, and to capacity is 0.18. Therefore, economic condition has a direct effect on capacity and internal operation, but a direct and indirect effect on performance. The internal operation is an endogenous downstream and mediator with four measurements, whose standardized regression weight estimate for measurements range between 0.87 and 0.94. However, in the integrated model, internal operation depends on the economic condition and airline capacity and can be treated as a dependent variable. Furthermore, the estimated value of square multiple correlations is 0.71. It plays the role of a mediator between performance and economic condition and the standardized regression weight estimate over performance is 0.64. Capacity is an endogenous downstream and mediator between economic condition and performance. This construct has three indicators whose estimated value ranges between 0.73 and 0.77. Performance is an endogenous downstream and dependent variable, which has four measurements and the standardized regression weight estimate, ranges between 0.70 and 0.90. The estimated value of standardized regression weight for performance is 0.90 respectively.

Table 4.11 shows a comparison of the direct effects among the various constructs of the research model. Economic condition, as an initial and independent variable, has a significant effect on internal operation and performance and airline capacity; however, the impact of economic condition on airline capacity is larger than the internal operation and performance.

It needs to be noted that in SEM, in order to compare the strength of the effect between two direct relations, one needs to use Critical Ratio (C.R). and the larger the C.R., the stronger the effect. For example, the value of standardized regression weight for Economic condition→ Performance equals β 1= 0.07 and also C.R (β_1) = 2.179. But, these two values for Economic condition→ Internal operation equals β_2= 0.11 and C.R. (β_2) = 2.055. Therefore, it can be seen that $\beta_1 < \beta_2$ but C.R.(β_1) > C.R. (β_2). Finally, it may be concluded that the value of standardized regression weight is not a suitable criteria for this comparison, while C.R. can be used instead. Although the construct of airline capacity has a direct and significant effect on internal operation and performance, the strength of this effect is larger on internal operation than performance. Consequently, internal operation has a significant positive and effect on performance.

Table 4.11: Parameter estimated of direct effects in the research model

(Source: Author)

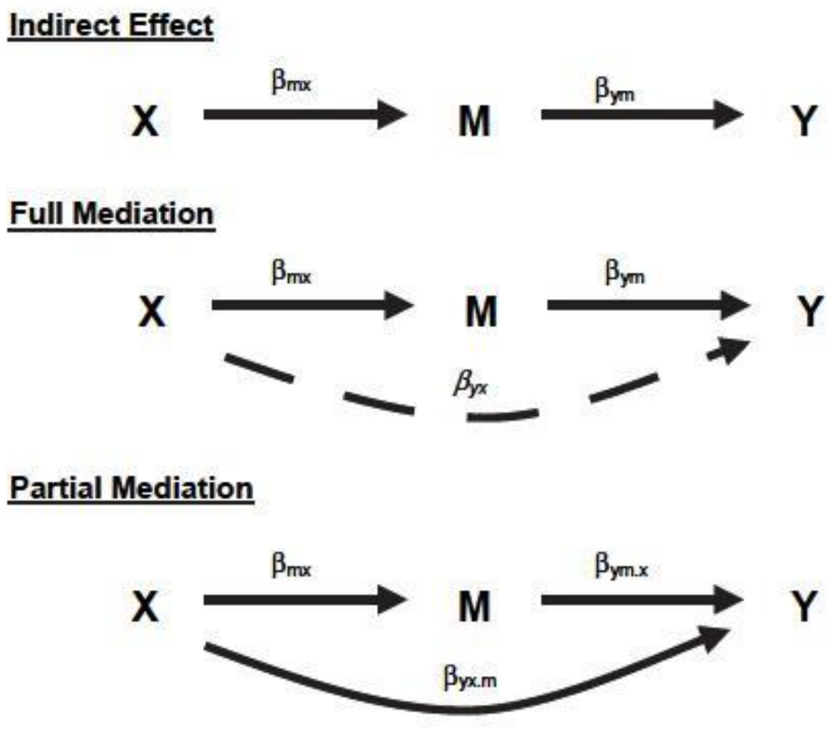
Path	Standardized coefficient	C. R.	p-value
Economic condition → Airline Capacity	0.18	2.216	<0.05
Economic condition → Performance	0.07	2.197	<0.05
Economic condition → Internal operation	0.11	2.055	<0.05
Airline Capacity → Internal operation	0.82	9.655	<0.01
Airline Capacity → Performance	0.32	3.254	<0.01
Internal operation→ Performance	0.64	7.415	<0.01

Airline capacity and internal operation are mediators between economic condition and performance. Therefore, there are three cases that should be taken into consideration regarding mediating of capacity and internal operation according to the first objective, which will be discussed in the following section.

Mediation Analysis

The main purpose of this study is to determine the relationship between the four constructs that are presented in this section. When a mediator exists between two variables or two constructs, relations may be categorized as follows:

Phase 1: When the effects of X on M and M on Y are both significant but there is no relation between X and Y; this is called the indirect effect model. Phase 2: When the effects of X on M and M on Y are both significant but there is no significant relation between X and Y, although there is an interaction. The full mediation model could be identified for this case. Phase 3: When all the effects of X on M, M on Y and interactions are significant, the partial mediation model could be designated.



Based on the above analysis, one should consider the following procedures. In the first step, the effects of X on M and M on Y should be checked for significance. Afterwards, the indirect effect is compared to the mediation effect when the validity of the first step is trusted. When the mediation effect is accepted it is necessary to study partial and full mediations. According to Table 4.11, the effect of economic condition on both internal and airline capacity is significant and in this stage we should test for indirect versus mediation.

The hypothesized model displayed in Table 4.12 can be categorized into two types, namely: 1) model with mediator latent variable, comprising all four identified latent variables, and 2) indirect model, in which economic condition, which is linked to airline performance by direct paths, is not estimated. The behaviour of the determined model is like a nested model with different degrees of freedom, whose goodness of fit is completely comparable to that of multi-modelling analysis.

Table 4.12 compares the mediation and indirect path in the defined path model. Some statistics, such as baseline comparison for model fitting (NFI, IFI, RFI, TLI, and CFI), RMSEA, and chi-square goodness-of-fit are included in the table. The chi-square statistics for both path models, mediation and indirect, are not statistically significant. The baseline comparison suits NFI, IFI, TLI, and CFI indices for the mediation and indirect model above 0.9, and the range between 0.899-0.932 (.899≈.900). Then, according to Ho (2006), the value of statistics, which is based on sampling, shows improvements in both models' fit associated with the null model. Therefore, as mentioned earlier, at least four of the statistical values, i.e., Chi-square, NFI, IFI, TLI, CFI, and RMSEA are significant (Kline, 2010), which means the model fitting for direct and mediation models has been satisfied.

Table 4.12: Model fitting and model comparison statistics between mediation and indirect model (Source: Author)

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Mediation	35	271.673	70	<0.001	3.881
Indirect	34	276.507	71	<0.001	3.894

Baseline Comparisons

Model	NFI	RFI	IFI	TLI	CFI
Mediation	0.901	0.871	0.925	0.901	0.924
Indirect	0.899	0.871	0.923	0.901	0.922

RMSEA

Model	RMSEA	LO 90	HI 90
Mediation	0.118	0.103	0.133
Indirect	0.118	0.104	0.133

Nested Model Comparisons

Assuming model Mediation to be correct

Model	DF	CMIN	P	NFI	IFI	RFI	TLI
Indirect	1	4.835	0.028	0.002	0.002	0.000	0.000

In addition, Table 4.12 compares the mediation and indirect models in which, based on CMIN statistics, the indirect model hypothesis in comparison to mediation model is rejected. Therefore, the indirect indicator acts as a mediator between construct economic condition and performance. However, the results reported in Table 4.13 support path analysis confirming each construct's direct, indirect, and total effects. Analysis provides sufficient support for the existence of a direct and significant effect of economic condition as well as performance, i.e., β = 0.07, C.R. = 2.197, $p < .05$ (see Table 4.11), and existence of indirect effect which is 0.22 (see Table 4.13). As displayed in Figure 4.3, the indirect effect is significant (Mathieu and Taylor, 2006) and bigger (Jiménez-Jiménez and Sanz-Valle, 2010) in comparison to the direct effect. Considering these points, it can be confirmed that internal operation and airline capacity act as partial mediations in the relationship between economic condition and performance in the research model.

When path analysis is done, the performance will be affected by economic condition through internal operation and airline capacity. Therefore, internal operation and airline capacity are believed to play the role of a significant mediator between economic condition and airline performance. This model, in comparison to the previous studies, is a completely new model, because economic condition is considered as essential input, based on which, airlines are expected to exercise internal operation and airline capacity effectively to be able to enhance the overall performance of the company.

Table 4.13: Direct, indirect, and total effects of the research model
(Source: Author)

Outcome	Input	Standardized estimates		
		Direct	Indirect	Total
Internal operation				
	Economic condition	0.11	-	0.11
Airline capacity				
	Economic condition	0.18	-	0.18
Performance				
(R^2= .90)	Economic condition	0.07	0.22	0.29
	Airline capacity	0.32	0.52	0.84
	Internal operation	0.64	-	0.64

Moderation Analysis

To be able to effectively and deeply focus on the relationships between the constructs in the research model, it is necessary to first analyse the possible moderating effect of firm age on these relationships.

The fourth objective state is the moderating effect of firm age in the airline performance model. In order to examine these effects, the SEM two-group comparison was used in this research. Based on the median value of firm age (median=21), the samples are classified into two categories along with the firm age levels median. The higher age level firms are classified in one group and the firms of lower age level are contained in the other group. A two-group comparison is included in the analysis to investigate the existence or lack of any differences detectable in the structural parameters that might exist between the low and high values of the variables. The hypothesized relationship parameters should be constrained in the first step to be equal. However, the parameters are not constrained in the second step. In case two tests contain the significant differences, i.e., chi-square difference, the studied relationship is moderated by the variable employed for splitting the sample. In order to test firm age differences among the regression weights, the critical ratio (C.R.) test ($> \pm 1.96$, $p < .05$) can be utilized to achieve the critical ratio statistics for the differences among regression weights of higher and lower age subjects (Ho, 2006). According to Arbuckle and Wothke (1999), the critical ratio of an estimate pair tests the hypothesis to confirm the equality of the two parameters. This method in the analysis is repeated to investigate the possible moderating effects in the six relationships between the constructs for the research model (see Table 4.11).

Figure 4.4 and Figure 4.5 show the structural model for two cases of higher and lower age companies in the airline industry. The direct and indirect effects of these two groups are given in Table 4.14.

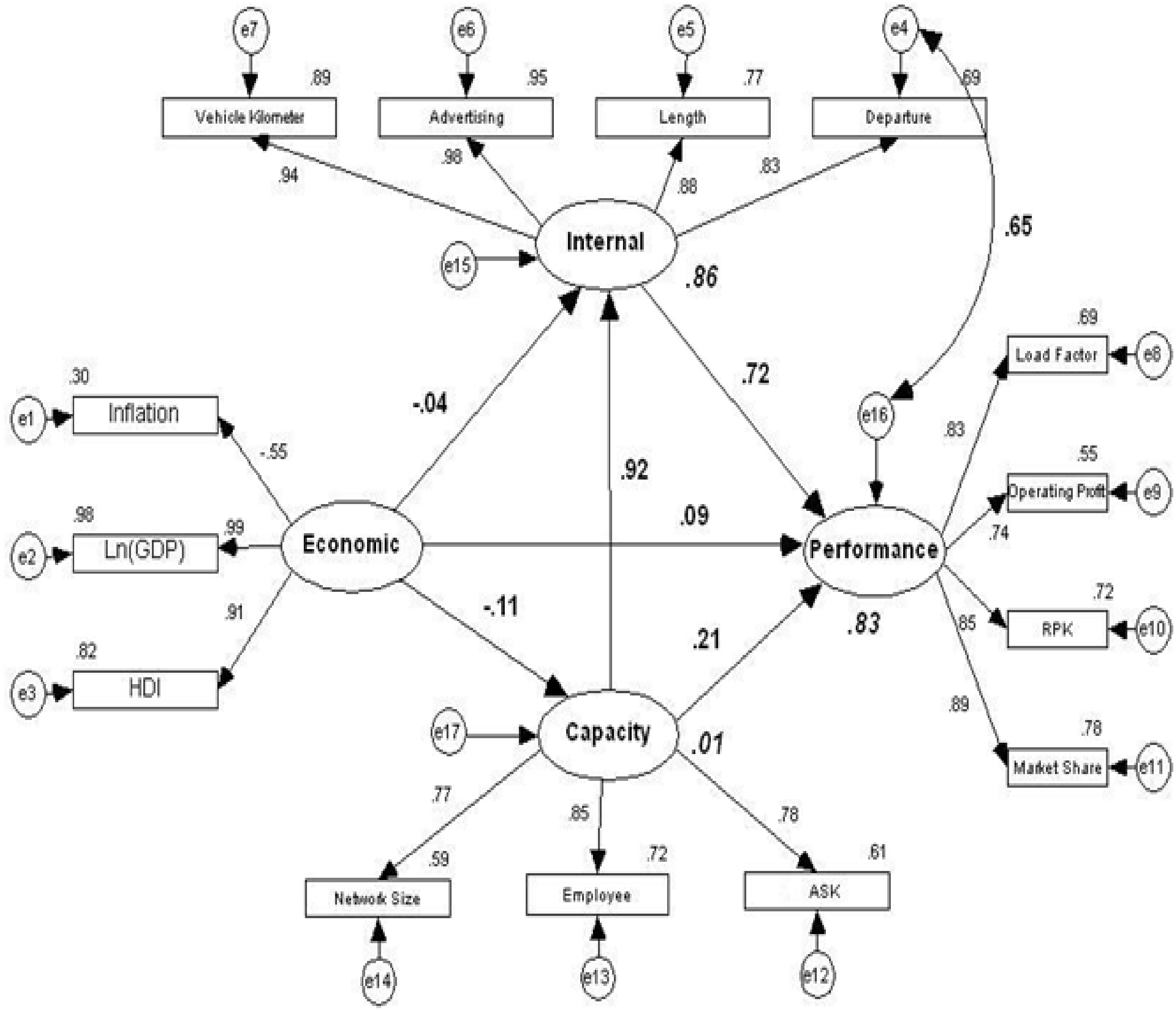


Figure 4.4: The structural model for airline with lower age (Source: Author)

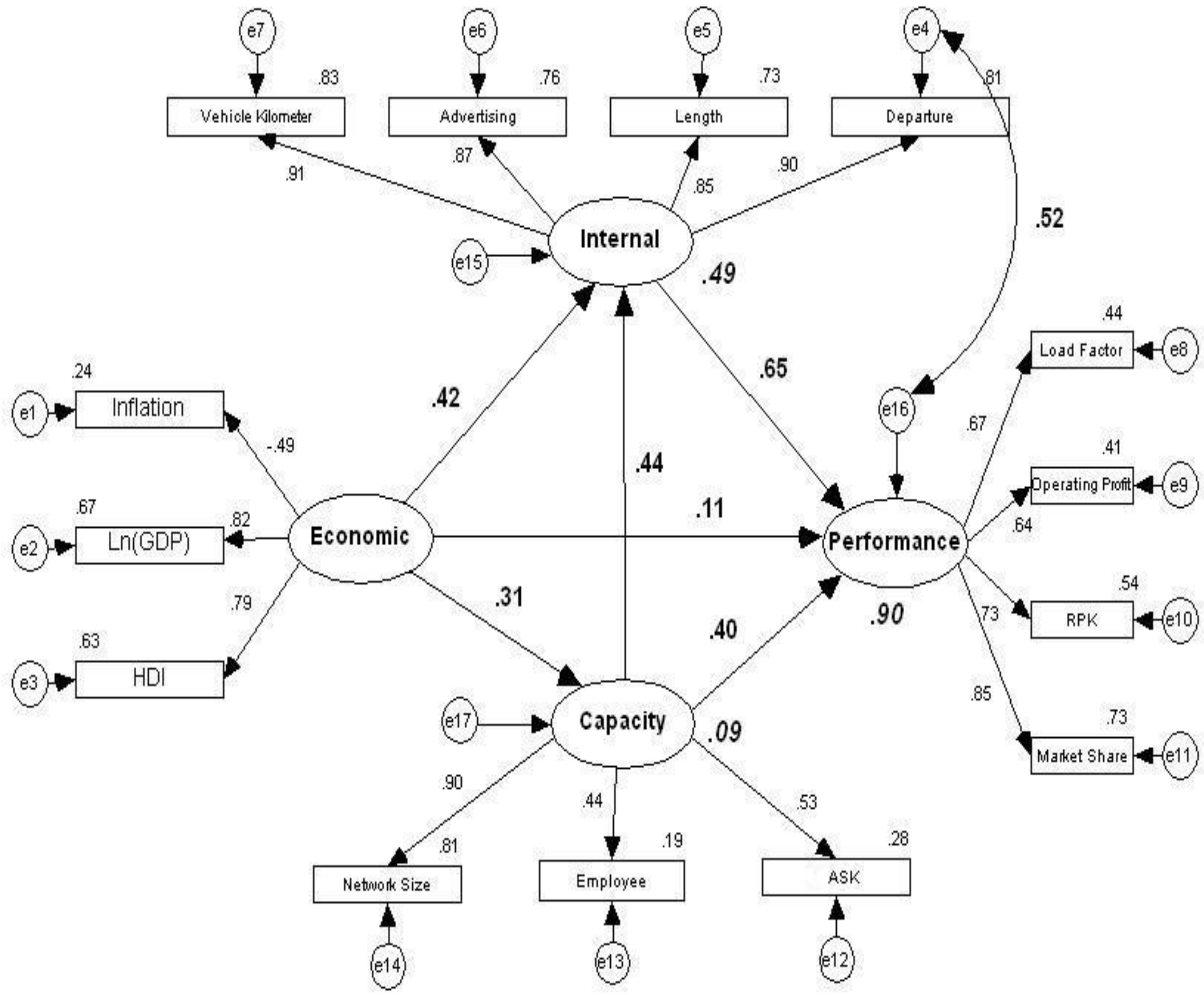


Figure 4.5: The structural model for airline with higher age (Source: Author)

It can be concluded that for younger companies, there is no significant relation for economic condition on internal operation and capacity. However there is a strong relation between economic condition and performance. Further, significant relations are seen for both capacity on internal operation and performance. Finally, no significant relationship between airline capacity and performance exists. Overall, it can be deduced that in lower age companies, although economic condition has a significant impact on performance, it does not affect both internal and capacity constructs. The relations between three constructs performance, internal and capacity are all indirect, i.e. capacity has a significant impact on internal operation and internal operation on performance. It should be noticed that the proposed model is absolutely different for higher age companies. In all relations between constructs, only the one between economic and performance is not significant. Therefore, economic condition has an indirect impact on performance through internal and capacity.

Table 4.14: Direct, indirect, and total effects based on the moderator (Source: Author)

Lower Age				
Outcome		Standardized estimates		
Internal operation		Direct	Indirect	Total
	Economic condition	-0.04	-	-0.04
Airline capacity				
	Economic condition	-0.11	-	-0.11
Performance				
(R^2= 0.83)	Economic condition	0.09	-0.125	-0.035
	Airline capacity	0.21	0.66	0.87
	Internal operation	0.72	-	0.72
Higher Age				
Outcome		Standardized estimates		
Internal operation		Direct	Indirect	Total
	Economic condition	0.42	-	0.42
Airline capacity				
	Economic condition	0.31	-	0.31
Performance				
(R^2= 0.90)	Economic condition	0.11	0.49	0.60
	Airline capacity	0.40	0.29	0.69
	Internal operation	0.65	-	0.65

Analysis of the above represents some differences between the performance model in lower and higher age companies. Table 4.15 gives quite strong proofs of our assertions. In the present model, there seems to be a significant difference in the relationship between economic condition and airline capacity, economic condition and internal operation, and, finally, between airline capacity and performance.

Table 4.15: Moderating test for research model (Source: Author)

Path	Overall model	Firm age Low	Firm age High	C.R.
Economic condition → Airline Capacity	0.18	-0.11	0.31	2.380*
Economic condition → Performance	0.07	0.09	0.11	1.128
Economic condition → Internal operation	0.11	-0.04	0.42	4.132**
Airline Capacity → Internal operation	0.82	0.92	0.44	0.579
Airline Capacity → Performance	0.32	0.21	0.40	2.344*
Internal operation → Performance	0.64	0.72	0.65	0.925

*P < 0.05; **P < 0.01, ***P < .001

4.5 Overall View of the Analysis Results

The data required for this research were collected from 209 airline companies based on their annual reports in 2009. The main aim of the study was to define a conceptual framework to show all the relationships that exist between determined measures and the indicators. For this purpose, the technique of SEM was employed to calculate in a single test the degree of validity of the structural and the measurement models. For statistical analysis, two programs – AMOS 16 and SPSS 18 – were utilized.

As the analysis results confirm, all Cronbach alpha values were well over 0.7, which is the minimum level recommended by Nunally (1978) (see Table 4.7). Therefore, all factor loadings for the indicators of latent variables were significant, i.e., $\alpha = 0.05$ (see Figure 4.2). Furthermore, each construct's goodness of fit indices fell within the ranges recommended by Kline (1998) (see Tables 4.9 and 4.10).

The research model dealt with the impacts of the determined measures of performance based on financial and non-financial indicators. The effects produced by each variable on each perspective of organizational performance of a company were presented in graphical relationships. As mentioned earlier in this chapter in Tables 4.9 and 4.10, the goodness of fitness indices for both models were quite satisfactory. The firm age of companies influences the relationships between some constructs in the performance model (see Table 4.15).

CHAPTER 5

DISCUSSION AND CONCLUSION

5.1 Introduction

After 11 September 2001, which led to a sharp decline in airline performance, airline companies were able to reach the desired level. This trend continued until 2008 (Figure 1.1). However, in 2009 a sharp decline in the airline companies' performance indicators is detectable. Revenue passenger kilometre in America, for example, decreased by 5.3%, by 4.5% in Europe, and 6.5% in Asia Pacific. Even other indicators, such as available seat kilometre faced 6.3%, 4.2%, 6.1% decrease in US, Europe, and Asia (Table 4.2). This decrease is also detectable in other parameters, such as load factor and number of passengers.

The topic of a collaborative relationship between economic condition and performance in the airline industry seems to suffer from a serious lack of sufficient and comprehensive research. In order to cover the existing gaps, the present study focuses on estimating the fit of the model for the airline industry to explore the effects of the indicators on performance in global airlines.

The literature reviewed in this study is selected from a variety of relevant sources that contain data on the airline industry, its global status, and the models and variables mentioned and discussed throughout the thesis. The performance of global airlines required a review of the past studies on the same or similar topics. The researcher has done his best to embed the literature in the discussions that have the closest relevance to avoid any distractions or deviations from the main discussion, which focused on performance models based on SEM and the constructs and variables of the aforementioned performance model.

The main structure SEM is similar to multiple regression, and includes multiple dependent and independent variables, however, SEM acts in a stronger and more effective way by taking into consideration the modelling of correlated error terms, interactions, nonlinearities, correlated independents, measurement error, one or more latent dependent variables with multiple indicators, and multiple latent independent variables, which are measured by multiple indicators. The SEM method can be utilized as a stronger and more effective option for path analysis, factor analysis, multiple regression, analysis of covariance, and time series method (ISIk, 2009). This means that these procedures are possible for consideration as specific cases of SEM, in other words, SEM can be considered as an extension of the earlier model known as generalized linear modelling (GLM), which has multiple regression as a part of itself.

In comparison to modelling based on regression, one of the most essential superiorities of SEM is its more flexible assumptions. The application of analysis of confirmatory factor to decrease the number of measurement errors through the ability to examine models with multiple dependent variables, the capacity to model error terms, the attraction of SEM's graphical modelling interface, multiple factors per unobservable variable, the desirability of overall testing models instead of coefficients individually, the capability to test coefficients across multiple between-subjects groups, the ability to model interrelating variables instead of being restricted to an additive model, and the ability to control more difficult data (non-normal data, incomplete data, time series analysis with auto-correlated errors). Furthermore, if the susceptibility of regression to interpretation error by misspecification is high, comparison alternative models to evaluate relative fitting model by strategy of the SEM will render it more robust.

Hair et al. (2006) believed that SEM, in comparison with other kinds of analysis methods of multivariate-data, possesses three significant features which distinguishes it from other models. These distinct characteristics are:

- SEM is capable of estimating interrelated and multiple dependence relationships;
- SEM is capable of characterizing unobserved conception in these relationships as well as correcting the errors in measurement throughout the procedure of estimation;
- SEM can define a model through explanation of the entire set of relationships.

Different kinds of structural equation models (SEM) need to meet certain requirements since if a model fails to meet the relevant identification requirements, any attempt to its estimation may end up in failure. For estimation of a model, there are several methods, some of which are frequently used methods, such as maximum likelihood (ML), asymptotically distribution free (ADF) estimator, generalized least squares (GLS), and robust statistics.

The maximum likelihood method expresses the statistical principle that underlies the parameter estimates derivation: the estimates maximize the likelihood, i.e., the continuous generalization that the population data, i.e., the observed covariances, were extracted from. This means that maximum likelihood estimators maximize the likelihood of a sample that is actually observed (Winer et al., 1991). It is considered as a normality method since maximum likelihood estimation assumes the distribution of statistical population for the endogenous indicators to be normal. Other techniques are based on a variety of parameter estimation theories but are not presently employed as often as before. In effect, the employment of an estimation method other than maximum likelihood needs explicit justification (Kline, 1998).

5.2 Summary of the Findings

Four constructs have been used in the research models (Figure 4.2). The initial construct, economic condition, includes inflation rate, ln(GDP) and HDI.
Except inflation rate, the other two indicators in this construct have high factor loading (bigger than 0.7), however, the measure of inflation rate, has a significant relationship with ln(GDP) in the same construct. Therefore, all of the measures should be considered in the economic condition construct.

The relationship between economic condition and ln(GDP) and HDI is significant and positive; however, it has a significant negative relationship with inflation rate. In addition, in such a relationship, the absolute value of standard coefficients for HDI (0.87) and ln(GDP) (0.97) are greater than that of inflation rate (0.62). Therefore, the impact of the HDI and ln(GDP) indicators on the economic condition is higher. An increase of one unit in the values of inflation rate, i.e., in the rate of HDI and ln(GDP), results in an increase in the economic condition value by 1.22 (0.87+0.97-0.62) units. Therefore, it can be claimed that the economic condition as an external factor has a strong positive effect on internal operation.

The construct of internal operation is the second construct of research model that contains four measurements including the number of departures, average stage length, advertising, and vehicle kilometres. As illustrated in Figure 4.2, the values of factor loading of the variable are over 0.7. Therefore, the relationship between them and the internal operation construct is significant. Airline capacity is the third construct of the research model and includes network size, available seat kilometre, and employee. Available seat kilometre has the most significant effect on airline capacity with a 0.77 factor loading. The fourth construct is performance, which, as explained before, is a combination of financial and non-financial variables. The indicators of this construct also have factor loadings with the values higher than 0.7, as a result of which, none of them were eliminated from the performance construct and were present in the model analysis. Two of the indicators of this construct, i.e., market share have the highest effect (0.88), and revenue passenger kilometre possesses the next position with (0.84) of factor loading.

Based on the given conclusions above, all construct measures should remain in the model. Then, by implementing a confirmatory factor analysis and modification indices, the final model is demonstrated Figure 4.3. Based on the results of Table 4.11, it can be concluded that the relationship between the variables are all significant and that the airline capacity construct has the most impact on internal operation following by the effect of internal operation on performance. In the second step, we compare mediation with indirect effect. Referring to Table 4.12, the K-square test is equal to CMIN=4.835 (p=0.028), which means that the indirect effect is not significant and therefore mediation is selected. Furthermore, using Table 4.13, the indirect effect of economic condition over performance is significant (0.22) and greater than the direct effect (0.07), thus the underlying model performs as partial mediation, i.e., both airline capacity and internal operation constructs are in relation to economic condition and performance by partial mediators.

In the next part of data analysis, the researcher seeks to prove that a company’s earlier experiences in the relevant actions can contribute to the effective management and control of the performance. It is also sought to determine how the relationships among constructs are affected by the company's experiences. Therefore, the variable of firm age is defined as a moderator whose impact on relations between the constructs of research model has been investigated. According to Table 4.15, the impact of the firm age variable on the three relationships among two constructs including economic condition on airline capacity, economic condition on internal operation, and airline capacity on performance, is significant. Therefore, it can be concluded that the firm age acts as a moderator in the relationship among economic condition, internal operation, airline capacity, and performance.

5.3 Discussion of Findings

There have been many studies on the assessment of performance, most of which have focused on internal operation which they have considered as independent variables. Other researchers have also used external indicators, or economic condition, in addition to the internal operation, to study the factors that influence performance. In these studies, all the indicators have been used as one or multiple measures. In the discussions on performance in various studies, different kinds of performance factors have been introduced separately in distinct models. Revenue passenger kilometre and load factor, for example, which are considered as performance indicators in various studies, have been assessed by two different methods, each having different coefficients of independent variables. Also, in examination of the factors affecting the performance indicators, indicators, such as GDP or inflation rate, have been separate as two distinct measurements. However, these models have not been able to assess the overall performance. Furthermore, they have not been able to answer how economic condition (GDP, inflation rate, and HDI) affects the performance of airline companies.

5.3.1 Contribution of the Thesis

The first contribution of the present study is its use of constructs instead of the observed factors in performance and economic and internal variables. In other words, it uses latent variables instead of measured variables since each latent variable or construct contains several observed indicators. Therefore, for this part, four constructs have been introduced, of which the first one is economic variable instead of GDP and inflation rate, which have been used separately in the past studies. The second contribution of this research is the use of another important indicator called HDI as economic variable, in which all three measures have been considered as one construct as economic condition. The second and third constructs are known as internal operation and performance, respectively, and these measurements were used in a study by Duliba et al. (2001).

The third contribution of this research is the application of the airline capacity construct to examine the influential factors affecting airline performance. The measures of this construct have been used according to the factors affecting the organizational capacity of the Lusthaus et al. (1995) and Lusthaus (2002). Based on the definitions presented in the research, airline capacity variables have been defined for the airline industry, including available seat kilometre, number of employees, and network size, which have been applied as measures of this construct.

The findings of this study provide additional evidence for earlier studies that supported that the internal variables, such as flight numbers and flight hours, have a significant impact on the performance with the exception that the present study accepts existence of significant relationships among the constructs. Moreover, economic condition, as stated in studies by Chin and Tay (2001), Jenatabadi and Ismail (2007), and Aderamo (2010) have a significant impact on performance, which is also supported by the current research. In addition, the value of R^2, known as the model relationship, is 0.90 (Figure 4.3). In other words, 90% of the changes, a very high percentage, that occur in performance depend on the internal operation, capacity, and economic condition.

The findings of this research also show that economic condition has a significant effect on airline capacity. This impact is stronger than the effect of the economic condition on performance (Table 4.11). Therefore, economic condition influences the performance directly or indirectly. In direct mode, the economic condition affects the performance of a company without having any impact on its airline capacity. Airline companies have no ability to modify or control this influence. As an example, if the incomes increase, the willingness of people to travel will also increase accordingly. In such a case, the economic variables have a positive effect on the enhancement of performance. However, if the inflation rate goes up, the tendency of people to travel by air will also slump, finally leading to a cutback in the number of flights and a reduction of overall performance of the company.

Another mode of the effect of economic condition on performance is the indirect way in which with any changes in economic conditions, or economic variables, company managers seek to find and apply strategies within the abilities and capacities of the company. Through some of these strategies, such as changes in specific programmes and schedules, like number of flights or changing the long distance destinations and routes to the short distance ones, or vice versa, or through various advertisements and promotions, the airline companies can control their performance. These changes primarily affect the internal operation and capacity of the company, and, consequently, the internal operation and airline capacity alter the level of performance. Therefore, the fourth contribution of this research is the investigation of the direct and indirect effects of the economic variables in a model. Based on the results presented in Table 4.13, it can be claimed that internal operation and airline capacity act as two mediators between the economic condition and performance, while in other studies they have been considered as independent variables. Thus, according to this pattern, airline executives can plan for an increase or control of performance concurrently. If the objective is the enhancement of performance, managers should take the economic condition into consideration. By analysis of the economic condition, they can make changes in the measurements of the internal operation and airline capacity, which, consequently, results in an increase in performance. As mentioned in the results of this study in Section 4.4.8, the effect of the internal operation on performance is higher than the effect of the economic condition on performance and the effect of the economic condition on the internal operation. In addition, the coefficient of the effect of the airline capacity on performance is higher than the effect of the economic condition on performance and the effect of the economic condition on airline capacity.

Furthermore, airline capacity has a vital and significant effect on the internal operation. Thus managers can handle direct and indirect impact on performance by taking control of airline capacity. Such a direct impact means that by increasing the network size, it is possible to control more airway routes, and, subsequently, an increase in the number of passengers in this competing world. It is common that passengers look for companies with vast capability of transferring to different parts of the world, because it improves the ability of the passengers to select routes. Moreover, increasing in the number of crew and personnel in the airport enhances comfort and acquiescence of passengers, which may increase the number of passengers. The indirect impact of airline capacity on performance is in a way that by increasing the number of cabin and cockpit crew, network size and available seat kilometre , the number of flights increases. This point is shown in Figure 4.3 and has a great effect on the performance of airline companies. These conclusions arise from the fact that the associated factor loading of the number of flights with internal operation is high. Moreover, based on the modification indices of model fitting it has a strong relation with performance. Therefore, the fifth contribution of this study is the use of airline capacity that can have a direct and indirect significant effect on performance.

The fourth objective seeks to examine the effect of the firm age variable, which indicates the company's experience on the relationships defined in the airline performance model. Some studies focus on the impact of firm age on the relationships between variables or constructs and organizational performance (Tam and Tan, 2007, Lubatkin et al., 2006, Wagner, 2011, Pribadi and Kanai, 2011). This research, as its sixth contribution, attempts to investigate the role of firm age in the relationship between the four constructs. Therefore, the purpose of this part of the study is to examine the role of firm age as a moderator in the relationship among the constructs in the research models.

Now, the models of lower age and higher age companies are compared. In younger companies, no significant relationship between the economic condition construct, internal operation and capacity exists, but it has a positive significant relation on performance. Also airline capacity has a significant impact on internal operation but not on the performance. Finally, internal operation has a positive significant relation with performance. Thus, the context of being significant for the lower age companies (Figure 4.4) with the general model (Figure 4.3) is different. This means that performance is under the effect of three other constructs, it has direct and indirect relations, respectively, with economic condition and capacity (Figure 5.1).

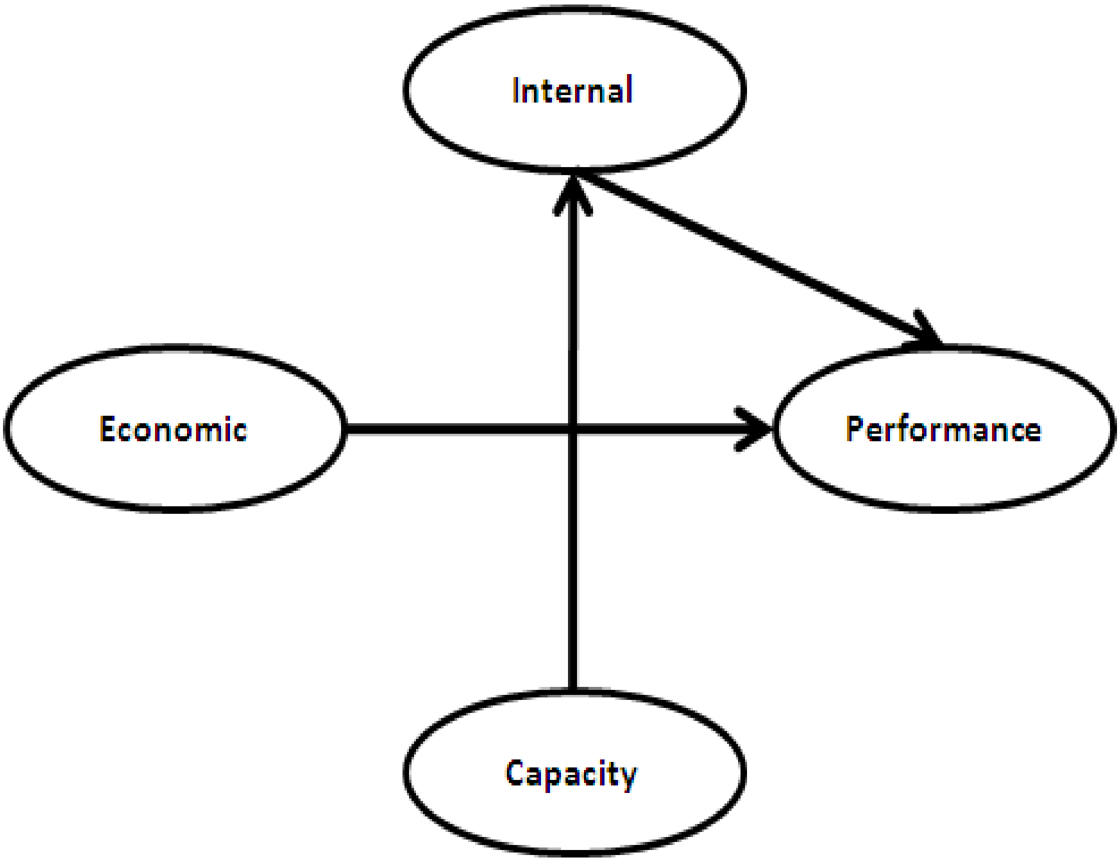


Figure 5.1: Research model with presenting effective relations in airline with lower age group (Source: Author)

On the other hand, higher age companies follow the general model. However, there is less significant impact imposed by economic factor on the performance. Figure 5.2 shows the model for talented companies with significant relations. It can be seen that internal operation is not a mediator but it is proved that based on two other constructs, the economic construct has an indirect impact on the performance.

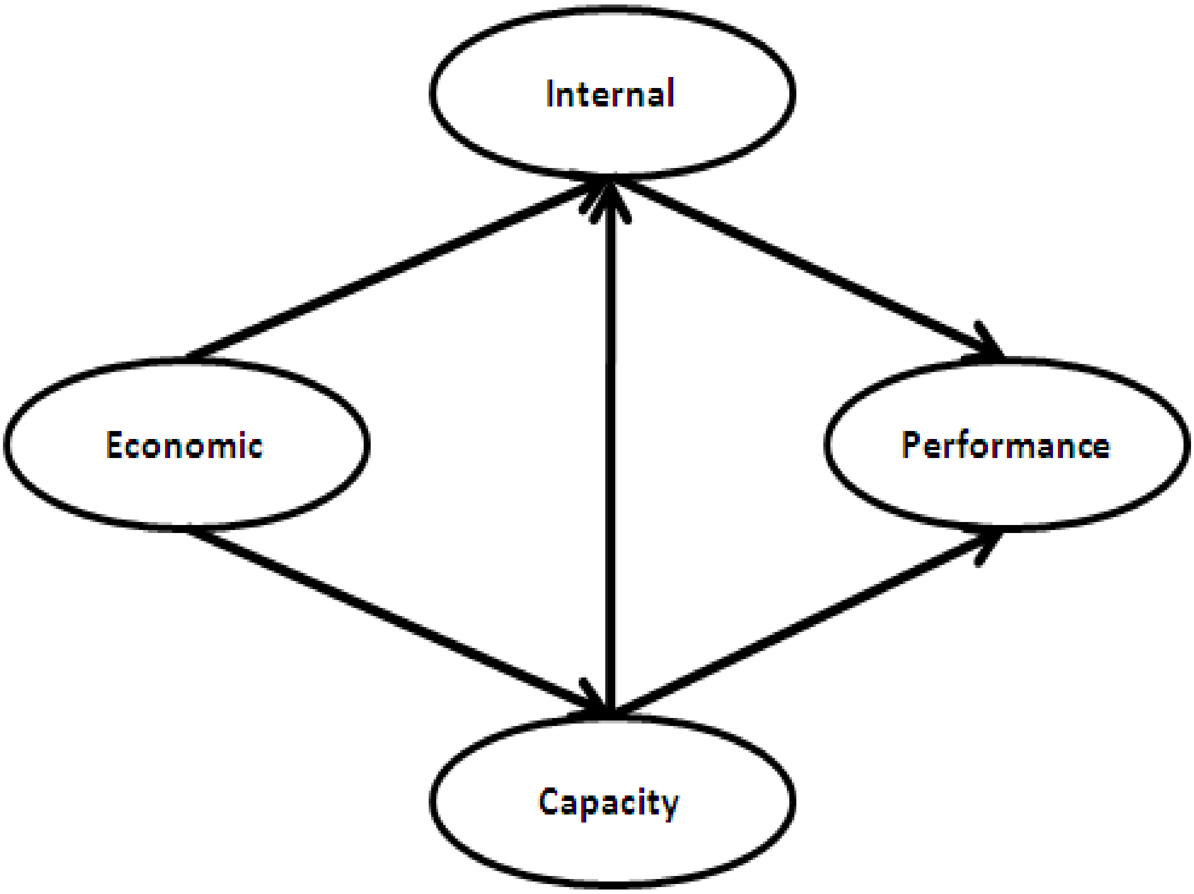


Figure 5.2: Research model with presenting effective relations in airline with higher age group (Source: Author)

In general, the effect of the economic construct on the other three constructs is different for both models, i.e., for lower age companies, the economic construct has a negative and insignificant impact on capacity and internal operation constructs, while for the other models it is positive and significant. However, the economic construct has a direct impact on performance for lower age companies although it is not significant for a higher age one. These differences between the two groups show that higher age companies have a strong capability of improving performance through internal operation and capacity even in bad economic conditions. In the same situation, the lower age companies will not be able to improve the performance even though they improved internal operation and capacity. Concisely, higher age companies benefit from optimum performance by altering the direct relation into indirect.

Table 4.15 shows the comparison between six relations of constructs based on higher and lower age companies. It can be seen that in the relations of economic condition on internal operation, economic condition on capacity and capacity on performance, there exists significant differences between the two groups. In other words, a significant difference is realized between the coefficients of the variation in these three relations between the two groups. For example, by increasing the level of experience in the airline industry, a stronger relationship exists between the variation of the economic condition on the internal operation and the airline capacity. It can be achieved by concentrating on economic condition and using flexible flight programming based on economic condition variations. Ultimately, it can be deduced that company experience or firm age can help in taking control of the relationship between the constructs, thus this measurement acts as a moderator in the research model.

Hence, it can be concluded that companies with longer years of experience can manage the impact of the economic condition by controlling internal operation and airline capacity. Lower age companies with less experience can also benefit from higher age companies as a benchmark for better performance. Integration of smaller companies into larger ones is also an option for the improvement of performance.

The outstanding point of this research is fitting the model by relating the number of departures and performance, which demonstrates the advantage of latent variables and SEM methodology, since more information can be obtained by relating constructs and measurements in the causal model. Moreover, Figure 4.3 shows that the correlation between the number of departures and performance is significant. As a result, in critical situations, overall performance, which is a combination of market share, RPK, operating profit, and load factor measurements, can be improved by increasing the number of departures. In addition, this correlation for lower age companies is equal to 0.65 and for higher age companies it is equal to 0.52 (see Figure 4.4 and 4.5). Consequently, the number of departures has a more significant effect on the performance of the lower age companies compared to the higher age companies.

5.4 Conclusion

One of the most important results of globalization has been the increase of the performance and resources of airline companies, expanding the market areas, multiplying various destinations and business partners, and, consequently, enhancing the conditions for more competitiveness. Nevertheless, as an outcome of globalization, unexpected and unprecedented economical fluctuations, both in national and international arenas, appeared to lead to unforeseen turmoil, predicaments, and risks, which seriously threatened the survival of most airline companies around the globe as a result of depriving them of the opportunities for enhancement of performance. Therefore, the estimating and measurement of performance and effective management of companies formed an important topic for studies in recent decades. This study intends to propose an appropriate solution and a comprehensive model for performance measurement.

According to Neely (1999), this trend gradually turned into an integral part of planning and controlling of organizations. Also Neely (1998) believed that managers and directors measure performance for two main reasons, namely: to influence the subordinate's behaviour, and to know their current position in the market. Therefore, PM helps the managers to proceed in the right direction to be able to revise the business objectives and re-engineer the process of business as required (Van Hoek, 1998, Kuwaiti and Kay, 2000). A research conducted by Martinez and Kennerley (2005) confirms the positive effects of performance measurement in services, such as improve company image and customer satisfaction, enhanced productivity, and improved business. Taking these points into consideration, it can be concluded that PM is an essential factor for companies to assess and evaluate their actual goals against the predefined one to ensure their right position and actions in the competitive environment.

Although PM has many advantages and benefits for airline companies, sometimes, as Halachmi (2002) points out, the expenses of introducing and implementing measurement of performance becomes more than the potential benefits it can yield. A study by Martinez and Kennerley (2005) also resulted in similar results revealing that the application of complicated performance measurement has resulted in negative and significant effects due to the considerable time consumption, huge savings, and the people commitment. Moreover, in some cases the application of performance measurement system has created in certain limitations to the liberty of managers due to its rigid nature. However, the employment of performance measurement system seems to have both positive and negative impacts on the performance of a company. This idea can easily be challenged by some researchers believing that removal or avoidance of performance measurement system is not the solution, but rather that companies need to design and materialize a system whose indicators and measurements of performance can be properly selected with a comprehensive review of the literature of the organization.

Taking the requirements of the airline industry and the prospective benefits into consideration, a performance measurement and assessment of the performance model with its independent (latent) variables, internal operation, airline capacity, and economic condition were determined to assess the airline. Fourteen measurement and four latent variables were used in the modelling of global airline performance.

The data gathered from 214 airline companies were refined and analysed through a statistical method known as SEM to test the validity of the measures and to construct valid relations within the indicators and measures of the model. Finally, the research model was specified demonstrating the interrelationships and their path coefficients between the predetermined performance measures. The objectives proposed at the beginning of the study were well validated or nullified according to the results achieved from the data analysis. The major findings of the research were compliant with some of the said objectives as revealed in the previous chapter.

In this research, a model made up of four constructs was designed to pave the way to understanding their role in airline performance estimating. The model proposed in this study has a potential capability and ability to be applied to airline companies. In this model, in order to enhance its efficiency, all redundant measures were eliminated or modified to be closer to the requirements of the airline industry as possible. The results of the analyses of the data verified that the model consisting of four constructs were designed in order to understand their role in estimating performance. The validity of the constructs and the constituent variables were verified with content and construct validity testing. The final model, which has a potential to be used in airline companies is extremely close to the needs and the requirements of the industry as all redundant measures were eliminated and the most used and proper ones were added as measures and the indicators. Traditional quantitative performance measures were reduced and the qualitative measures of contemporary construction performance measurement were put forward as demanded by the current managerial status of the companies. Analysis of results also verified the validity of the constructs.

In the airline industry, three vital gaps for the estimation of performance exist in the earlier literature. The first discernable gap in such studies is the shortcoming of these models in introducing a general indicator such as "overall performance". The second gap is in all studies of airline performance modelling, they have used both economic and internal variables as independent variables. However, internal variables are influenced by economic indices and cannot be considered as independent variables. The third gap of such studies is not taking capacity of airline as an impactful factor on the performance and internal operation and also economic condition.

Therefore, the current research intends to cover the gaps with the introduction of the latent variable instead of the measurement variable and a single unified model using the SEM method, and also definition of airline capacity as an effective construct in research model.

5.5 Limitations of the Study

One the most importance limitations that this study suffers from are related to the documentary data, especially, data collected from companies' annual reports. This is because the annual reports of the organizations are not always accessible to researchers, and, hence, the data collection in this study and other studies of a similar nature is normally restricted to the available data sources. Another limitation in this research is related to stochastic sampling, which, in turn, results from the limited access to the annual reports, some of which were even inaccessible.

Some airline companies, especially governmental or public sector, receive financial support from their governments under the name of subsidy (Bhadra, 2009), which can be one of the most influential factors affecting a company's performance. According to the limitations in data and data collection, as mentioned earlier, this factor, as a moderator or internal operation variable, was not taken into consideration in the assessed and evaluated models in this research.

Since the data are collected from annual reports in this research and the structure of customer satisfaction database is based on questionnaires, this study cannot use customer satisfaction variables for estimating airline performance. Furthermore, as the population in the study is global airlines, collecting these kinds of data is very expensive.

Another limitation of this study is that the cost of flight variables cannot be embodied in the research model. In most previous studies (Assaf, 2009) financial performance was used as the dependent variable, while non-financial performance (such as load factor) and cost of flight were used as independent variables:

Financial performance =F (cost, non-financial performance)

However, in this research both financial and non-financial variables are applied as one construct named overall performance.

5.6 Recommendations and Suggestion for Future Studies

The top management team is one of the most important topics that can be applied to the assessment of organizational (Pegels and Yang, 2000, Hambrick et al., 1996, Bowlin and Renner, 2008) and airline performance (Goll et al., 2008, Jones, 2006). It can be examined as a moderator in the relationship between the constructs of performance models.

As mentioned earlier, in the limitations section, the subsidy that some companies receive from government can be considered as a moderator variable or internal indicator. Furthermore, a similar study can be conducted on the relationship between CEO compensation and airline performance (Perryman, 2009), which can also be taken as a moderator for research models.

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APPENDICES

Appendix A: Correlation Between the variable (Source: Author)

Indicators	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Economic	1.00																	
2. Capacity	.176	1.00																
3. Internal	.253	.836	1.00															
4. Performance	.290	.872	.932	1.00														
5. HDI	.860	.151	.218	.249	1.00													
6. Ln(GDP)	.982	.173	.249	.284	.844	1.00												
7. Network Size	.136	.773	.647	.675	.117	.134	1.00											
8. Employee	.129	.731	.611	.638	.111	.126	.565	1.00										
9. ASK	.131	.742	.621	.647	.112	.128	.574	.542	1.00									
10. Load Factor	.227	.685	.732	.785	.195	.223	.530	.501	.508	1.00								
11. Operating Profit	.202	.609	.651	.698	.174	.198	.471	.445	.452	.548	1.00							
12. RPK	.236	.710	.758	.814	.203	.231	.549	.519	.527	.639	.568	1.00						
13. Market Share	.260	.782	.835	.896	.223	.255	.605	.572	.580	.704	.626	.730	1.00					
14. Vehicle	.237	.783	.937	.873	.204	.233	.606	.572	.581	.685	.609	.710	.782	1.00				
15. Advertising	.237	.783	.936	.872	.204	.233	.606	.572	.581	.685	.609	.710	.782	.877	1.00			
16. Length	.237	.783	.937	.873	.204	.233	.606	.573	.581	.685	.609	.710	.782	.877	.877	1.00		
17. Departure	.222	.733	.876	.945	.191	.218	.567	.535	.544	.742	.660	.769	.847	.821	.820	.821	1.00	
18. Inflation	-.613	-.108	-.155	-.177	-.527	-.601	-.083	-.079	-.080	-.139	-.124	-.144	-.159	-.145	-.145	-.145	-.136	1.00