AN INTEGRATED ANALYSIS OF THE RELATIONSHIP BETWEEN PRODUCTIVITY, QUALITY, CUSTOMER SATISFACTION, AND FINANCIAL PERFORMANCE IN THE US AIRLINE INDUSTRY: THE APPLICATION OF THE RESOURCE BASED VIEW AND STAKEHOLDER THEORY

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ABSTRACT

The relationship between nonfinancial and financial performance measures has been extensively investigated (Banker and Mashruwala, 2007; Banker et al., 2000; Ittner and Larcker, 1998a; Sun and Kim, 2013). However, prior studies have tended to focus their investigation on the relationship between one nonfinancial measure in isolation with another financial measure (Bryant et al., 2004). While these studies provide valuable insights into the contemporaneous and temporal relationship between nonfinancial and financial performance, they are criticized for failing to capture the "trade-off" between various performance measures, which may in turn lead to unreasonable conclusions (Bryant et al., 2004; Ittner and Larcker, 2001). This research, therefore, attempts to address this limitation by conducting a simultaneous investigation of the links between productivity, service quality, customer satisfaction, and financial performance in the US Airline industry. Drawing on the Resource Based View and Stakeholder Theory, an integrative framework is developed to investigate the linkages between airline productivity, service quality, customer satisfaction, and financial performance. This theoretical framework is tested using a longitudinal panel data set drawn from seven major US Airlines over 15 years (1995-2009).

Using the partial least square approach to structural equation modelling, findings of this research suggest that improvements in airline productivity can lead to enhancement of service quality as reflected in reductions in flight delays, mishandled baggage, and customer complaints. Airline productivity is also positively linked to current and future periods of financial performance. Further, the results uncovered in this research also suggest that service quality problems, such as flight delays and mishandled baggage, have strong negative effects on current and future customer satisfaction. The results also show that changes in service quality are not reflected concurrently in financial performance. Such changes in service

quality are found to have significant impact on future financial performance. However, the link between customer satisfaction and current and future financial performance is not significant.

This research contributes to literature by (1) developing an integrative framework drawing on the Resource Based View and The Stakeholder Theory, and (2) identifying the lag length required for the changes on exogenous variables to be reflected on the endogenous variables. Empirically, this research contributes by applying the PLS-SEM that enables simultaneous investigation of multiple variables. It also contributes to practice by providing useful insights for managers for strategy formulation and evaluation.

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CHAPTER ONE: INTRODUCTION

It is widely acknowledged in the literature that performance measures are important components of a performance management system; they are designed to assist managers in assessing past performance and developing future plans (Artz et al., 2012; Barnabè and Busco, 2012; Kaplan and Norton, 1996b; Neely, 1998). Performance measures that provide information about past performance enable managers to identify existing "*capabilities*", while forward looking performance information helps managers to explore potential capabilities (Grafton et al., 2010; Henri, 2006). To this end, it has been suggested that performance measurement systems should contain multiple financial and nonfinancial measures (Ittner and Larcker, 2003; Kaplan and Norton, 1992).

Financial performance measures provide information about the effects of past and current actions on performance (Johnson and Kaplan, 1987). However, these measures do not provide important aspects of performance, such as product/service quality or levels of customer satisfaction. As a result many scholars suggest financial performance measures should be supplemented with nonfinancial performance measures (Eccles, 1991; Ittner and Larcker, 2003; Kaplan and Norton, 1992).

Contemporary performance measures contain multi-dimensional measures with a balanced mix of financial and nonfinancial measures which aim to capture both tangible and intangible resources useful for the assessment of past performance and the development of future plans (Franco-Santos et al., 2007). However, the use of nonfinancial performance measures benefit organizations when they are selected on the basis of their effect on financial performance (Chenhall, 2005; Ittner et al., 2003; Kaplan and Norton, 1996a). This implies that understanding the connections between various performance measures motivates employees by providing information that shows the effect of their current actions on future financial performance (Kelly, 2010).

Numerous studies have investigated the relationship between nonfinancial and financial performance measures (Banker et al., 2000; Behn and Riley, 1999; Ittner and Larcker, 1998a; Sun and Kim, 2013). Nevertheless, these studies tend to focus on investigating the relationship between one nonfinancial measure in isolation with another financial measure (Bryant et al., 2004). While these studies provide valuable insights into the contemporaneous and temporal relationship between nonfinancial and financial performance, they are criticized for failing to capture the "trade-off" between various performance measures, which may in turn lead to unreasonable conclusions (Ittner and Larcker, 2001). My research therefore attempts to address this limitation by conducting a simultaneous investigation of the links between productivity, service quality, customer satisfaction, and financial performance in the US Airline industry.

I extend the existing discourse about the links among nonfinancial performance measures and their impact on financial performance by adding insights from a Resource Based View and Stakeholder Theory. Firstly, drawing on the resource based view and adding insights from the service productivity literature, I examine the effect of airline resource productivity on airline service quality and financial performance. Service productivity theorists (Calabrese, 2012; Grönroos and Ojasalo, 2004; Schmenner, 1986) argue that the relationship between productivity and service quality should be explored in the context of the service industry. With this argument in mind, I explicitly examine the link between productivity and service quality using data drawn from the US airline industry. As such the question of how strategic initiatives enhance productivity and impact service quality cannot be fully understood without an analysis of the nature of the service business.

Particularly, (Calabrese, 2012; Schmenner, 1986) argue that the association between resource productivity and service quality depends on the extent of service customization, the level of customer interaction required during the production of the service, and the proportion of capital/ labour resources required for doing so. Based on this argument, I hypothesize that US airline managers have the opportunity to simultaneously enhance resource productivity and service quality and subsequently financial performance. This is possible because airlines are relatively capital intensive and their services are largely homogenous as they do not require *customization and interaction* with the client during the service production process (Schmenner, 2004).

Moreover, the stakeholder theory posits that stakeholder satisfaction improves financial performance (Berman et al., 1999; Harrison and Wicks, 2012; Ogden and Watson, 1999). This implies that a firm's ability to manage the diverse interests of its stakeholders is crucial for the attainment and *maintenance of competitive advantage* (Coleman, 2011; Freeman, 1984; 2010). Priem and Butler (2001) argue that the resource based view focuses on internal resources and thus should be supplemented by relevant theories to explain the role of external factors, in this research represented by the customers, when assessing the firm's performance. Based on this critique, I explore the role of customer satisfaction in the relationship between airline service quality and financial performance. My hypothesis is that enhanced resource productivity and service quality lead to sustainable competitive advantage when productivity and quality improvement strategies are formulated and implemented with the preferences and value propositions of customers in mind.

Empirically, I analyse a longitudinal panel data set that contains information about the productivity, service quality, customer satisfaction, and financial performance of seven major US airlines over 15 years (1995-2009). The use of longitudinal panel data provides an opportunity to assess the time lag required for changes in the dependent variable (e.g., service quality) to be reflected in the dependent variable (e.g., financial performance). I analyse the data using the Partial Least Square approach to Structural Equation Modelling (PLS-SEM) which enables simultaneous assessment of the relationship between multiple constructs with several manifest variables (Hair et al., 2012a). By doing so, I aim to enrich prior literature by focusing on resource productivity, service quality and customer satisfaction, and financial performance.

1.1 Research Background

Performance measures are fundamental components of the overall performance management system of many organizations, and are often designed to assist management in not only evaluating past performance but also in developing future plans (Bourne et al., 2013b; Franco-Santos et al., 2007; Neely, 2005; Simons, 1995). Using performance measures to evaluate past performance (feedback) helps management to identify existing capabilities, while the use of performance measures to develop future plans (feed forward) assists management to identify potential capabilities (Grafton et al., 2010; Henri, 2006). Existing and potential capabilities in turn enable a firm to deploy its resources in a way that allows attainment and maintenance of competitive advantage (Barney, 1991; Eisenhardt and Martin, 2000; Newbert, 2008). Performance measures, therefore, play an important role in enhancing organizational performance.

Comprehensive performance measures contain both financial and nonfinancial measures in order to provide information that shows the effect of current actions on future performance (Franco-Santos et al., 2012; Ittner and Larcker, 1998b; Kaplan and Norton, 2001; Luft, 2009). Nonfinancial performance measures, as part of the overall performance measurement system, provide useful information to monitor strategy implementation and to identify strategic tangible and intangible resources and capabilities (Kaplan and Norton, 1996b). To this end, non-financial performance measures should be selected and incorporated as part of the performance measurement system based on their impact on future financial performance (Ittner and Larcker, 2003).

Cognizant of the importance of the incorporation of nonfinancial performance measures as part of the performance measurement system, various performance measurement frameworks have been suggested, including the balanced scorecard (BSC). The BSC contains nonfinancial and financial performance indicators categorized into four perspectives: (1) *learning and growth; (2) internal business process; (3) customer perspective; and (4) financial perspectives (Kaplan and Norton, 1992)* . These four perspectives are interlinked in a cause and effect pattern (Kaplan and Norton, 1996a). According to proponents of the BSC, measures of learning and growth are leading indicators of measures of the internal business process; measures of the internal business process are leading indicators of measures of the customer perspective; and finally, measures of the customer perspective are leading indicators of financial performance (Kaplan and Norton, 1992; Kaplan and Norton, 1996b). The cause and effect relationship between the measures in the BSC framework suggests that nonfinancial measures are leading indicators of future performance, while financial measures are lagging indicators of past performance (Kaplan and Norton, 1996a).

Performance measures can facilitate learning and communication and motivate employees to improve performance as they inform the outcome of current actions on future financial performance (Ittner and Larcker, 2003; Kaplan and Norton, 2007). In the absence of a validated causal link among performance measures "firms may weight all measures equally, subjectively assign weights based on untested assumptions, or self-servingly place more weight on better performing measures to boost performance evaluation and bonus" (Kelly, 2010, p.2).

Performance measures enhance the utilization of organizational capability by providing broad based information that shows the effect of current actions on future financial performance (Kaplan and Norton, 1996a). Consistent with the argument that understanding the relationship between nonfinancial and financial performance measures is important, evidence is generally shown with the application of the Resource Based View in investigations of the role of performance measures to identify and utilize organizational capabilities. For instance, Henri (2006) investigates the relationship between performance measures and organizational capabilities, based on the RBV, and argues that the use of performance measures to predict future performance creates an opportunity to identify strategic priorities and capabilities which ultimately leads to improved organizational performance. As such, the effect of performance measures on organizational performance is determined by the subsequent decisions made by managers who use the information they obtain from the performance measures (Grafton et al., 2010).

1.2 Research Motivation

Numerous studies have investigated the relationship between nonfinancial and financial performance measures (Banker and Mashruwala, 2007; Behn and Riley, 1999; Ittner and Larcker, 1998a; Sun and Kim, 2013). "These studies have generally focused on two areas: the *value relevance* of nonfinancial information on stock price, and the *relationship* between nonfinancial performance measures and current or future accounting performance" (Ittner and Larcker, 2008, p.1236). The *value relevance* studies typically argue that nonfinancial performance measures contain more information which is not reflected in financial performance measures and thus suggest the existence of a strong positive link between nonfinancial information and stock price (Amir and Lev, 1996; Liedtka, 2002; Riley Jr et al., 2003).

As noted earlier, prior studies that investigate the link between nonfinancial and financial performance measures and financial performance suggest the existence of a positive relationship between nonfinancial and financial performance (Banker and Mashruwala, 2007; Behn and Riley, 1999; Davila and Venkatachalam, 2004; Ittner and Larcker, 1998a; O'Connell and O'Sullivan, 2014; Sun and Kim, 2013; Wiersma, 2008). These studies have enriched the management accounting literature about the importance of nonfinancial performance measures for strategy formulation, implementation, and performance evaluation. However, these studies tend to focus on investigations of the association between one nonfinancial performance measure in isolation and its relationship with financial performance (Bryant et al., 2004). As a result, a significant gap exists in current knowledge about the connections between the nonfinancial performance measures and their effect on financial performance (Anderson et al., 2003). Consequently, some researchers have called for more studies that examine how the nonfinancial performance measures are linked and how such links impact firm performance (Behn and Riley, 1999; Hoque, 2014).

Unlike manufacturing businesses which keep an inventory of products, service businesses deliver their product as a result of a direct request from, and involvement with, their customers (Parasuraman, 2002). Consequently, service businesses face challenges in their attempts to achieve service productivity and service quality instantaneously. As a result, simultaneous investigation of productivity, service quality, and financial performance is suggested in order to understand the role of service in the relationship between productivity and profitability (Calabrese, 2012). Furthermore, customer involvement in service production affects both productivity and service quality, and consequently affects the level of customer satisfaction and financial performance. It seems there is a need for an integrative approach to explore the links between service productivity, service quality, customer satisfaction, and financial performance, and to understand the resources employed and the returns obtained (Calabrese and Spadoni, 2013; Grönroos and Ojasalo, 2004).

It is argued that service businesses face challenges in their efforts to achieve both productivity and service quality and, as a result, a trade-off is inevitable (Anderson et al., 1997; Lapré and Scudder, 2004). Conversely, contextual factors, such as variability of customers' requirements (Frei, 2006) and proportion of labor cost to cost of plant assets (Schmenner, 1986; 2004), are suggested to influence the link between productivity and service quality. These studies provide evidence of the existence of a parallel argument in the literature regarding the link between productivity, service quality, and customer satisfaction. To address such divergent findings, scholars suggest an integrative investigation to understand the effects of strategic actions taken by managers to improve productivity on service quality, customer satisfaction, and financial performance (Calabrese and Spadoni, 2013).

One possible reason for inconclusive results of prior studies may be a failure to consider the unique nature of the service type. The US Airline industry provides a relatively homogenous product with a limited level of customization and is largely capital intensive (Schmenner, 1986). This study aims to contribute to the ongoing debate by investigating the link between airline productivity and service quality in the US airline industry. It suggests compatibility of service productivity and service quality exists in the US airline industry because initiatives for the growth of productivity have a concurrent and positive effect on service quality and profitability via improvement in employee coordination and enhancement of operational efficiency.

In the same way, studies which evaluate the performance of airlines suggest that productivity, service quality, and customer satisfaction are the key drivers of financial performance (at least in the US airline industry) (Liedtka, 2002). Similarly, Tsikriktsis (2007) finds that operational performance and service quality are positively associated with profitability in the US airline industry. However, the link between productivity, service quality, and customer satisfaction, and the effect of such linkage on financial performance, is not fully explored (Gupta and Zeithaml, 2006; Parast and Fini, 2010; Zeithaml, 2000).

While the link between nonfinancial performance measures and financial performance has been extensively investigated, little attention has been given to the linkages among nonfinancial measures and their combined effect on financial performance. As noted earlier, this research aims to address this gap in the literature by exploring the relationships between airlines' operational factors and their combined impact on financial performance. This study, therefore, investigates the link between airline productivity, service quality, customer satisfaction, and financial performance. It proposes and empirically tests an integrative framework that links these nonfinancial performance measures based on the convergent insights of both the Resource Based View (RBV) and the Stakeholder Theory (ST) using the data drawn from the US airline industry.

1.3 Research Objectives and Research Questions

This study aims to investigate the links between airline productivity, service quality, customer satisfaction, and financial performance.

Generally, it aims to answer the following research question:

What is the link between productivity, service quality, customer satisfaction, and financial performance in the US Airline Industry?

Specifically, this study attempts to answer the following:

1. How do efforts to improve airline productivity influence service quality and financial performance?
2. How do changes in service quality affect customer satisfaction and financial performance?
3. What is the relationship between customer satisfaction and financial performance?

1.4 Research Approach

Airline productivity is operationalized as a multidimensional construct with two distinct dimensions: employee productivity and aircraft productivity. Each dimension is measured using two manifest variables. Employee productivity is measured using available seat miles per employee and aircraft per employee, while aircraft productivity is measured using average block hours per day and average number of flights per day. Airline service quality is measured using four manifest variables: on time arrival, mishandled baggage, involuntarily denied boarding, and number of customer complaints. The American Customer Satisfaction Index (ACSI) is used to measure customer satisfaction. Four measures of financial performance are used: return on assets, return on sales, return on investment, and operating profit margin. All measures are selected based on prior study (Belobaba, 2009; Liedtka, 2002; Tsikriktsis, 2007b) and further validated for reliability and internal consistency.

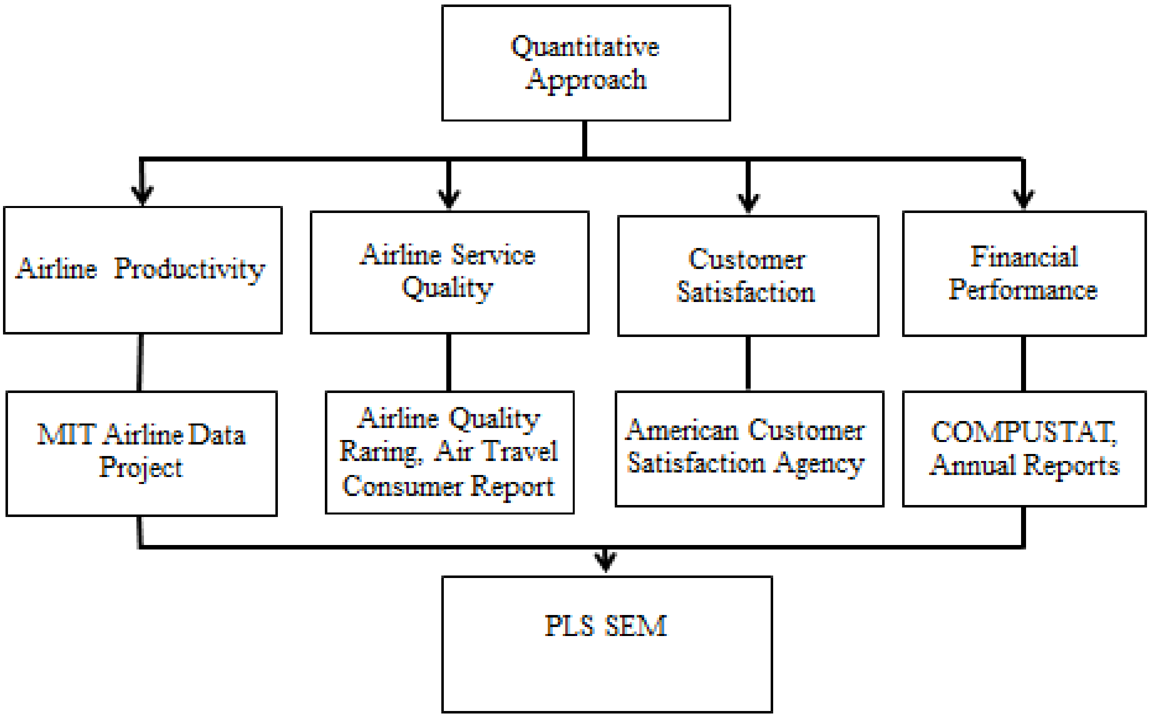
This research employs a quantitative approach using data publicly available from seven major US Airlines (American, Continental, Delta, United, Southwest, Northwest, and US Airways), covering 15 years of operation (1995-2009). Data related to airline productivity is obtained from the Massachusetts Institute of Technology (MIT), Airline Data Project. In addition, service quality data is collected from the Airline Quality Rating published by Wichita State University and triangulated with similar data from the Air Travel Consumer Report published by the US Department of Transportation. Customer satisfaction data is obtained from the annual reports of the American Customer Satisfaction Agency. The financial performance information is collected from COMPUSTAT. This data is compared with the data collected from the annual reports published by the airlines. This research includes 105 observations with a maximum of three missing values (approximately 2%) for each indicator.

Three alternative analytical tools are considered: (1) the Multivariate Regression Analysis, (2) the covariance based structural equation modeling (CB-SEM), and (3) the partial least square approach to structural equation modeling (PLS-SEM). Each approach has advantages and disadvantages as well as model assumptions that must be satisfied.

The Multivariate Regression Analysis requires that the data be normally distributed, that there is a linear relationship among variables, that the error term be homoscedastic across all the endogenous variables, and that there is a large sample size (Osborne and Waters, 2002). The CB-SEM shares most of the assumptions of Multivariate Regression Analysis, particularly the normality assumption (Nusair and Hua, 2010). Further the CB-SEM requires a large sample size with a minimum observation of 200 (Bentler, 1987). PLS-SEM, however, does not impose restrictions of data normality and can provide robust results even with a relatively small sample size (Christian, 2014).

The dataset and model used in this research have been tested against the assumption of Multivariate Regression Analysis, using IBM SPSS statistics 2.1, to ensure that the data meet the statistical assumptions. Results reveal that my data are not normally distributed, and the assumption of linearity is violated. Consequently, I conclude that Multivariate Regression Analysis is not suitable for data analysis in this research. As seen above, the CB-SEM also requires a relatively large, and sample size and a normally distributed sample. As the data used in this research are not normally distributed and the sample size is relatively small (105 firm-year observations), PLS-SEM is considered the most appropriate analytical tool for this research. The research approach of this dissertation is presented in Figure 1.

Figure 1. Research Approach



Notes: This figure depicts the research approach used in this dissertation. This research applies a quantitative approach. Data related to airline productivity is collected from the Massachusetts Institute of Technology, Airline Data Project. Airline service quality is collected from the Wichita State University and the Air Travel Consumer Report issued by the US Department of Transportation. The customer satisfaction data are obtained from the American Customer Satisfaction Agency. I collected financial information from COMPUSTAT, the US Department of Transportation, and from the annual reports of airlines. Three alternative analytical tools have been considered for the analysis of the data, namely: the multivariate regression analysis, the covariance based structural equation modeling, and the partial least square approach. After thorough testing of the statistical assumptions of each statistical tool, the partial least square approach to structural equation modeling is selected for the data analysis.

1.5 Summary of Findings

As indicated earlier, the main objective of this research is to investigate the linkages between airline productivity, service quality, customer satisfaction, and financial performance. Moreover, the research aims to identify the time lag for changes in one variable, e.g., airline productivity, to be reflected in the other variable, e.g., service quality. To this end, I develop three PLS-SEM models with varying time lags and test them using SmartPLS software.

SmartPLS software provides results that help researchers to assess the validity of measures and the predictive capability of the structural models.

Evaluation of internal reliability, convergent validity, and discriminate validity suggest that the model developed in this research is valid and reliable, based on the metrics and criteria used. Furthermore the results of the structural model show improvements in airline productivity can lead to enhancement of service quality, reflected in a reduction of flight delays, mishandled baggage, and customer complaints. Airline productivity is also positively linked to current and future financial performance.

Additionally, the results uncovered in this study suggest that service quality problems, such as flight delays and mishandled baggage, have a strong negative effect on current and future customer satisfaction. Furthermore, the results show that changes in service quality are not reflected concurrently in financial performance, instead they are found to have a significant impact on future financial performance. However, the link between customer satisfaction and financial performance is statistically insignificant.

1.6 Research Contribution

The contributions of this research are three fold. The *first* is the application of the convergent insights of the Resource Based View and Stakeholder Theory (ST) to predict the temporal relationship between nonfinancial performance measures and financial performance. I argue that resource productivity leads to superior financial success, as posited by the RBV, when the firm is able to satisfy its stakeholders, as suggested by ST. To this end, this study develops an integrative theoretical framework based on the RBV and ST to investigate the impact of airline productivity on service quality, customer satisfaction, and financial performance. To the best of my knowledge this study is the first to develop an integrative framework and empirically test it in one empirical setting.

Prior studies which aim to investigate the relationship between nonfinancial and financial performance measures report varying time lags for the changes in nonfinancial performance measures to be reflected in the financial performance of firms. Methodological and measurement factors are identified as some of the possible reasons for such inconclusive results (Ittner and Larcker, 2008). This research conducts an integrated investigation of the longitudinal association of more than one nonfinancial and financial performance measures with multiple indicators, and uses PLS over 15 years (1995-2009) which should provide an adequate basis for the temporal relationship among performance measures. The *second* contribution of this research is therefore specifying the time required for a firm to observe the effect of its efforts to improve productivity and service quality on customer satisfaction and financial performance.

The *third* contribution of this study is its methodological rigor attributed to the measures and the analytical tool applied to explore the link between the nonfinancial and financial performance measures. The study develops an integrative framework that explores the links between multiple constructs with related manifest variables. This approach enhances our understanding of the simultaneous effect of more than one organizational factor on financial performance. As a result, this study uses PLS-SEM to investigate the simultaneous effects of multiple variables (F. Hair Jr et al., 2014). Notwithstanding the important benefits and subsequent popularity of PLS-SEM in other disciplines, "the accounting discipline has been slower in its general acceptance of PLS and other SEM modelling techniques" (Lee et al., 2011, p.5). To address the complex issues in management accounting research, scholars underline the need to apply updated analytical tools (Chenhall, 2012). Consistent with such calls, this research aims to contribute to the management accounting literature by applying the PLS-SEM to predict the hypothesized relationship among the variables.

This research also has practical implications. The current business environment is characterized by fierce competition and rapid technological change (Hannigan et al., 2015). As a result, firms are under continuous pressure to identify and sustain the source of their competitive advantage so as to survive in the market. Understanding the relationship between the various performance measures assists managers to direct their attention to key performance drivers so they can devise effective strategies to coordinate and utilize their tangible and intangible resources and improve the overall performance of their airline. This research provides additional insights into the links between efficiency in labor, aircraft utilization, and service quality, and the subsequent effect on bottom line performance. The US airline industry operates in one of the most developed economies in the world, therefore the theoretical framework is developed and tested using US data and could be applied to other airlines in developed countries. The conclusions may also generalize to other industries.

1.7 Thesis Structure

This thesis is organized into six chapters. Chapter One firstly presents the background and motivation for the research along with the main objectives. It introduces the research design and methodology and briefly highlights the main theoretical and practical contributions made. The chapter concludes by outlining the structure of the dissertation.

Chapter Two presents a systematic review of related literature. It introduces the relevant and various disciplines related to the research. The notion of performance measures is a topic of interest to scholars in the areas of accounting, operations, marketing, and management, therefore the chapter presents a review of the empirical evidence from these disciplines. The US airline industry fits within the broader service industry so Chapter Two also reviews the literature on the characteristics of service businesses. Furthermore, it considers prior studies concerning the linkages between airline productivity, service quality, and customer satisfaction, and their link to financial performance. The chapter concludes by identifying important gaps in the literature.

Chapter Three discusses the theoretical framework of the study. As noted above, this research applies combined insights from the RBV and the ST as the base on which to form the hypothesized relationships among the key constructs. The relationship between resource productivity, service quality, and financial performance is discussed drawing on the RBV. The ST is applied as a theoretical basis for the role of customer satisfaction in the link between service quality and financial performance. This chapter, therefore, develops an integrative theoretical model with the theoretical underpinning of the RBV and ST. In addition, Chapter three presents the five hypotheses of this research.

Chapter four presents the methodology used in this research, which is a quantitative approach. The research sample covers seven major US Airlines and data are collected from various publicly available sources. Three alternative analytical tools, the Multivariate Regression Analysis, CB-SEM, and PLS-SEM, are considered to analyse the data. Therefore, Chapter four begins with a discussion of the sampling process, the data collection and cleaning procedures, followed by definitions of variables and measures. Then, the testing and comparison of the various statistical tools are discussed to determine the most suitable analytical tool for the research. Specifically, the theoretical assumptions of Multivariate Regression Analysis and CB-SEM are tested and presented in this chapter. This chapter concludes that PLS-SEM is the most suitable analytical tool for this research.

Chapter Five presents the results of the study. Three steps should be followed when using PLS-SEM: model specification, assessment of the measurement model, and assessment of the structural model. The first part of this chapter, therefore, discusses the steps and guidelines when using PLS-SEM. The SmartPLS software has been used to estimate the PLS-SEM results. Accordingly, this chapter presents the results of the assessment of the measurement models developed and tested in this research based on the PLS-SEM guidelines. . It also presents the results of the evaluation of the structural models, including a section of further analysis which considers the time lag between changes in independent variables to be reflected in the dependent variable. These further analyses are carried out to enhance the robustness of the findings.

Chapter Six presents the discussion and conclusion of the findings. As noted above, the main objective of this study is to explore the links between airline productivity, service quality, customer satisfaction, and financial performance. The time lag required for changes in the independent variables to be reflected in the dependent variables is explored and this chapter discusses the effect of such time lags. It also presents the major theoretical and practical implications of this research. The thesis concludes with a discussion of the limitations of the research and suggestions for future research.

1.8 Summary

This study aims to investigate the links between nonfinancial performance measures and the effect of such links on financial performance. Specifically, the main objective is to explore the relationship between airline productivity, service quality, customer satisfaction, and financial performance. The relationship between nonfinancial performance measures and financial performance has been an area of interest for academic researchers from accounting, strategy, and marketing and operations management. As a result, numerous studies have been conducted to investigate the relationship between various nonfinancial performance measures and financial performance. Furthermore, the predictive relevance of nonfinancial performance measures on market value has been extensively explored. However, research that explores the links between nonfinancial performance measures and the combined effect of such links on financial performance is limited.

This research aims to fill this gap by developing an integrative framework based on the combined insights of the RBV and ST. Understanding the connections between airline productivity, service quality, customer satisfaction, and financial performance enhances our understanding of the interplay between strategic actions to improve productivity, customers' requirements for service quality, and stakeholder wealth maximization as expressed by financial performance. Accordingly, this research aims to contribute to both theory and practice by exploring the time lag effect of changes on airline productivity, service quality, customer satisfaction, and financial performance.

This research has important theoretical and practical implications. The application of the combined views of the RBV and ST to the linkages among the service productivity, service quality, customer satisfaction, and financial performance is one of the key contributions of this research. To the best of my knowledge, this is the first study to develop an integrative theoretical framework that links productivity, service quality, customer satisfaction, and financial performance on the basis of the theoretical underpinning from these two theories. The analysis of the time lag to identify the length of time between changes in the exogenous variables and endogenous variables can be considered as the methodological contribution. Furthermore, this research provides an empirical contribution due to the methodological rigor in using PLS-SEM. The research also has practical implications for airline managers. Productivity and service quality are important factors to maintain competitive position. Understanding how efforts to improve productivity impacts service quality and financial performance enables managers to evaluate and revise their existing strategies.

In general, this research intends to develop an integrative theoretical framework based on the RBV and ST. The profitability of airlines has been declining over the sample period due to competition and rising customer expectations, ensuring productivity and service quality is crucial for the survival of airlines. Thus the theoretical model developed is empirically tested using longitudinal panel data of seven major US airlines over a 15 year period (1995-2009). The PLS-SEM is used to analyse the data.

The findings of this research show that airlines can achieve both productivity and service quality. Furthermore, airline productivity is positively linked to both current and future financial performance. The results also suggest that changes in service quality are reflected in future financial performance. However, there is no statistically significant association between customer satisfaction and financial performance. These findings add to the existing body of literature by improving our understanding of the relationship between nonfinancial and financial performance measures, and by developing and empirically testing an integrative framework that shows the simultaneous effect of strategic actions taken to improve productivity on service quality, customer satisfaction, and financial performance. The findings of this research, therefore, make conceptual and methodological contributions to the management accounting literature. Furthermore, managerial implications provide useful insights for airline managers to formulate appropriate strategies.

This chapter has outlined the background to the study. The main objectives, the motivations the academic and practical contributions and the structure of the thesis are briefly described. The next chapter provides a review of the relevant literature.

CHAPTER TWO: LITERATURE REVIEW

As noted in chapter one, the main objective of this research is to investigate the relationship between productivity, service quality, customer satisfaction, and financial performance in the US airline industry. The US Airline industry has attracted the attention of researchers due to its unique characteristics, the crucial role it plays in the US economy, and the availability of rich data. Based on the same rationale, this research tests the theoretical framework using data drawn for seven major US airlines covering a period of 15 years. This chapter therefore starts by introducing the empirical site of this research, firstly presenting the historical development of the US Airline industry. The chapter also discusses the unique characteristics of the industry followed by an overview of its performance over the study period.

The notion of performance measures is a topic of interest for academics from different disciplines (Neely, 2005). Researchers from accounting, operations, marketing, and management have extensively explored the relationship between various performance measures (Franco-Santos et al., 2012). This chapter reviews empirical studies on the relationship between nonfinancial and financial performance measures from accounting, operations management, marketing, and strategy. Furthermore, drawing on the service operations literature, the chapter discusses the characteristics of service businesses to establish a theoretical background for the suitability of the empirical setting of this study.

Section 2.3 presents a review of literature related to performance measures in service businesses with specific reference to the constructs used in this research. Particularly, this section reviews conceptual and empirical studies on the links between productivity, quality, and customer satisfaction, and their link to financial performance. To this end, literature about the relationship between productivity, service quality, and financial performance is reviewed followed by a discussion of the literature on the relationship between customer satisfaction and financial performance. The chapter concludes by presenting important gaps in the literature.

2.1 The US Airline Industry

The US airline industry provides an interesting setting to empirically test the theoretical framework developed in this research due to its unique features as well as its impact on the US economy and the availability of data. The purpose of this section is to briefly discuss the characteristics of the US airline industry.

The US airline industry dates back to the early 1900s from the inception of the first manned powered flight in a heavier than air machine by Orville and Wilbur Wright at Kitty Hawk on December 17, 1903, marking an flying history of over a century. After decades of regulated operation, the industry was deregulated in 1978. In section 2.1.1, I present the historical development of the industry by focusing on the pre and post deregulation eras. Section 2.1.2 presents the unique features of the US airline industry followed by an overview of its performance over the study period (1995-2009).

2.1.1 The History of the US Airline Industry

The US airline industry has undergone tremendous changes during its more than one hundred year history. From its inception, the industry was regulated for over five decades until the 1978 deregulation act. Airline services started in 1918 when the US Post Office began to transport mail using US Army aircraft and pilots (Goetz, 2002). With increasing demand for such an airmail service, the 1925 Contract Air Mail Act allowed the Post Office to use private air carriers to provide its services (Cook, 1996).

In 1935, the Interstate Commerce Commission was mandated to regulate airlines (Cook, 1996). The Act forced carriers to enter into service contracts at a price lower than cost and led many airlines into financial loss (Heppenheimer, 1985). It was therefore replaced by the Civil Aeronautics Act of 1938 at which time the responsibility for the regulation of commercial airlines was transferred from the Interstate Commerce Commission to the Civil Aviation Authority (Levine, 1987). Two years later, in 1940, the Civil Aviation Authority was renamed the Civil Aeronautics Board (CAB) (Cook, 1996). CAB was mandated to formulate and execute policies to enhance the operational and financial performance of airlines (Meyer, 1981).

During World War II, US commercial airlines were used to support the military. This contributed to substantial growth and profitability of airlines as a result of the rise in the number of aircraft operating commercially (Meyer, 1981). Subsequently, trunk airlines (defined in the following paragraph) began to use aircraft with higher seat density which allowed them to charge low fares and resulted in increased demand and traffic (Heppenheimer, 1985).

After the World War II, local service airlines started flight services which connected small cities within the US (Button, 1991). This led to the classification of airlines as Trunk and Local Service Airlines (LSA). Trunk airlines are the largest national airlines dedicated to "long distance routes", while LSA are small carriers that provide connecting flights between smaller cities and Trunk airline terminals (Cook, 1996). At the time, airlines in this category include American, Continental, Delta, Northwest, and United.

The Civil Aeronautics Board regulated routes, prices, entry to and exit from the industry for over 40 years until the 1970s (Button, 1991). As a result, airline operation was not guided by market forces during this regulation era (Cook, 1996). This limited competition and required that the federal government subsidize routes which connect cities lacking economic viability to attract an airline service (Kahn, 1988). Consequently, the overall profitability of airlines has been declining due to overcapacity, lower fares, and non-price competition (Cook, 1996) .

In the 1970s academics and practitioners began to criticise the Civil Aeronautics Board for imposing layers of regulatory requirements on airlines (Levine, 1987). This led to the issuance of the airline Deregulation Act, 1978, in order to transform the airline industry from being regulated to being market oriented (Meyer, 1981).

Following the Deregulation Act of 1978, a dramatic expansion of the US Airline industry is observed, facilitated by the growth of existing airlines, the transfer of existing local service airlines to trunk routes, and new entrants to the industry (Cook, 1996). Airlines operating at that time expanded their services by adding new routes, while some LSAs shifted their operations to the trunk routes (Färe et al., 2007).

Following the Deregulation Act of 1978, the airline industry was transformed from a centrally regulated system to a market oriented industry where fares and routes are determined based on demand and supply (Bates, 1996; Hannigan et al., 2015). This encouraged airlines to expand their routes by acquiring local service carriers and by entering into code sharing agreements (Cook, 1996). This facilitated the development of the hub and spoke system where passengers take flights from their place of embarkation then change to another flight at an intermediary hub to reach their ultimate destination (Cook, 1996).

It has been widely documented that airline deregulation has resulted in increased passenger traffic due to reduced fares and increased numbers of flights (Goetz and Vowles, 2009). Airline productivity and service quality have also been improved due to enhanced operational efficiency (Treacy, 1995).

Despite improvements in operational efficiency and service quality, it is puzzling to observe that the profitability of airlines worsened after deregulation (Dempsey, 2008). Moreover, there is a growing concern that larger carriers are dominating the market via mergers and acquisitions and the control of hubs (Goetz, 2002). This is because the consolidation and merger of airlines limits passengers choices and thereby gives a monopoly power to airlines in terms of fares and other related services (Cook, 1996).

In summary, the US airline industry started its operations over a hundred years ago, mainly through the provision of mail transport services. During World War II, US airlines expanded their operations by providing transport services to the military, and this contributed to the profitability and growth of the airlines. The airline industry was regulated for the first 40 years of its operation. During this period, important strategic issues, such as routes, were determined by the regulating agencies. As a result, despite the expansion of airlines, the pre deregulation era of US airlines is characterized by a lower level of profitability as a result of overcapacity and lack of competition. After the Deregulation Act of 1978, airlines set prices and selected routes based on market forces. This has substantially contributed to the expansion of airlines and passenger volumes. Airline productivity and service quality have also improved. However studies show that the profitability of the airlines is declining due to rising oil prices and economic recession[1].

2.1.2 Characteristics of the US Airline Industry

The airline industry has attracted the attention of academia and practitioners due to its crucial role in fostering globalization, economic and social integration, and its significant contribution to the economy (ATAG, 2014). Industry reports show that the aviation industry supports over 58 million jobs globally which represents 6% of global employment (IATA,

[1] This study covers the period 1995-2009. All discussions are related to this period.

2013). It plays a significant role in the American economy by generating more than $1 trillion in annual economic activity which represents more than 5% of US GDP, and around 10 million well-paying jobs (A4A, 2013).

Studies show that the airline industry continues to a play key role in the global economy. Air travel demand, both for passengers and cargo, is forecast to rise in the years ahead and this, in turn, is expected to require additional new investment of $4-5 trillion to the industry by 2030 (IATA, 2013). Airline productivity is therefore crucial for national economic growth. Despite its economic significance, the profitability of the airline industry has been affected by a number of factors including "overcapacity, commoditization of offerings, fierce competition aggravated due to entry of low cost carriers, volatile fuel prices and economic downturn" (Wirtz et al., 2008, p.3). Such unique characteristics make the US airline industry an ideal setting to empirically test my theoretical framework.

Service Business

Airlines earn revenue by transporting passengers and their luggage from one place to another (Airline Economics, 2013). The airline industry is basically a service business where production and consumption is simultaneous. Unused/unsold capacity due to decline in demand cannot be stored for future use. Thus airlines cannot possess inventory for future use.

The service literature classifies service businesses into four types: *service factories, mass services, professional services, and service shops* (Schmenner, 1986). This classification is based on the proportion of cost of labor to plant and machinery used in the service production process, the extent to which the service provider is required to tailor the services to meet the requirements of a customer, and the level of customer involvement in the process of service production (Verma and Boyer, 2000). Accordingly, service types that are capital intensive with less customer involvement in the process of service production, such as airlines and hotels, are categorized as *service factories* (Schmenner, 1986). The second category of service – *service shops* – is characterized as those services which are capital intensive and have a high level of customer involvement in the service production process. The third category, which relates to service types that are relatively labor intensive but that do not require customization of services to each customer, such as schools, are categorized as *mass services*. *Professional services* are the fourth category, they are highly labor intensive with a high level of customer involvement.

Schmenner's (1986) service business classification[2] underlines that the link between service productivity and service quality is determined by the level of customer interaction and the nature of the service. Service businesses that provide highly customized services require more labor than plant and equipment to serve the specific needs of their customers. It is apparent that such customized services require interaction with customers. As a result it is challenging for service businesses to achieve both productivity and service quality (Schmenner, 1986). On the other hand, research suggests that productivity and service quality are compatible in service types that are capital intensive with less level of service viability and limited customer involvement (Calabrese, 2012). However, prior research tends to neglect the unique nature of the service type. It is interesting, therefore, to explore the interplay between service productivity and service quality in the US Airline industry that is characterized by lower labor intensity and limited customization of services and interaction with customers during the production of the service.

[2] Schmenner's service business classification will be discussed in more detail in section 3.2.1: characteristics of service businesses.

Capital Intensive Business

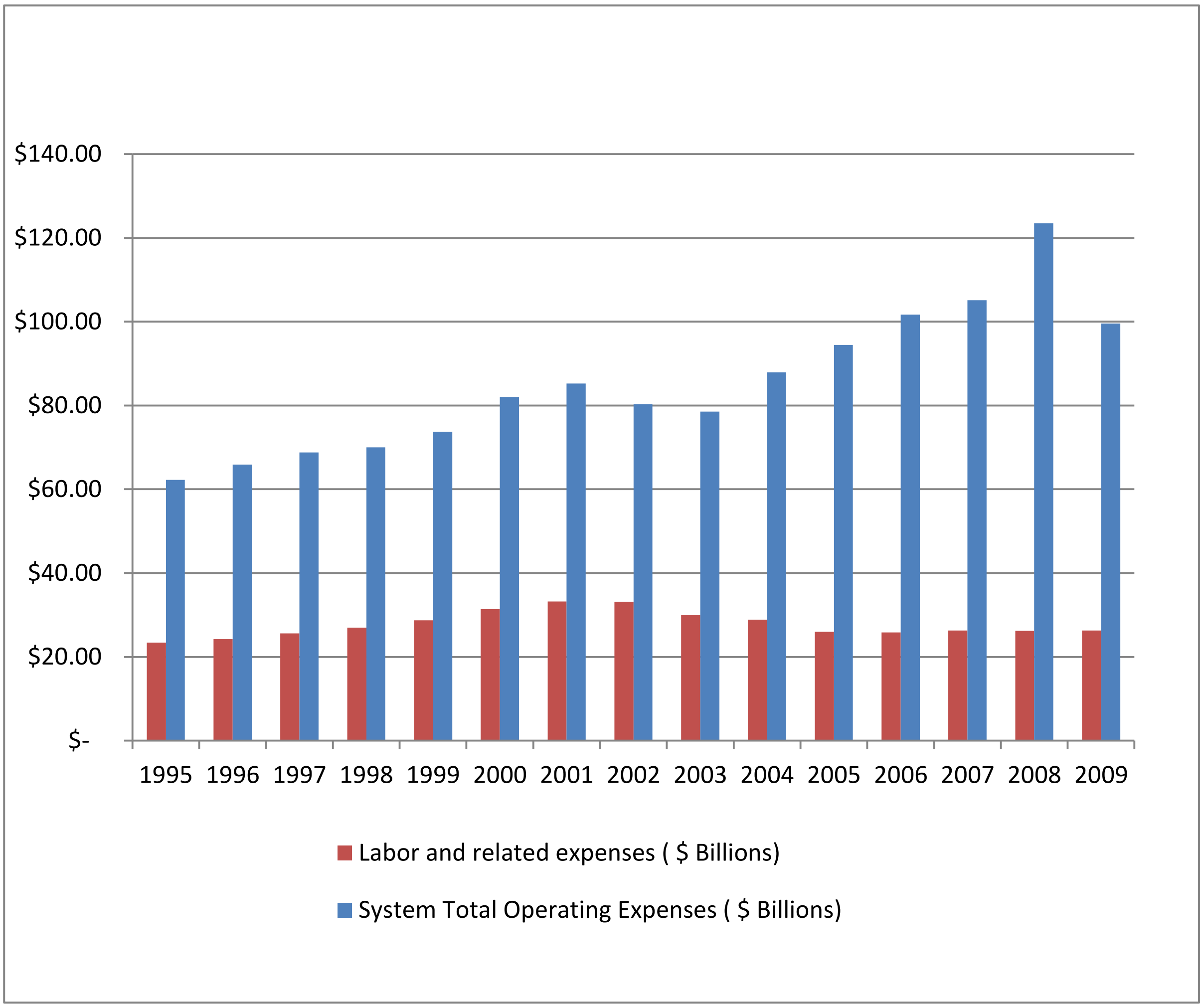
Airlines deploy significant resources for basic operations which require various facilities and machinery, including aircraft, simulation equipment, and a variety of repair and maintenance machinery (Airline Economics, 2013). Airlines finance much of their capital requirements through the issuance of stock and from short and long term loans (Airline Economics, 2013). Aircraft are also obtained through leasing. As a result, airlines incur large financing costs that often drain cash from their net profit.

Labor Intensive Business

The airline industry employs a number of different categories of personnel: (1) pilots, (2) flight attendants, (3) ground technicians and other types of personnel, to run their core airline operation. Studies show that more than 25% of airline revenue is used to cover employee wages and benefits (Low and Lee, 2014). Figure 2 shows the proportion of salaries and wages to total operating expenses over the period of this study. As noted in Figure 2, airlines incur substantial sums of labor related expenses to motivate employees to better performance. It is therefore important for airline managers to explore the effect employee productivity has on service quality, customer satisfaction, and financial performance.

The data show that labor and related expenses represent a significant portion of airlines' operating expenses. For instance, each year, airlines incur labor and labor related expenses of over $US23 billion (1995) to $US33 billion (2002). On average, during 1995 – 2009, labor and labor related expenses represent 33% of the total operating expenses of the seven major US airlines.

Figure 2. Proportion of Labor Related Expenses to Total Operating Expenses (1995-2009)

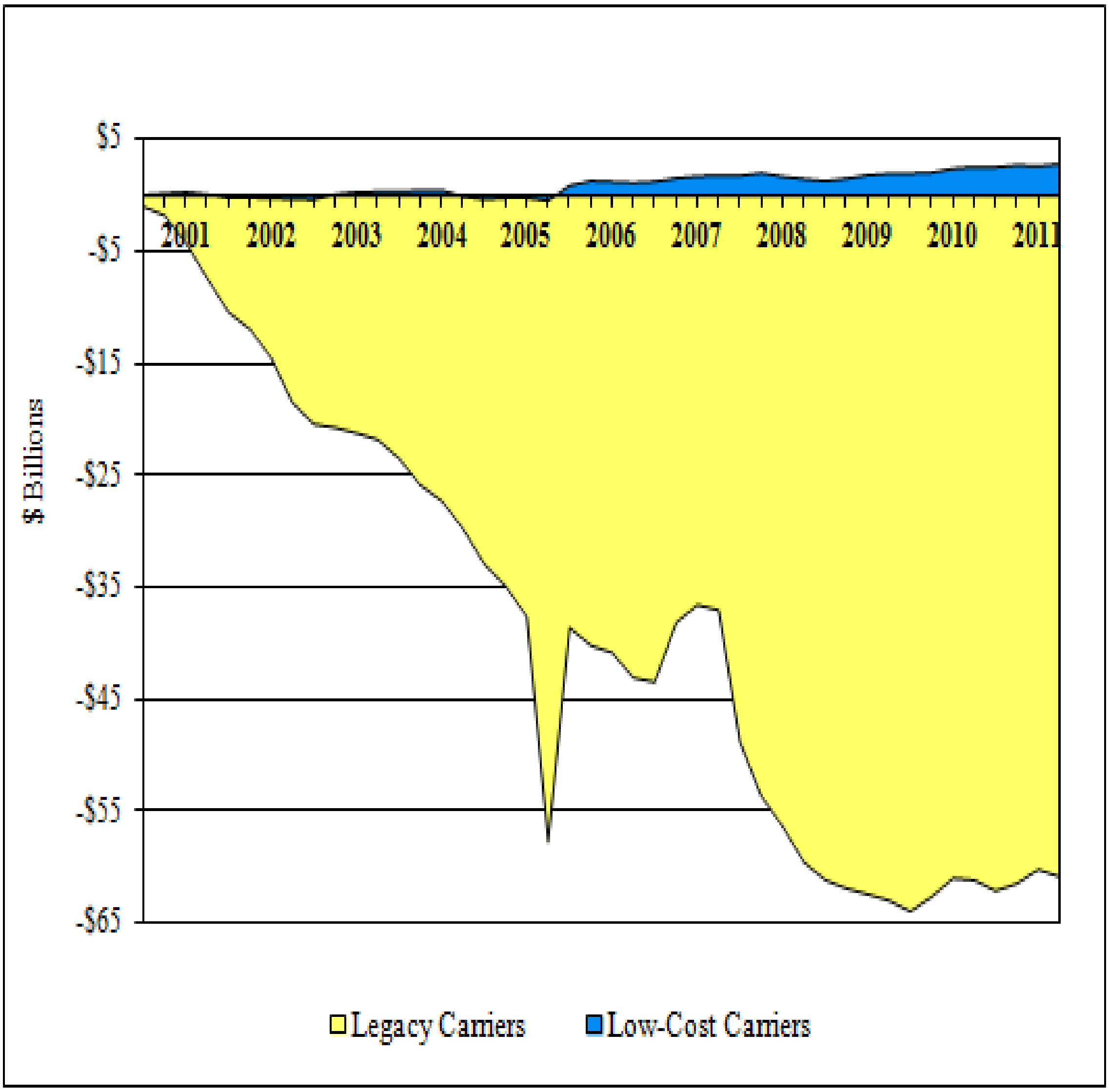


Notes: Figure 2 shows that airlines incur substantial operating expenses ranging from over 60 billion to 123 billion USD. Further, the figure also shows the proportion of total labor and related expenses to total operating expenses of the seven major airlines covered by this study. For instance, each year, airlines incur over 23 billion (1995) to 33 billion USD (2002) in labor and labor related expenses. Figure 2 also shows that labor related expense represent between 23% and 47% of the total operating expense, with an average of 33%.

Small Profit Margin

As seen above, airlines incur significant costs to run their operations. As a result, their profitability has been deteriorating for several years. Studies show that airlines earn lower profit margins due to competition, and also to fluctuating air travel demand as a result of economic downturn and rises in oil prices (Francis et al., 2005). Figure 3 shows the total accumulated losses of airlines during 2001-2011. As the figure shows, the losses demonstrate an increasing trend which threatens the survival of airlines. Exploring the key drivers of profitability would therefore provide insights which managers may use to formulate appropriate strategies.

Figure 3. Accumulated Net Losses and Gains for Network and Low-Cost Airlines (2008-2011)

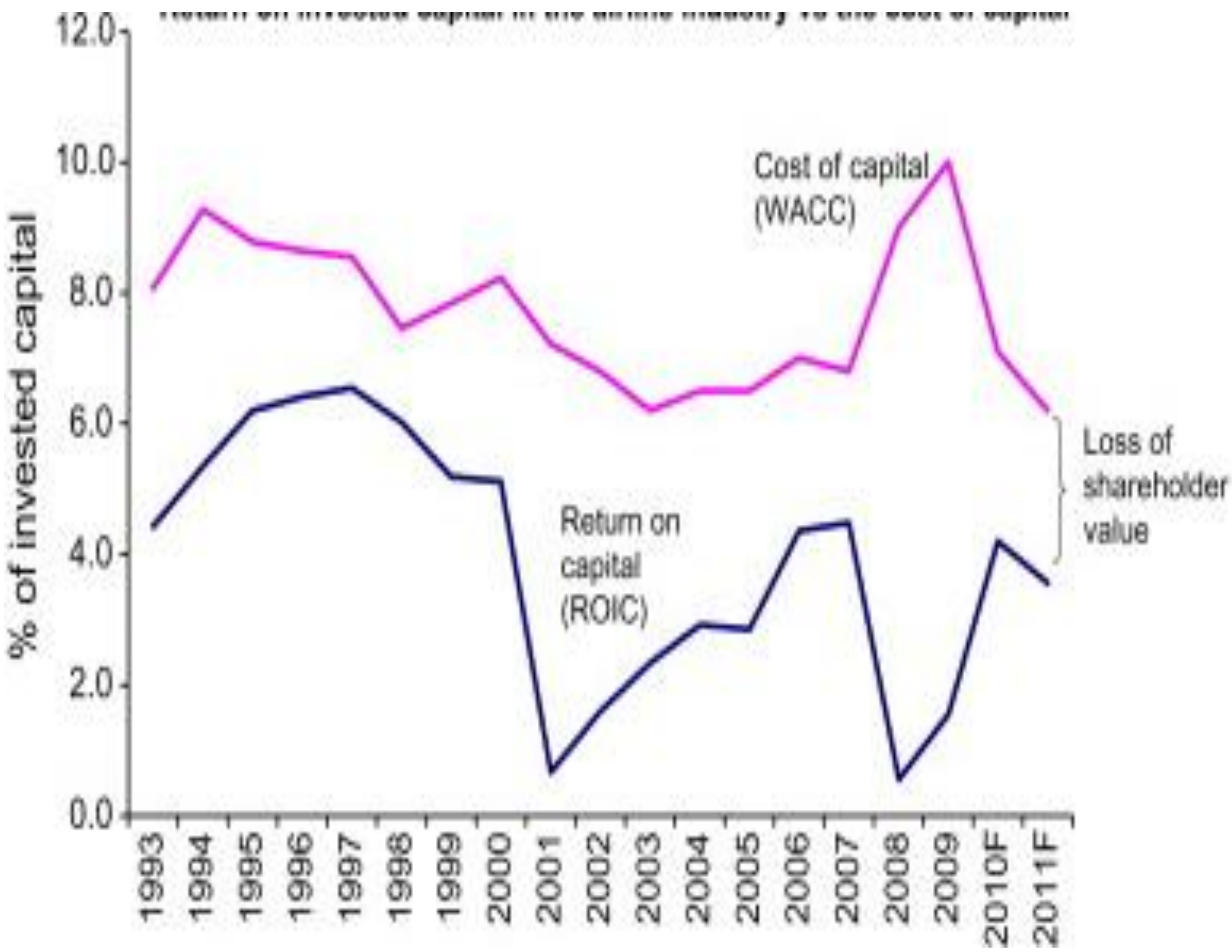


(***Source*****:** Inspector General - Aviation performance report (2008-2011))

Notes: This figure is adapted from the Aviation performance report (2008 – 2011) issued by the US Inspector General. It shows that the profitability of US airlines has been declining with the highest loss of 57 billion USD reported in 2011. The figure also shows that the largest proportion of loss is incurred by legacy airlines.

Many financial theories assume that company values and investment decisions are strongly influenced by the present value of future cash flows. Rational investors buy assets only when the estimated return is at least sufficient to both cover the risk-free interest rate and to provide reasonable compensation for the actual risk involved (Verbeeten, 2006). Firms create value for their shareholders and are able to survive and prosper in highly competitive markets only when they generate an economic return that is higher than the cost of their capital (Wojahn, 2012). However, as can be seen in Figure 4, the airline industry has been realizing losses since the turn of this century and it is failing, by a considerable margin, to cover the weighted average cost of invested capital (Pearce, 2012).

Figure 4. Return on Invested Capital in the Airline Industry vs. Cost of Capital (1993-2011)



(**Source**: Pearce, (2012, p. 6)

Notes: This figure is adapted from Pearce (2012). It shows that the performance of US airiness as measured by return on capital is lower than the cost of capital suggesting that airlines are not creating value to shareholders.

In summary, the unique features of the US Airline industry reveal that the industry is mainly a service business that uses high levels of human and capital resources to run its operations. Ensuring productivity is therefore crucial for the long term sustainability of airlines. Moreover, the above discussion shows that airlines are not creating value to shareholders due to a decline in profitability. Furthermore, research suggests that productivity, service quality, and customer satisfaction are key drivers of financial performance in the US airline industry. It is therefore essential to investigate the linkages among these key organizational factors.

2.2 Financial and Nonfinancial Performance Measures

The relationship between nonfinancial and financial performance measures has been extensively studied. As a result, various authors define performance measures in different ways. It has been widely argued that financial performance measures are short term and past oriented. Such measures have also been criticised for failing to capture the intangible assets that are crucial for the sustainability of firms (Kaplan and Norton, 1992; Neely, 2005). For this reason, several scholars suggest the incorporation of nonfinancial measures as part of the performance measure system. (Ittner and Larcker, 2003; Kaplan and Norton, 1992). In section 2.2.1, the definition of performance measures is provided. Section 2.2.2 reviews studies that suggest the use of nonfinancial performance measures. Then section 2.2.3 discusses prior studies from accounting, management, and marketing and operations management which focus on productivity, service quality, customer satisfaction, and financial performance. This section also discusses the characteristics of service businesses.

2.2.1 Definition of Performance Measures

Performance measures are often defined as "benchmarks designed to indicate economy (minimize cost of resources with regard to quality of inputs), efficiency (e.g., relationship between output of goods and services, in relation to resources used to produce them), or effectiveness (relationship between the intended and actual results) of a current or past activity, unit, organization, etc." (Townley, 2005, p.1). To this end, effective performance measures are comprehensive with a balanced mix of both financial[3] and nonfinancial information designed to gauge the attainment of strategic objectives (Kaplan and Norton, 1992).

Financial performance refers to performance information of an organization expressed in monetary terms (Bernard, 1999). Accounting measures, such as return on assets, return on equity, operating margin, and gross profit margin, are examples of financial performance. Gross profit margin and operating margin are commonly used measures of financial performance by airline researchers as these measures control differences in terms of capital structure and aircraft ownership among airlines (Windle and Dresner, 1992). Examples of nonfinancial measures include customer satisfaction, quality, and market share (Kaplan and Norton, 1992).

Bititci et al. (1997) define a performance measurement system as "the information system which is at the heart of the performance management process and it is of critical importance to the effective and efficient functioning of the performance management system" (p. 533). This definition implies that performance measures are important components of the overall

[3] For detailed explanation of the difference between financial information and nonfinancial information refer to: Bernard, R. R. S. (1999). The Rise of Non-financial measures. *Encontro da Associação Nacional dos Programas de Pós-Graduação em Administração, 23.*

performance management system in an organization. Further, Bititci et al. (1997) underscore the role of performance measures for the success of an organization's performance management system. To this end performance measures should be selected based on the expectation of managers (Lebas, 1995).

Financial performance measures have been widely criticized for being "narrow" due to their focus on tangible resources only. Multidimensional measures, on the other hand, are preferred because they contain sets of financial and nonfinancial measures that capture various tangible and intangible aspects of an organization (Kaplan and Norton, 1996b; Neely, 2005). Based on this notion, Bourne et al. (2013a) define a performance measurement system as "the use of a multi-dimensional set of performance measures for the planning and management of a business" (p. 4).

It is widely known that performance measures assist managers by providing information useful for the development of future plans and the evaluation of past performance. As such, a company's performance measurement system assists managers by: (1) facilitating communication among various members of the organization that are involved in setting objectives and (2) providing information to assess the attainment of those objectives (Forza and Salvador, 2000).

A well designed performance measurement system that provides performance information about the attainment of targets and efficiency in utilizing resources assists managers to be proactive in making decisions (Neely, 1998). Neely (1998) emphasizes that performance measures should be designed in such a way that actions are quantifiable and measurable to assess *efficiency and effectiveness* of an operation. Furthermore, Otley (1999) argues that the way performance information is used by managers impacts on employees so they behave in a certain way. This suggests that proper use of performance information is important to encourage desired behavior that leads to the attainment of organizational objectives.

It is further argued that performance measurement models with measures that are linked through a cause and effect pattern motivate employees to better performance by providing information about the impact of their current actions on future performance (Kelly, 2010). Therefore, it is imperative that a "performance measurement system should also include a component that will continuously check the validity of the cause-and-effect relationships among the measures" (Lebas, 1995, p. 35).

In summary, performance measures are important components of the overall performance management system of an organization. To this end they are designed to assist managers to assess past performance and develop future plans. Performance measures that contain multiple sets of financial and nonfinancial measures provide useful information about the effect of past actions on current and future performance. Likewise, performance measures with cause and effect relationships motivate employees to better performance by providing information about their current actions on future performance. This suggests that effective performance measures contain multi-dimensional measures with a valid cause and effect relationship among them.

2.2.2 Rationale for the Use of Nonfinancial Performance Measures

The importance of integrating nonfinancial performance measures as part of a company's performance measurement system was first recognized three decades ago. For instance, Johnson and Kaplan (1987) argue that management accounting which considers financial information does not provide an adequate basis on which to make long term decisions. Whilst financial measures provide important information to assess the effect of past and current actions, such information is not sufficient to make long term strategic decisions (Malina and

Selto, 2001). Consequently, forward looking performance measures are suggested to develop long term strategies (Kaplan and Norton, 1992).

Conventional management accounting approaches tend to focus only on the provision of financial information to assess the performance of managers at different levels of the organization (Chenhall, 2005). These measures often rely on cost and revenue information and fall short of identification of the causes of these financial results. A body of literature has emerged which identifies limitations of these conventional accounting performance measures. Such limitations include the failure to measure the intangible resources of an organization, being past oriented, and the failure to show the effects of current actions on future financial performance (Ittner and Larcker, 2003; Kaplan and Norton, 1996a).

To address the limitations of traditional accounting measures, various performance measurement frameworks, including the performance matrix (Keegan et al., 1989), the results and determinants (Fitzgerald, 1991), the SMART performance pyramid (Cross and Lynch, 1992), the performance prism (Neely et al., 2001), and the balanced scorecard (Kaplan and Norton, 1996a) have been introduced in the last three decades (Neely, 2005).

The *performance matrix* combines multiple performance measures designed to capture internal and external as well as financial and nonfinancial information (Neely et al., 2005). The results and determinants framework has two important components: the drivers of performance and the subsequent results. The underlying assumption for the *results and determinants* framework is that financial performance is the outcome of various operational factors, such as quality of a product or service, innovativeness, flexibility of operations, and efficiency in resource utilization (Keegan et al., 1989).

The *SMART Performance Pyramid* was introduced by Cross and Lynch (1992). The performance pyramid aims to integrate organizational strategy with operations by cascading objectives from the top level of management down to the operational level (Tangen, 2013). The SMART Performance Pyramid has four levels: the organizational vision, targets and long term objectives, routine operational activities, and key performance indicators (Cross and Lynch, 1992). The *Performance Prism* is another performance measurement framework developed to address the limitations of traditional measures (Tangen, 2013). It has five interlinked dimensions: satisfaction of stakeholders, main organizational strategies, operational process, key capabilities, and the contributions of stakeholders (Neely et al., 2001).

One of the most widely applied performance measurement frameworks is the balanced scorecard (Ittner and Larcker, 1998b). The balanced scorecard contains both financial and nonfinancial measures interrelated in a cause and effect pattern. It has four perspectives, namely: *Learning and Growth Perspective, Internal Business Process Perspective, Customer Perspective, and Financial Perspective* (Kaplan and Norton, 1992; Kaplan and Norton, 1996a; 2001). According to Kaplan and Norton (1992), measures of learning and growth are leading indicators of measures of the internal business process, while the measures of the internal business process are a leading indicator for measures of customer perspective. Similarly, measures of the customer perspective are leading indicators of financial performance.

Ittner and Larcker (1998b) find that innovations in performance measures have advanced with the balanced scorecard being most widely used. Further, they emphasize the importance of comprehensive performance measures for the integration of financial and managerial accounting to identify critical value drivers. Comprehensive performance measures are referred to as measures that contain integrated sets of financial and nonfinancial information about the various operations of an organization (Chenhall, 2005; Henri, 2006; Malina and Selto, 2001). Comprehensive performance measures are preferred to traditional accounting measures because they “supplement the traditional financial measures with a diverse mix of nonfinancial measures that are expected to capture key strategic performance dimensions that are not accurately reflected in short term accounting measures” (Ittner et al., 2003, p. 717).

It is further argued that comprehensive performance measures are tools that assist managers to integrate the various functional units towards the implementation of organizational strategy (Chenhall, 2005; Neely and Adams, 2005). This implies performance measures should be consistent over time and across functional units. Moreover, comprehensive performance measures that incorporate the essential factors of the organization are sought to assist management in implementing its strategy (Townley, 2005). In summary, prior empirical work shows that comprehensive performance measures incorporate both financial and nonfinancial performance measures designed to assist the formulation and implementation of the strategy of an organization.

Following the introduction of various performance measurement frameworks, there is a large body of literature that investigates the relationship between nonfinancial and financial performance measures (Abdel-Maksoud et al., 2005; Banker et al., 2000; Behn and Riley, 1999; Ittner and Larcker, 1998a). These studies suggest the existence of link between nonfinancial and financial performance measures. For instance, Ittner and Larcker (1998a) investigate the relationship between customer satisfaction and financial performance as measured by profitability and stock return in a telecommunication firm. Based on marketing and economic theory, they document customer satisfaction as a leading indicator of future financial performance; information about customer satisfaction affects stock price, and the economic value of customer satisfaction is partially reflected in the accounting measures. Thus, their study reveals that the relationship between customer satisfaction and firm performance is positive, but nonlinear, and at times diminishing with high satisfaction.

Furthermore, Behn and Riley (1999) examine the association between nonfinancial information and financial performance. They find association between on time performance, mishandled baggage, ticket over-sales, inflight services, and customer satisfaction. Their findings suggest the existence of an association between the nonfinancial performance measures of customer satisfaction, load factor, market share and available tone-miles with expenses. Their findings also suggest that non-financial performance measures are leading indicators of future financial performance. However, they acknowledge that the selection of the performance metrics, the relationship between them, and the time lag used in the investigation of the relationship between nonfinancial and financial performance measures is not supported by theory.

A further stream of empirical work focuses on the importance of a causal linkage between the nonfinancial and financial performance measures (Ittner and Larcker, 2003; Malina and Selto, 2001; Patel et al., 2008; Wiersma, 2008). For instance Ittner and Larcker (2003) find that firms with business models integrated with cause and effect relationships have higher returns on assets than those who do not use such models. They investigated 60 companies that use a combination of nonfinancial and financial performance measures to explore the existence of a causal link among the performance measures. Their findings show that the majority of the companies surveyed have a list of performance measures without causal relationships. The implication of their study is that nonfinancial performance measures assist organizations to enhance performance if only those nonfinancial performance measures that have effect on performance and when causal link is established among the performance measures.

Wiersma (2008) examines whether nonfinancial information have *incremental* or *relative* information compared to financial performance measures. Using three years of panel data, he finds that nonfinancial performance measures have "incremental information content compared to financial performance measures" (p.2). This finding supports the existence of a causal relationship between absence frequency, future cost, and increased revenue. However, evidence does not support his prediction of the relative information content of nonfinancial performance over financial performance measure. This study considers only two nonfinancial performance measures related to one category, the employee, and therefore lacks generalizability in terms of the causal relationship between nonfinancial and financial performance measures.

Yet another stream of research relates to the investigation of the impact of using nonfinancial performance measures on firm performance (Grafton et al., 2010; Henri, 2006; Said et al., 2003). For instance, Said et al. (2003) study the relationship between the integration of nonfinancial performance measures in compensation contracts and the current and future performance of an organization. They compare firms that use a combination of nonfinancial and financial performance measures against firms that depend on financial performance measures only. Their findings show that the use of nonfinancial and financial information is positively related to stock market returns but they find no significant relationship with the accounting performance. Moreover, they find that the relationship between the use of nonfinancial performance measures and firm performance is dependent on firm specific operational and competitive factors.

As discussed earlier, multidimensional performance measures benefit organizations when managers understand the underlying relationship among the performance indicators and their effect on performance (Patel et al., 2008). Based on this argument, Patel et al. (2008) employ a quantitative approach to examine cause and effect relationships among the performance measures used by the UK's National Health Service. Using the structural equation modelling and publicly available data covering two years, they developed and tested a causal model that shows the interaction among the performance indicators.

It has been argued that understanding the cause and effect relationship between key performance drivers and organizational objectives is crucial for the effectiveness of performance measures (Ittner et al., 2003; Kaplan and Norton, 1996b). Performance measurement models with causal links provide information about the effect of current actions on future financial performance, facilitate communication and control of organizational objectives, and serve as tools to motivate employees (Malina and Selto, 2004b). Therefore, identifying the cause and effect relationship among performance measures assists management to combine and deploy its resources and focus its attention on the key determinants of performance.

Research underscores the importance of a causal link among performance measures showing that companies with causal models linking nonfinancial performance measures and financial performance perform better than those without such causal links (Ittner and Larcker, 2003; Smith and Wright, 2004). In the absence of a validated causal link among performance measures "firms may weight all measures equally, subjectively assign weights based on untested assumptions, or self-servingly place more weight on better performing measures to boost performance evaluation and bonus" (Kelly, 2010, p.2). Scholars further argue that performance measures with causal links enhance the effectiveness of financial statement audits as such models provide information about the relationship between operational activities and financial performance (Vera-Muñoz et al., 2007). Despite the strong theoretical claim concerning the benefits of establishing cause and effect between performance measures, there is limited supporting empirical evidence (Kelly, 2010; Malina and Selto, 2001; 2004a).

One of the most popular performance measurement models with a cause and effect relationship among performance measures is the balanced scorecard, introduced by Kaplan and Norton (1992). The balanced scorecard was originally introduced as a performance measurement framework with four perspectives: (1) learning and growth, (2) internal business process, (3) the customer perspective, and (4) the financial perspective. The basic assumption of the balanced scorecard is that the four perspectives are interrelated in a cause and effect fashion (Kaplan and Norton, 1992). The balanced scorecard has been improved as a performance management framework as a result of the introduction of the strategy map (Hoque and James, 2000; Kaplan and Norton, 2000).

Overall the above studies underscore two important requirements in terms of determinants for performance measures to assist organizations achieve their objectives: the need to identify key performance indicators, and the need to establish causal relationships among the performance measures. However, empirical studies to validate the claimed cause and effect relationship among the set of performance measures are limited (Hoque, 2014).

2.3 Performance Measures in Service Industries

The service management literature argues that the service industry differs from the manufacturing industry in terms of the role of the customer and the nature of the product. In service industries, the customer is a "co-producer" of the service (Parasuraman, 2010). The involvement of the customer in the production of the service has implications for productivity, service quality, customer satisfaction, and financial performance (Grönroos and Ojasalo, 2004). Unlike the manufacturing industry, the products of service industries cannot be stored (Grönroos and Ojasalo, 2004 p.5), and the impact of the perishable nature of unsold capacity on the financial performance of service industries is different from the impact on manufacturing industries where such unsold items are stored and reported as inventories.

Productivity is a multidimensional concept comprised of inputs, such as labor, fixed assets, materials used in the production process, and the resulting output. The concept of productivity relates to how managers identify, coordinate, and deploy their resources with a view to the enhancement of output with less input. Research suggests that airline productivity boosts airline profits, shareholder dividends, employee benefits, and government tax revenues (Powell et al., 2013).

Service quality depends on customers' perceptions in the service industry and thus has an impact on productivity (Grönroos and Ojasalo, 2004; Parasuraman, 2002). Therefore, an integrated view of productivity, service quality, and customer satisfaction (Calabrese, 2012; Grönroos and Ojasalo, 2004; Parasuraman, 2002), as well as the impact on economic performance (Barnabè and Busco, 2012) has been suggested. This approach links the resources consumed to provide the services with the services produced, which in turn facilitates a comparison among firms in the same industry (Schefczyk, 1993). This study therefore focuses on the investigation of the relationship between productivity, quality, and customer satisfaction, and their impact on financial performance.

2.3.1 Productivity, Service Quality, and Financial Performance

The service literature operationalizes service productivity as "the ratio of the service output experienced by a customer to the inputs provided by that customer as a participant in service production" (Parasuraman, 2002, p. 7). This perspective emphasizes the role of customers in the production of service, and the unique nature of service whereby production and consumption are instantaneous. The service literature classifies service businesses into four categories, based on the volume of labor and other organizational resources used: service factories, mass services, professional services, and service shops (Schmenner, 1986). Airlines are placed in the service factories category as they largely depend on organizational resources rather than human resources in delivering services (Schmenner, 1986). Schmenner's (1986) classification provides an interesting opportunity to explore whether the relationship between service productivity and service quality is conflicting or complementary across the four types of service.

Schmenner (1986, p.3) argues that "*Labour intensity and customer interaction and service customization"* are the key determinants of service productivity. *Labour intensive* service businesses are characterized as having more labor/employee costs than plant and machinery costs. In other words, the proportion of total labour cost incurred by labour intensive service businesses is higher compared to costs related to plant and machinery.

Based on the above two major factors influencing service productivity; the level of *customization* of the service they offer and *customer interaction*, and the level of human, organizational, and capital resources they require to produce their services, service businesses are classified into four distinct categories. These are: service factories, mass services, professional services, and service shops (Schmenner, 1986). Figure 5 shows Schmenner's Service Process Matrix.

Figure 5. Schmenner's (1986) Service Process Matrix

		Degree of interaction and customization	
		Low	**High**
Degree of labor intensity	**Low**	**Service factories** • Airlines • Trucking • Hotels • Resorts & recreation	**Service shops** • Hospitals • Auto repairs Other repair services
	High	**Mass services** • Retailing • Wholesaling • Schools • Retail aspect of commercial banking	**Professional services** • Doctors • Lawyers • Accountants • Architects

(**Source**: adapted from Schmenner, (1986, p. 5)

Notes: Schmenner's Service Process Matrix shows that service businesses are categorized into four areas based on the *degree of interaction and customization* and *the degree of labor intensity* in the process of service production; these are service factories, service shops, mass services, and professional services. According to Schmenner, service factors are relatively capital intensive. These types of service businesses produce relatively standardized services with a relatively low level of customer interaction. Schmenner describes service shops as those services which are not labor intensive but which involve a relatively high level of interaction with customers to produce tailored services according to the specific requirements of those customers. Mass services are characterized as those which are labor intensive but do not require customer interaction with relatively standardized services. Schmenner explains professional services as those requiring a relatively high level of customer interaction and which use more labor than capital to satisfy each customer's requirements by providing tailored services. Schmenner provides examples under each category.

According to (Schmenner, 1986; 2004) the first category of service businesses is *service factories* (see Figure 5). Service factories are characterized as those businesses that provide their services with a relatively lower proportion of labor cost compared to plant and machinery. Service factories provide relatively homogenous services to all customers and thus do not require interaction with them. Airlines and hotels are among the typical examples of service businesses included in the service process matrix.

However, service businesses that provide services which vary with the requirements of customers, and with a relatively high proportion of cost of plant and equipment, are categorized as *service shops* (Schmenner, 1986). For instance, Schmenner (1986) describes hospitals as an example of service shops because they provide health care services to their customers/health care service seekers based on their health condition. Figure 5 also shows that service businesses that use more labor than plant and machinery to produce their services with no, or limited, interaction with customers during the service production process are classified as *mass services*. Schmenner (ibid) explains these types of service businesses provide largely homogenous services that are not required to tailor towards the needs of each customer, such as educational institutions, retail shops, and cleaning services.

The service process matrix, presented in Figure 5 above, also shows service businesses that provide tailored services to their customers, based on their specific requirements, and which have a relatively high proportion of labor cost to plant and machinery, along with high levels of customization and customer interaction, categorized as *professional services*. Schmenner (1986) describes professional service providers as having higher levels of labor cost and higher levels of customization of service with higher customer interaction, exemplified by doctors, accountants, and lawyers.

The implication of the service process matrix is that the level of interaction between service provider and client, and the extent of *customization* of service, are important factors for the productivity of service. A service business that involves high levels of customer interaction, for example, restaurants or advertising agencies, entails additional work as the provider responds to customer requests (Schmenner, 1986; 2004). This implies that service businesses with high levels of interaction with clients are likely to incur additional costs in order to meet customer requirements. Similarly, a service that requires tailoring according to the needs and requirements of the customer leads to higher costs due to the additional work done (Calabrese and Spadoni, 2013; Frei, 2006). Thus, service businesses with high levels of interaction with customers, and with a high proportion of labor cost, could achieve both productivity and service quality by improving the productivity of their employees (Calabrese, 2012).

As discussed above, Schmenner (1986) describes service factories as service businesses with a type of service that can cater to customers without the need for customization using a relatively high proportion of cost of plant and equipment compared to the cost of labor. It is argued that the lesser the level of *customization and interaction* and the lower the proportion of labor cost to plant and machinery, the higher the possibility to achieve productivity and service quality (Calabrese, 2012). Hence, service factories can achieve both productivity and service quality simultaneously (Calabrese, 2012; Schmenner, 1986). Mefford (1991) further argues that productivity and quality are directly related as efforts to enhance productivity reduce defects and reworks which have a direct effect on quality. Similar results are reported in the airline industry by Sim et al. (2006), i.e., aircraft productivity, as measured by the number of hours an aircraft is on revenue generating activity, is positively related to airline service quality, as measured by reduced number of lost bags and the number and length of flight delays. Truitt and Haynes (1994) find that an airline can increase productivity and service quality simply by adding new aircraft to its operations.

Empirical evidence supports the assertion that service quality affects financial performance indirectly through its effect on customer satisfaction. This is true because different aspects of service quality have different impacts on customer satisfaction depending on the purpose of travel (Anderson et al., 1997; Bernhardt et al., 2000). This is consistent with the argument that relative measures of service quality better explain the relationship between quality and customer satisfaction (Kim and Lee, 2011). In summary, the above studies show mixed results due to use of cross sectional data (Bernhardt et al., 2000) measuring narrow dimensions of productivity and quality, and the lack of an integrated measure of the effect of the constructs (Sim et al., 2006; Tsikriktsis, 2007).

2.3.2 Customer Satisfaction and Financial Performance

The relationship between customer satisfaction and financial performance is one of the most highly researched areas in accounting and in marketing (Anderson et al., 1994; Banker et al., 2000; Behn and Riley, 1999; Ittner and Larcker, 1998a; Sun and Kim, 2013). Marketing researchers conceptualize customer satisfaction as “transaction specific and cumulative” (Anderson et al., 1994, p.53). The attitude of customers after purchase of a specific product or service is specific to that transaction (Anderson et al., 1994). Cumulative customer satisfaction, on the other hand, is related to “an overall evaluation based on a total purchase and consumption experience overtime” (Anderson et al., 1994, p.54). Transaction specific measures of customer satisfaction help firms to take corrective measures to address the cause of the specific issue that may result in a customer’s dissatisfaction. Therefore, cumulative customer satisfaction provides a broader view of a firm’s overall current and future performance (Anderson et al., 1994). Consistent with prior work, the conceptual framework considered in this research is, therefore, cumulative customer satisfaction.

Scholars argue that customer satisfaction is different from quality as the former requires customers to have purchased the product or service to form a judgment about their satisfaction, while the latter can be perceived without the customer consuming the product or service (Anderson et al., 1994; Oliver, 2010). Accordingly, quality is related to current perceptions of the customer about a given product or service, while customer satisfaction is cumulative. Therefore, consistent with prior work, this research conceptualizes quality as fundamentally different from customer satisfaction.

There is a long standing argument in both the accounting and marketing literature that customer satisfaction is positively related to financial performance (Anderson et al., 1994; Bernhardt et al., 2000; Fornell et al., 2006; Ittner and Larcker, 1998a). Similarly, Sun and Kim (2013) find a positive relationship between customer satisfaction, as measured by the American Customer Satisfaction Index[4], and measures of financial performance, such as return on assets and market value. Supporting the claim that nonfinancial performance measures are leading indicators of future financial performance suggests that customer satisfaction, load factor, and market share are all positively associated with financial performance in the US airline industry (Behn and Riley, 1999). However, the authors acknowledge a lack of theoretical justification for the constructs and the relationship between them as limitations of their study.

There is a parallel argument that the relationship between customer satisfaction and financial performance measures is nonlinear. For instance, demographic characteristics of customers (Dotson and Allenby, 2010) and the level of competition (Banker and Mashruwala, 2007) are identified as moderating factors in the relationship between customer satisfaction and financial performance. The relationship between customer satisfaction and financial performance holds true only with the longitudinal data to realize the effect of efforts to enhance customer satisfaction on financial performance (Anderson et al., 1994; Bernhardt et al., 2000). Furthermore, there is a growing argument that "customer satisfaction may lead to lower stock price as investors may believe that the firm is giving too much away to the buyers" (Fornell et al., 2006 , p.5).

In summary, the above studies reveal the existence of a growing interest for the in-depth exploration of the relationship between productivity, customer satisfaction, and financial

[4] The American Customer Satisfaction Index is a measure of levels of customer satisfaction. The American Customer Satisfaction Agency conducts an annual survey of customers of various US companies and produces a customer satisfaction index.

performance. However, this review of the literature shows mixed results about the direction of the relationship between customer satisfaction and financial performance.

2.4 Summary

The main objective of this research is to investigate the links between nonfinancial performance measures and the effect of such links on financial performance. Particularly, this study aims to investigate the relationship between the nonfinancial performance measures of productivity, service quality, and customer satisfaction, and their relationship with financial performance. The service literature suggests performance measurements in the service industry should consider the context of the industry. Consistent with this suggestion, this study reviews prior work on the relationship between productivity, quality, customer satisfaction, and financial performance, including studies related to the role of a cause and effect relationship among performance measures.

Scholars have long argued that financial performance measures are inadequate to make long term strategic decisions as they only show results of past actions. As such, financial performance measures are lagging indicators which are useful for the assessment of past performance. Furthermore, the information obtained from financial measures is limited to tangible assets only. Cognizant of the limitations of the financial performance measures, scholars suggest integrating nonfinancial performance measures as part of a firm's performance measurement system.

The literature reviewed in this chapter shows that incorporating nonfinancial performance measures in the performance measurement system improves employee performance by informing managers and employees the effect of their actions, and assists management to identify its existing and potential capabilities. Further, studies suggest that the use of nonfinancial performance measures benefits organizations when such measures are incorporated based on their link with financial performance. In other words, establishing causal relationships among performance measures is crucial for the effectiveness of a performance measurement system.

The relationship between nonfinancial and financial performance measures has been extensively investigated. These studies are broadly classified into two areas. One strand of literature investigates the *value relevance* of nonfinancial measures to predict the market value of a firm. These studies show that nonfinancial performance measures affect the stock price, suggesting the value relevance of nonfinancial performance measures. The second strand of literature explores the relationship between nonfinancial and financial performance measures. These studies suggest that nonfinancial performance measures are leading indicators of future financial performance.

Studies investigating the relationship between productivity and service quality have shown mixed results. Cross sectional data, measuring narrow dimensions of productivity and quality, and the lack of integrated measures of the effect of the constructs are some of the likely causes of such mixed results. This research addresses these limitations by integrating productivity, service quality, and customer satisfaction, and considering their impact on financial performance using longitudinal panel data. Moreover, multiple dimensions of both productivity and service quality are considered.

The literature review shows that prior studies on the relationship between productivity and financial performance lend support to the argument that high levels of productivity are associated with high levels of financial performance (Tsikriktsis, 2007). However, these studies use only one dimension of capacity - load factor - with the exception of Tsikriktsis (2007) who incorporates fleet utilization to measure operational efficiency. Even those who use more than one dimension of productivity fail to investigate the links between productivity, service quality, customer satisfaction, and financial performance. This research, therefore, builds on the existing literature on performance measures by investigating the causal link between the two dimensions of productivity, service quality, customer satisfaction, and financial performance.

Empirical evidence supports the claim that service quality affects financial performance indirectly through its effect on customer satisfaction (Behn and Riley, 1999; Sim et al., 2006; Tsikriktsis, 2007). However, prior studies tend to focus on investigating certain aspects of quality in isolation. Therefore, this research adds to the existing knowledge by investigating the interplay between the various dimensions of productivity and their impact on service quality, customer satisfaction, and firm performance.

Studies into the relationship between customer satisfaction and financial performance show mixed findings (Anderson et al., 1997; Bernhardt et al., 2000; Fornell et al., 2006; Ittner and Larcker, 1998a). Moreover, these studies do not explicitly investigate the drivers of customer satisfaction and their ultimate effect on financial performance, with one exception; Smith and Wright (2004) developed a causal model to show the determinants of customer loyalty, customer satisfaction, and financial performance.

Overall, the literature suggests that understanding how the various nonfinancial performance measures affect financial performance assists management to identify existing and potential capabilities (Grafton et al., 2010). This in turn helps top management to devise strategies to improve performance. Empirical evidence reviewed in this chapter supports the theoretical claim that nonfinancial performance measures are indeed leading indicators of future financial performance. The literature also shows the benefits of performance measurement models with cause and effect relationships among nonfinancial and financial performance measures. This creates an opportunity for managers to identify the key determinants of performance, and thereby deploy resources and focus their attention on those key drivers. However, empirical studies largely focus on establishing associations with some aspects of nonfinancial measures. Furthermore, there is a lack of theoretical justification for the selected constructs. This research fills these important gaps by investigating the relationships between nonfinancial performance measures and financial performance measures based on the RBV and ST.

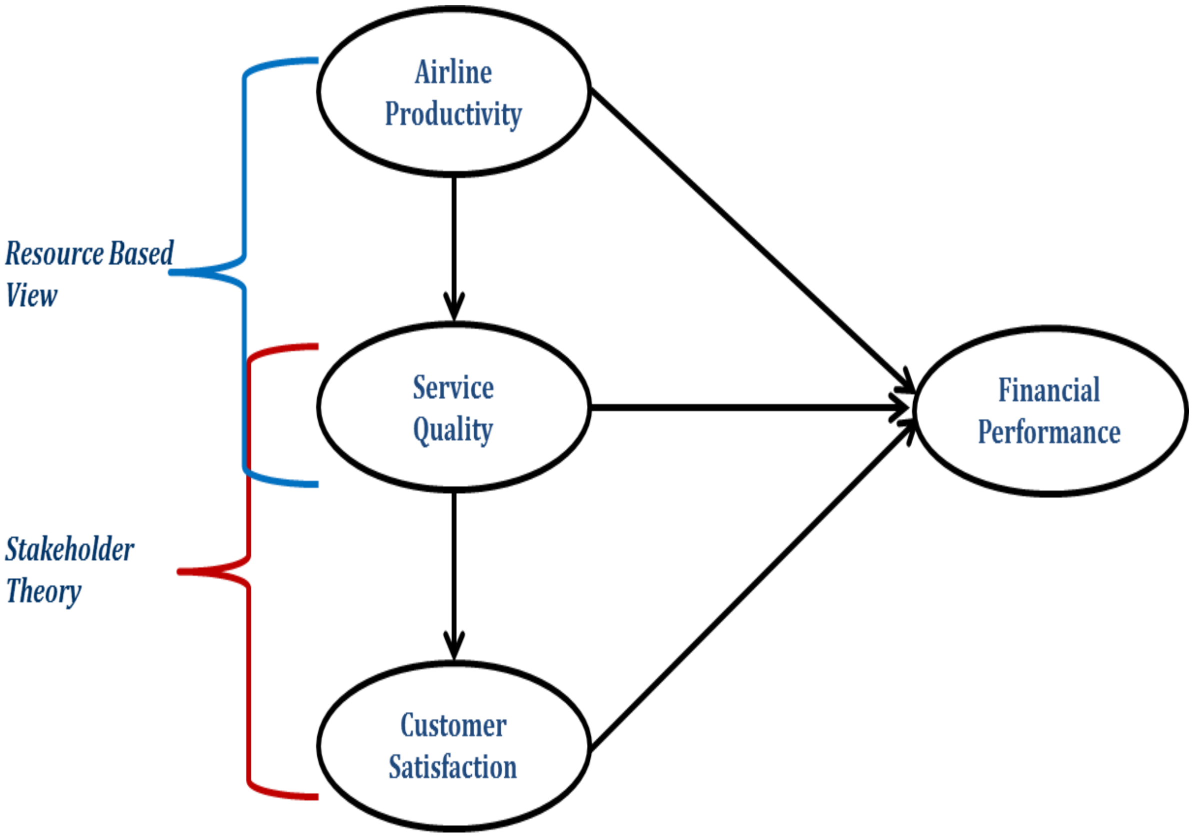
CHAPTER THREE: THEORY AND HYPOTHESES DEVELOPMENT

As noted earlier, the main objective of this research is to investigate the relationship between airline productivity, service quality, customer satisfaction, and financial performance. To this end, relevant literature has been reviewed in Chapter Two. Based on the review, I develop a theoretical model drawing on the combined views of Resource Based View (RBV) and Stakeholder Theory (ST). The RBV has been an important theoretical basis for the investigation of factors that drive competitive advantage. According to the RBV, superior financial performance is dependent on the characteristics of a firm's resources (Barney, 1991; Grant, 1991). Specifically, resources that are distinct from those resources possessed by competitors, and those that cannot be easily copied or easily transferred are sources of competitive advantage (Barney, 1991). Proponents of ST, on the other hand, argue that a firm's superior performance depends on its ability to satisfy its stakeholders (Donaldson and Preston, 1995; Freeman, 1984; Harrison and Wicks, 2012).

The RBV argues that firms achieve superior performance if they possess resources that are not commonly found in other competitors, and if such resources are not easily transferable and cannot be easily copied (Barney, 1991). Based on the basic notions of RBV and ST, this research argues that ownership of productive resources with characteristics described by the RBV as "*valuable, rare, and inimitable*", is not a sufficient condition for firms to achieve competitive advantage. It is also equally important for such firms to ensure that these resources are deployed in such a manner as to enhance stakeholder satisfaction. Consequently, I argue that firm's performance can best be explained by applying the combined view of the RBV and ST.

In section 3.1, the RBV is discussed as it relates to resource productivity and the subsequent effect on service quality and financial performance. Section 3.2 presents ST focusing on the role of stakeholder satisfaction, in this case customer satisfaction, on financial performance. Finally, the combined view of the RBV and the ST is discussed in Section 3.3. This chapter ends by presenting a summary of the main points discussed. Figure 6 presents the theoretical model developed based on the combined view of the RBV and ST.

Figure 6. Theoretical Model with Underlying Theories



Note: This figure presents the theoretical model developed which is based on the Resource Based View and Stakeholder Theory. The link between airline productivity, service quality, and financial performance is developed based on the Resource Based View . The link between service quality, customer satisfaction, and financial performance is elaborated on the basis of on Stakeholder Theory.

3.1 Theoretical Framework

The theoretical model (Figure 6) in this research shows the link between airline resource productivity, service quality, and the subsequent effect on customer satisfaction, and the combined effect of these factors on airline financial performance, based on the RBV and ST.

The RBV and ST have been widely used in strategic management research to investigate corporate performance. Both the RBV and ST elaborate on the key sources of improved financial performance, and thus they share the same dependent variable, i.e., firm performance. However, these two theories diverge in their conceptualization of the firm and their respective assumptions.

The RBV operationalizes firms as a collection of resources, and these resources are sources of competitive advantage if they are *valuable, rare, and inimitable* (Barney, 1991; Größler, 2007; Henri, 2006; Hoopes et al., 2003). Resources may be either tangible, e.g., aircrafts and simulation equipment, or intangible, e.g., employee expertise and management capabilities (Barney, 1991; Eisenhardt and Martin, 2000). The RBV has provided an influential theoretical background to explore the role of a firm's resources on corporate performance (Wernerfelt, 1995). It emphasizes the role of internal resources as the means to achieve competitive advantage (Priem and Butler, 2001). The role of stakeholders, such as customers, suppliers, and the community, in shaping a firm's financial success appears to be neglected.

The ST, on the other hand, regards a firm as the "nexus" of relationships among various stakeholders (Freeman, 1984), satisfying the interests of the various stakeholders which leads to competitive advantage (Donaldson and Preston, 1995b). Further, proponents of ST argue that a management approach which focuses on satisfaction of stakeholders leads to superior competitive advantage (Harrison et al., 2010).

The ST focuses on the role of stakeholders in gaining competitive advantage and overlooks the crucial role resources play in order to satisfy the interests of stakeholders. However, the financial success of a firm that possesses "*rare, unique, and inimitable"* resources is dependent on its capability to satisfy the conflicting interests of its stakeholders. This argument is consistent with the strategic management literature that suggests complementing the RBV with other theories which have "demand oriented perspectives to advance the RBV to answer how resources enable a firm to achieve and maintain superior performance" (Priem and Butler, 2001, p.36). With this suggestion in mind, I argue that a firm's internal resources, as described in the RBV, should be complemented with the ability to satisfy its stakeholders, as indicated by the ST, in order to gain competitive advantage. Consequently, this research integrates the RBV and ST to examine the effect of airline resource productivity (employee productivity and aircraft productivity) on quality and customer satisfaction, and their combined effect on financial performance.

There is growing interest in the strategic management literature in the integration of the RBV and ST to explain the relationship between nonfinancial and financial performance. For instance, Surroca et al. (2010) investigate the mediating role of intangible assets in the relationship between corporate social responsibility performance and financial performance, drawing on the RBV and ST. Moreover, the RBV and ST have also been applied by researchers who investigated the link between maintaining good relationships with stakeholders and financial performance (Choi and Wang, 2009), and the link between value creation and appropriation (Garcia‐Castro and Aguilera, 2014).

Drawing on RBV and ST, this study develops and empirically tests an integrated framework that links productivity, service quality, customer satisfaction, and financial performance. The theoretical framework presented in Figure 6 is developed based on the argument that corporate financial performance is the outcome of simultaneous effects of productivity, service quality, and customer satisfaction, and thus these factors should be explored simultaneously. Section 3.1.1 discusses the RBV as it applies to productivity, service quality, and financial performance.

3.1.1 The Resource Based View (RBV): Productivity, Service Quality, and Financial Performance

The RBV suggests that firms attain and maintain competitive advantage from their *unique and inimitable resources and capabilities* (Barney, 1991; Hoopes et al., 2003). It is further argued that the sustainability of a firm depends on how the valuable resources are coordinated and deployed (Barney and Wright, 1998). The core idea of this argument is that a firm's sustainability is basically determined by its ability to effectively and efficiently use the capabilities of its human resources to increase productivity (Burney et al., 2009). Accordingly, firms require a unique capability to combine and deploy their key resources in such a manner that wastage and defects will be minimized and customer expectations will be met (Peteraf, 1993).

In accounting there is a growing body of literature applying the RBV in investigations of the role of performance measures on identifying and utilizing sources of competitive advantage. It is argued that performance measures enhance utilization of organizational capability[5] by providing broad based information that shows the effect of current actions on future financial performance (Grafton et al., 2010; Kaplan and Norton, 2000).

Consistent with the argument about the importance of understanding the relationship between nonfinancial and financial performance measures, evidence generally shows the application of the RBV in investigations of the role of performance measures to identify and utilize organizational capabilities. For example, Henri (2006) investigates the relationship between performance measures and organizational capabilities. Based on the RBV, he argues that the

4. Capabilities can be thought as organizational competence skills in combining and deploying resources to achieve organizational objectives (Grant, 1991).

use of performance measures to predict future performance creates the opportunity to identify strategic priorities and capabilities which leads to improved organizational performance.

A recent study on the relationship between the use of performance measures and firm performance shows that performance measures help organizations unleash organizational capabilities (Grafton et al., 2010). The study further argues that the relationship between the use of broad based performance measures and financial performance is determined by the subsequent decisions made by managers based on the information provided by the performance measurement system.

The above studies provide evidence that a firm's sustainability is largely determined by its capability to understand the effect of the interactions among its resources and consequently to identify its key competence to meet customer requirements. Further, these studies provide evidence that performance measures play an important role in the process of identifying and deploying resources to achieve organizational objectives.

Consistent with the RBV, the service profit chain (SPC) posits that employee satisfaction will ultimately lead to productivity and profitability (Heskett and Schlesinger, 1994) as a result of increased efficiency in resource utilization. However, the SPC does not explicitly consider the role of customer satisfaction in the relationship between service productivity and profitability (Kim and Prater, 2011).

According to the RBV, resources are classified as either tangible or intangible. General resources, such as equipment, machinery, and raw materials are classified as tangible resources, and others, such as human resources, patents, and technology, are intangible (Grant, 1991). In the airline industry, the key resources used as input are human resources (airline employees), aircraft, and fuel (Tavassoli et al., 2014). Airlines hire highly skilled manpower to provide their service, making their employees a valuable intangible resource. Airlines invest substantial amounts of money in hiring, training, and compensating their employees to ensure operational efficiency and service excellence. As a result, employee related expenses represent a quarter of the operating expenses of airlines (Low and Lee, 2014). Such investment creates value and ensures sustainability of airlines in addition to enhancing productivity and service quality which ultimately leads to superior financial performance.

The other major resource of airlines is the aircraft fleet. Due to the rise in air travel demand, airlines have increased the number of their aircraft, either through leasing or through direct purchase from the manufacturer. Airlines with higher numbers of aircraft have been able to improve their performance as a result of frequency of service, reduced flight delays, and corresponding rises in revenue (Low and Lee, 2014).

It is clear that both tangible and intangible resources are crucial for all airlines and their ultimate success or failure. However, the level of efficiency in utilizing these resources varies across airlines (Seristö and Vepsäläinen, 1997) as a result of differences in management competence in the organization and deployment of their resources (Becerra, 2008). As such, utilization of these resources can lead to sustainable competitive advantage when management is capable of identifying, organizing, and deploying them in a way that reduces cost and wastage, and enhances efficiency, quality (Low and Lee, 2014), and customer satisfaction. However, research that investigates the key drivers of performance when resources are homogenous is scarce (Hannigan et al., 2015). This research therefore contributes to the literature by exploring the links between airline productivity, service quality, customer satisfaction, and financial performance.

Scholars have long noted that the capability of an organization to mobilize its physical, human and financial resources effectively and efficiently is crucial in determining its competitive position (Eisenhardt and Martin, 2000). These studies emphasize intangible resources, including patents and organizational culture, as sources of competitive advantage based on the premise that such resources cannot be easily adopted or acquired by competitors (Grant, 1991; Peteraf, 1993). Other scholars argue that a firm's resource is considered as source of competitive advantage when it enables the firm to "exploit opportunities or neutralize threats" in the firm's environment (Barney, 1991, p.106). Cho and Pucik (2005) define intangible capability as a firm's ability to *innovate* and provide superior products or services. Further, Cho et al (2005) investigate the relationship between *innovativeness, quality, growth, profitability, and market value* of companies selected from the Fortune 1000 companies. Drawing on the RBV, they argue that a firm's "capability to balance innovativeness and quality" is a key determinant in the achievement of competitive advantage (Cho and Pucik, 2005, p. 5).

Anderson et al. (1997) suggest the existence of a "trade-off" between customer satisfaction and productivity in service businesses due to the inherent difference between goods and services; the latter involving customization to meet the needs of specific customers, which usually entails additional cost. Anderson et al. (1997) posit that the effect of productivity on service quality is different for goods and services. Findings suggest that the relationship between productivity and service quality is negative for customized services, while it is positive for standardized services. He argues that the relationship between productivity and service quality is negative for customized services, while it is positive for standardized services. The airline service is a standardized service with minor customization.

In summary, the above studies suggest that a firm's sustainability is largely determined by its capability to understand the effect of the interaction among its resources and consequently to identify its key competence to meet customer requirements. This study builds on the approaches followed by Cho and Pucik (2005) approach and takes forward the application of the RBV to the airline industry to investigate a firm's capability to strike the right balance between productivity and service quality. This study differs from Cho and Pucik (2005) as it focuses on investigating the two dimensions of productivity, i.e., employee and aircraft productivity, and service quality, and their effect on customer satisfaction and firm performance in a different setting. In this research, I argue that a firm's capability to enhance productivity while maintaining the value proposition of customers leads to profitability in the US airline industry.

3.1.2 The Stakeholder Theory (ST): Service Quality, Customer Satisfaction and Financial Performance

The Stakeholder Theory (ST) defines the firm as the "nexus of relationships among its primary stakeholders" (Bridoux and Stoelhorst, 2014, p.108). Specifically, Donaldson and Preston (1995b) argue that a firm is "an organizational entity through which numerous and diverse participants accomplish multiple and not always entirely congruent purposes and thus effective management of the varying stakeholders interest leads to superior financial performance" (1995b, p.8).

Stakeholders can be thought of as those groups without whose support the organization would cease to exist (Freeman, 1984, p.3). They are categorised as either primary or secondary (Mitchell et al., 1997). Primary stakeholders are those who "bear some form of risk as a result of having invested some form of capital, human or financial, something of value, in a firm" (Clarkson, 1995, p.5). Examples of primary stakeholders include employees, capital suppliers, other resource suppliers, customers, and the community (Hillman and Keim, 2001).

The ST has three perspectives: normative, descriptive, and instrumental (Donaldson and Preston, 1995a). The normative perspective emphasizes social and moral obligations so that a firm's responsibility extends beyond creating value to shareholders (Ayuso et al., 2014b). The descriptive perspective defines a firm as a collection of complementary and, at times, competitive interests (Donaldson and Preston, 1995).

The instrumental perspective recognizes that a firm has several stakeholder groups with varying interests (Donaldson and Preston, 1995) and that serving these interests "is an effective means to improve efficiency, profitability, competitiveness, and economic success" (Ayuso et al., 2014, p.6). This perspective holds that a firm's ability to satisfy its stakeholders leads to an increase in the firm's value (Ayuso et al., 2014a; Donaldson and Preston, 1995b).

Drawing on the instrumental perspective of ST, Donaldson and Preston (1995) assert that "success in satisfying multiple stakeholders interests rather than in meeting conventional economic and financial performance would constitute the ultimate test of corporate performance" (p.16). Other scholars further emphasise the role of customers in enhancing firm performance. In this regard Ayuso et al. (2014) argue that satisfied customers foster the value creation process by spreading their perception of the product.

Research on the performance of service industries has long placed emphasis on the impact of productivity on service quality and customer satisfaction. Scholars have begun to take steps to empirically investigate the theoretical claim of the instrumental perspective of ST (Chung-Leung et al., 2005; Hillman and Keim, 2001; Ogden and Watson, 1999). For instance, Chung-Leung et al. (2005) document a direct relationship between positive stakeholders' perceptions of a firm and its financial performance in Chinese service businesses. Similarly, Ogden and Watson (1999) find a positive association between customer satisfaction and corporate financial performance in the UK privatized water industry.

Studies investigating the performance of airlines suggest that customer satisfaction can impact airline profitability in a competitive market (Steven et al., 2012). Correspondingly, research findings show that customer complaints affect airlines' future profitability as a result of their negative effect on customer loyalty (Sim et al., 2006). Service quality aspects such as on time arrival and lost baggage are reported to have a direct impact on airline profitability (Tsikriktsis, 2007). These studies evidence the importance of customer satisfaction for airlines to achieve and maintain competitive advantage.

Consequently, this research applies the RBV and ST to investigate the interactive effect of customer satisfaction in the relationship between a firm's resource productivity and its financial performance. This argument is consistent with the strategic management literature which suggests complementing the RBV with "demand oriented perspectives to advance the RBV to answer how resources enable a firm to achieve and maintain superior performance" (Priem and Butler, 2001, p.36).

Drawing on the RBV this research builds on the existing argument that the capability of management in deploying its resources determines airline productivity and financial performance as a result of improved quality of service and efficiency in utilizing resources (Sim et al., 2006; Wirtz et al., 2008). Furthermore, based on the ST, I argue that a firm's ownership of valuable and inimitable resources results in higher financial performance as long as the firm is able to satisfy the interests of its customers.

The integrative theoretical framework developed, based on the combined views of the RBV and ST, is discussed in the following section.

3.2 Hypothesis Development

3.2.1 Productivity, Service Quality, and Financial Performance

Productivity refers to the efficiency of a firm in utilizing its tangible and intangible resources to produce the required goods or services (Oum et al., 1992). Thus, productivity can be thought of as a measure of operational efficiency in utilizing resources, and is represented as the ratio of inputs to outputs (Schefczyk, 1993). Firms use a variety of methods to improve productivity which includes hiring skilled employees, providing on the job training, and acquiring new technology. Such initiatives are sought not only to produce more with fewer resources, but also to minimize the rate of defects in product quality. Coordinating available resources in a way that minimizes wastage and enhances output requires management competence. Therefore, productivity is regarded as a "measure of management performance as productivity is an indication of the degree of efficiency with which resources are coordinated and utilized" (Han, 1991, p.250).

Drawing on the RBV, this research operationalizes productivity as a multidimensional construct to account for the productivity of human and physical resources of airlines. Thus productivity of airlines is the combined outcome of employee productivity and aircraft productivity (Belobaba, 2009; Choi et al., 2015). It has been widely acknowledged that employee productivity shows management's efficiency in identifying, planning, coordinating, and deploying their employees. Airlines invest huge resources to acquire or lease aircraft to cater for the growing demand for air travel. Aircraft productivity is another aspect of airline productivity. Productivity of an airline enhances with increased use of each aircraft due to either reduced turnaround times, increased flights per day, or increased aircraft service time. It is also evident that airline profitability is affected by the extent of the load factor (occupancy) of the aircraft.

Load factor measures the number of miles an aircraft has flown while carrying passengers (Windle and Dresner, 1992). There is evidence that load factor is positively linked to future financial performance (Behn and Riley, 1999). However, research that focuses on load factor alone is criticized for its failure to consider aircraft that are not in service (Tsikriktsis, 2007; Windle and Dresner, 1992). This is because aircraft may be out of service due to declines in demand for air travel or due to mechanical (or technical) problems which can lead to decreased productivity. Thus, airline productivity is not only a function of flying long distances or ensuring aircraft seats are filled. Consequently, scholars suggest the use of a combination of productivity measures, such as fleet utilization, in addition to load factor measures (Grifell-Tatjé and Lovell, 1999; Windle and Dresner, 1992).

Research suggests a positive relationship exists between airline productivity and profitability. For example, Tsikriktsis (2007) investigates the effect of service quality and productivity as measured by load factor and fleet utilization on the profitability of US airlines. However, this study does not show the effect of employee productivity on overall airline productivity and the resulting effect on financial performance. Further, airline productivity is the outcome of employee productivity and aircraft productivity (Belobaba et al., 2009). In other words, this suggests that airline productivity is a multidimensional construct. However, prior studies do not consider the multidimensionality of productivity. While prior research has explored each of these dimensions individually, the examination of the combined effect of employee productivity and aircraft productivity on airline productivity enhances our understanding of the linkages among productivity, service quality, customer satisfaction, and financial performance. Therefore, in this research, productivity is considered to be a multidimensional latent construct: employee productivity and aircraft productivity are second order formative constructs aimed at assessing the contribution of each to the total productivity of the airlines.

Investment to enhance employees' skills and operating processes improves productivity as a result of the efficient use of resources (Heskett and Schlesinger, 1994). This is consistent with the RBV whereby a firm's effort to improve its operating process and employees' skills enhances aircraft utilization and minimizes flight delays and loss/misplacement of baggage. This, in turn, improves customer satisfaction as a result of reduced numbers of customer complaints. Moreover, a higher level of productivity leads to higher financial performance as a result of increased revenue due to improved turnaround time, increased number of flights per day, and reduced cost of input, in turn a result of improved aircraft utilization and employee productivity (efficiency in using inputs). Based on the above studies and the studies discussed in the literature review, I propose the following:

H1. The higher the level of airline productivity the higher the level of financial performance.

Studies which investigate the relationship between productivity and quality show mixed results. It is argued that there is a tradeoff between productivity and quality (Anderson et al., 1994; Lapré and Scudder, 2004). Anderson et al. (1997) assert that productivity and service quality is less likely to be achieved in a service industry, compared to goods, because of the standardized nature of services. However, Soteriou and Zenios (1999) report a positive link between operational efficiency and quality. Research suggests that improved productivity leads to a higher level of service quality due to enhancements in employee capabilities to deliver services as per the expectations of customers (Sim et al., 2006). This is because initiatives to improve productivity, such as employee training, hiring competent employees, and acquiring better aircraft and equipment, not only enhance employee productivity and aircraft utilization, but also improve on time arrival of aircraft, baggage handling, and the overall passenger experience. In other words, *Employee productivity* improvement programs enhance coordination among the ground and cabin crew to ensure fast turnaround, which should lead to improvement in *service quality*, such as on time arrival.

Aircraft utilization improves when the proportion of the time aircraft are on ground is reduced. This requires efficient coordination among employees to ensure that passengers and luggage are boarded on time to allow on time departure. (Sim et al., 2006). On time departure, in turn, leads to on time arrival, which in turn reduces customer complaints, assuming other unforeseen issues, such as those related to weather and security, remain constant. Therefore, strategic actions to improve airline productivity should not only reduce cost, and enhance profitability, but also improve airline service quality. Thus:

H2. The higher the level of airline productivity the lower the level of problems of service quality.

Research suggests that improvement in service quality leads to higher financial performance as a result of less rework, warranty claims, and compensation (Deming and Edwards, 1982; Garvin, 1988; Juran, 1988; Tsikriktsis, 2007). In contrast, when airlines fail to arrive on time there is a subsequent cascading effect on on-time departure. In the event of an unplanned flight delay (i.e. poor service quality), airlines incur additional costs, such as accommodation for passengers, meals, and other related expenses. Furthermore, customers who have a bad experience with an airline, for example due to flight delays, lost or mishandled baggage, or unfriendly employees, may decide not to use the same airline in their future travel. Therefore, poor service quality can have a direct, negative effect on financial performance due to additional costs incurred as a result of failure to conform to customer expectations. Therefore,

H3. The lower the level of service quality, the lower the level of financial performance.

3.2.2 Service Quality and Customer Satisfaction

The literature operationalizes quality in different ways. From an accounting point of view, quality is discussed in terms of its associated costs. Costs related to efforts to prevent and correct defects before products/services are delivered to customers are considered as conformance costs (Godfrey and Pasewark, 1988). Such costs are associated with internal quality control systems designed to meet the customer's requirements or specifications from the beginning. Nonconformance costs, on the other hand, are costs incurred to correct defects and failures after the goods are shipped or services are rendered (Carr and Ponemon, 1994).

Assessing quality in terms of cost of quality ignores the effect of quality on customer satisfaction and profitability. Considering the unique nature of services as compared to goods, the service literature conceptualizes quality as the "gap between delivered and desired service on certain dimensions" (Anderson et al., 1994, p.44).

Cognizant of the impact of quality on customer satisfaction and firm performance, scholars suggest accounting for quality should extend beyond the associated cost of quality to incorporate the customer perspective (Shank and Govindarajan, 1994). Consistent with scholars call for consideration of the market perspective of quality, several studies explore the impact of quality on customer satisfaction and financial performance (Shank and Govindarajan, 1994; Smith and Wright, 2004). For instance, Smith and Wright (2004) investigate the factors that determine customer loyalty and the subsequent effect on financial performance. Based on the concept of the value chain, they provide evidence that customer loyalty is a source of competitive advantage as it mediates the relationship between product quality and financial performance.

Marketing researchers often conceptualize customer satisfaction as *transaction specific* and *cumulative* (Anderson et al., 1994). The attitude of customers after purchase of a specific product or service is specific to that transaction (Anderson et al., 1994). Transaction specific measures of customer satisfaction help firms to formulate corrective measures to address the cause of the specific issue that results in a customer's dissatisfaction, while cumulative customer satisfaction provides a broader view of a firm's current and future performance (Anderson et al., 1994). In service organizations, customer satisfaction is affected by the expectation of customers (Parasuraman, 2010; Sim et al., 2006). Airline passengers are among the key stakeholders of airlines. Failure to meet passengers' expectations of quality of service, such as on time arrival, proper handling of luggage, and friendly treatment by employees, has a negative effect on the overall judgment of the passenger about the airline. Thus, failure to meet these expectations has a negative effect on customer satisfaction which, in turn, affects future financial performance (Sim et al., 2006). Therefore,

H4. The lower the level of service quality the lower the level of customer satisfaction.

3.2.3 Customer Satisfaction and Financial Performance

The literature regarding the relationship between customer satisfaction and financial performance is not conclusive. It has been argued that customer satisfaction is positively related to a firm's financial performance (Behn and Riley, 1999; Chand, 2010; Ittner and Larcker, 1998a; Sun and Kim, 2013). Other scholars claim that customer satisfaction is negatively linked to a firm's financial performance in service businesses (Anderson et al., 1997). Moderating factors, such as competition (Banker and Mashruwala, 2007) and demographics (Anderson et al., 2008), are reported to have an impact on the relationship between customer satisfaction and a firm's financial performance. These differences justify the need for further exploration of the factors that affect customer satisfaction and its impact on financial performance in the context of the service industry.

One of the reasons for the varying effects of productivity on customer satisfaction for goods and services is the level of customization inherent in services (Anderson et al., 1994). Moreover, cross sectional data does not provide an adequate basis to show the effect of efforts to improve customer satisfaction on financial performance (Bernhardt et al., 2000). When customers are not satisfied it has become customary practice that the terms of sales include terms that allow customers to return to the producer for replacement or rework. In the case of services, acquisition and consumption are simultaneous. Thus, dissatisfied customers cannot return the services, the most they can do is to seek compensation for their perceived loss.

Therefore, the effect of productivity on service quality, customer satisfaction, and ultimately on financial performance, is not instantaneous.

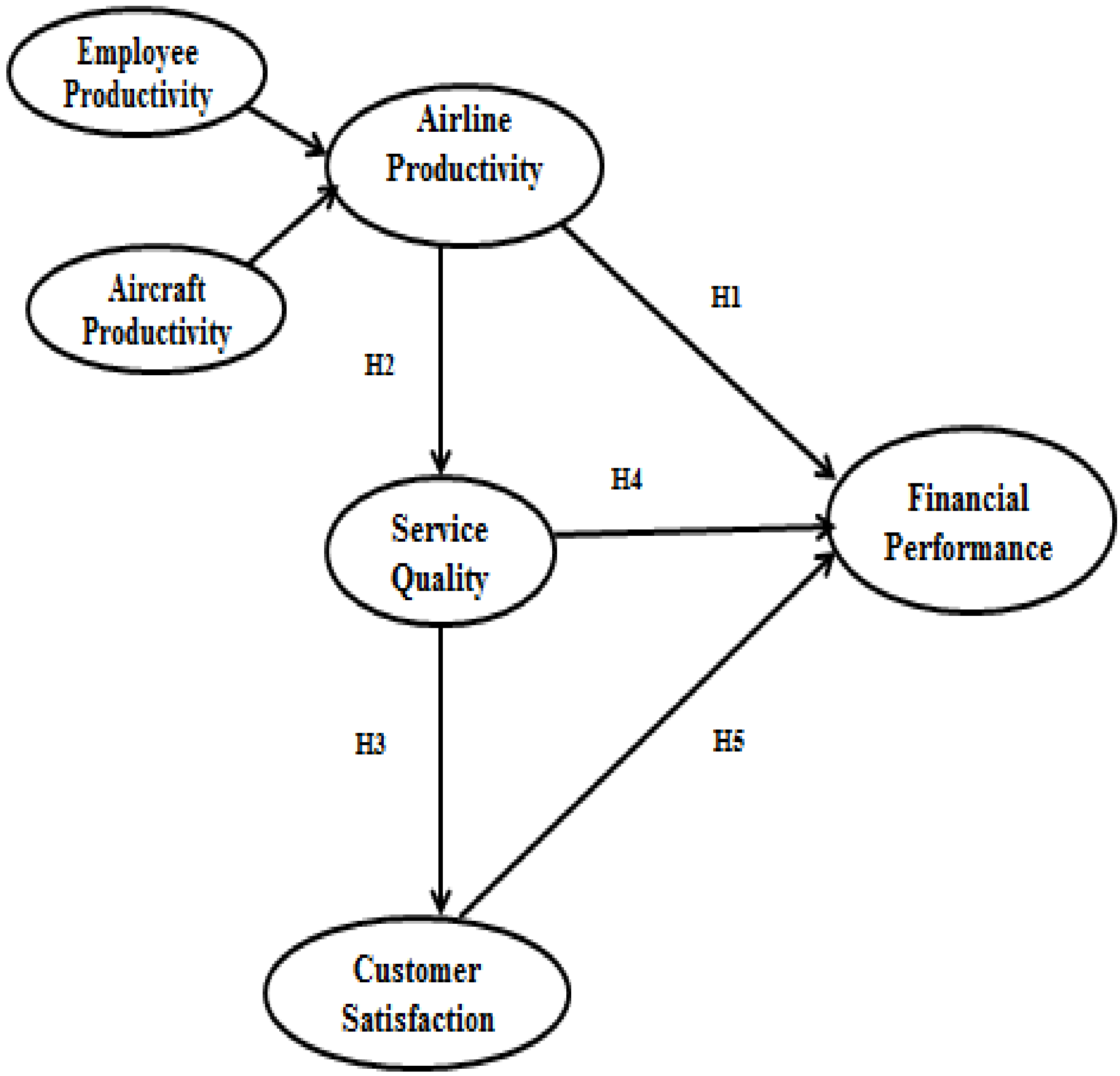
Dissatisfied customers have the potential to negatively impact future performance by choosing not to use the same service again (from the same vendor), and they may also discuss their dissatisfaction with others, thereby having a significant impact on the future financial performance of a firm (Sim et al., 2006). Satisfied customers, on the other hand, lead to future profitability and higher market value as a result of increased customer loyalty and the positive expression by customers of their satisfaction, which may attract new customers and also reduce the cost of acquiring new customers (Bernhardt et al., 2000; Fornell et al., 2006).

Improvements in productivity have immediate effect on profitability in the short term due to the firm's ability to produce and sell more with less input. But, such improvements can only be sustainable when the firm is able to ensure that efforts to improve productivity are not at the expense of quality and customer satisfaction. Thus, drawing on ST, I argue that the capability of the firm to balance productivity, quality, and customer satisfaction leads to higher financial performance as a result of growth in market share and subsequent revenue from satisfied customers. Therefore, I propose the following:

H5. The higher the level of customer satisfaction the higher the level of financial performance.

The theoretical model (Figure 7) links productivity, service quality, customer satisfaction, and financial performance. This model is developed based on the combined views of the Resource Based View and Stakeholder Theory. Drawing on the Resource Based View, the model shows that airline productivity is a multidimensional construct with two dimensions. It has been argued that airline productivity is the outcome of employee productivity and aircraft productivity. Accordingly, employee productivity and aircraft productivity are modeled as second order formative constructs of airline productivity. The figure also shows that improvement in airline productivity leads to improved financial performance (H1) and improved service quality through the reduction of service quality related problems (H2). Further, drawing on Stakeholder Theory, the figure shows that problems of service quality will have a negative effect on customer satisfaction (H3) and on financial performance (H4). Customer satisfaction is predicted to have a positive effect on financial performance (H5).

Figure 7. Theoretical Model with Hypotheses



3.3 Summary

The primary objective of this research is to investigate the temporal relationship among nonfinancial performance measures. To this end, this research particularly explores the linkages among airline productivity, service quality, customer satisfaction, and financial performance measures in the US Airline industry. The link between nonfinancial and financial performance measures has been extensively researched. However, prior research largely focuses on the investigation of associations between one or more nonfinancial measures and financial measures. These studies contribute substantially to the management accounting literature by shedding light on the importance of nonfinancial performance measures. Further studies have enhanced the understanding that nonfinancial performance measures are leading indicators of future financial performance.

In spite of the richness of the literature on the relationship between nonfinancial and financial performance measures, significant gaps remains concerning the linkages among nonfinancial performance measures and the effect of such linkage on financial performance. Understanding the interrelationship among nonfinancial performance measures is important to identify the factors that affect performance. Furthermore, as considered in this research, knowledge of the impact of changes on a given nonfinancial measure, e.g., airline productivity, on another nonfinancial measure, e.g., service quality, can help the design of appropriate strategies to maximize overall performance.

A review of related literature underscores the importance of performance measures and the role of nonfinancial performance measures in providing a more complete picture about past performance and as an adequate basis on which to predict future performance. Most importantly, the review of the literature demonstrates that despite the importance of nonfinancial performance measures, empirical research on the temporal relationship between nonfinancial performance measures and their effect on nonfinancial performance is limited. It also shows that the variables lack theoretical underpinning. Furthermore, studies that simultaneously investigate the linkages among various nonfinancial measures and their impact on financial performance are scarce in the accounting literature.

To address these important gaps, this research develops an integrative framework based on the combined views of the RBV and ST to simultaneously investigate the linkages between airline productivity, service quality, customer satisfaction, and financial performance. In this chapter, the RBV has been discussed with a focus on its theoretical basis for resource productivity and the subsequent effect on service quality and financial performance. It may seem intuitive that resource productivity leads to sustainable financial performance when strategic initiatives to enhance resource productivity are carefully designed and implemented to ensure quality and customer satisfaction. However, it requires managerial capability to avoid, or minimize, trade-offs and to maximize overall performance. Understanding the nature of the relationships between productivity, service quality, and customer satisfaction, and their impact on financial performance enhances managers' understanding, which in turn helps them to design appropriate strategy.

This study suggests that a firm's possession of productive resources leads to superior financial performance when the firm satisfies its customers. This research is based on the argument that corporate performance can best be explained by combining the RBV and ST. To this end, this research applies the combined insights of the RBV and ST as the theoretical basis to explain the hypothesized relationships between the nonfinancial performance measures of productivity, service quality, and customer satisfaction, and their effect on financial performance.

CHAPTER FOUR: RESEARCH DESIGN AND METHODLOGY

The objective of this research is to investigate the relationship between *airline productivity*, *service quality*, *customer satisfaction,* and *financial performance* in the US airline industry. Specifically, this research aims to understand how efforts to improve *airline productivity* impact *service quality*, *customer satisfaction,* and *financial performance*. To this end the following specific research questions are investigated:

1. How do efforts to improve *airline productivity* influence *service quality* and *financial performance*?
2. How do changes in *service quality* affect *customer satisfaction* and *financial performance*?
3. What is the relationship between *customer satisfaction* and *financial performance*?

These questions are framed following a thorough review of the literature under various themes of research into the relationship between nonfinancial performance measures and financial performance, as summarized in Chapter Two; and with the theoretical underpinning drawn from the Resource Based View (RBV) and Stakeholder Theory (ST), as already discussed in Chapter Three. This chapter unfolds these research questions.

Specifically, this chapter outlines the methodology adopted to investigate the relationship between *airline productivity*, *service quality*, *customer satisfaction,* and *financial performance*. It discusses the measurement of variables and the data collection and sampling processes, and details the methodology for the analysis of the dataset.

The chapter is organized as follows. Section 4.1 explains the variables and the measures used. Section 4.2 illustrates the process of sample selection and data collection. Section 4.3 discusses the procedure of data cleaning. Section 4.4 discusses the alternative analytical tools considered in relation to the nature of the sample and the data. Specifically, multivariate regression analysis, the covariance based structural equation modelling (CB-SEM) and partial least square approach to structural equation modelling (PLS-SEM) are compared and appraised. PLS-SEM is identified as the most appropriate analytical tool for this research. Section 4.5 presents the steps taken to apply PLS-SEM. Section 4.6 briefly summarizes the chapter.

4.1 Variable Measurement

The literature asserts that the existence of an alignment between a theoretical definition of the variables and the actual measures is fundamentally essential to ensure internal validity of the constructs (Schwab, 2004). Schwab (2004) further recommends the constructs to be selected on the basis of relevant theories. Consistent with this suggestion, *airline productivity* and *service quality* are selected and operationalized based on the RBV, while *customer satisfaction* is conceptualized based on ST.

The measures used in this research are selected on the basis of a thorough review of prior literature to identify the resources crucial to achieve and maintain a competitive position in the airline industry. In addition to accounting, marketing and service literature, in particular, have been referred to identify the measures of *service quality* and *customer satisfaction*. In general, all constructs and their respective measures which are used in this study are developed based on insights from prior studies (Belobaba, 2009; Liedtka, 2002; Steven et al., 2012; Sun and Kim, 2013; Tsikriktsis, 2007; Windle and Dresner, 1992).

4.1.1 Measures of Nonfinancial Performance

Airline productivity, *service quality*, and *customer satisfaction* are the nonfinancial performance measurement constructs used in this research. These constructs are measured using indicators that have previously been validated for both their reliability and convergent validity in prior studies. The measures are further validated for this study using PLS SEM. Section 4.1.1.1 discusses the measures for airline productivity.

4.1.1.1. Measures for Airline Productivity

There are multiple valid methods available to measure productivity. The two most widely known methods of measuring productivity are the total factor productivity and the partial productivity (Windle and Dresner, 1992). Total factor productivity measures focus on the measurement of the overall improvement of a given output using a combined set of resources (Oum et al., 1992). They are commonly used by researchers to measure and compare the productivity of various firms over a given time period (Windle and Dresner, 1992).

Partial productivity focuses on the measurement of the contribution of a specific input, such as labor or fixed assets, to the overall productivity of a firm (Oum et al., 1992). However, research shows that single productivity measures do not always provide full information about the relationship between the diverse inputs and outputs because “partial productivity measures can vary in opposite directions and so no single productivity measure can be unambiguously linked to a business performance such as profit” (Grifell-Tatjé and Lovell, 1999, p.2). A combination of partial productivity measures, such as labor and fixed assets productivity, is suggested to address the limitations of partial productivity measures (Windle and Dresner, 1992). Based on these studies, this research uses a combination of partial productivity measures. Thus, *employee (labor) productivity* and *aircraft productivity* are used to measure airline productivity.

The airline literature suggests two distinct sets of measures of airline productivity: *employee productivity* and *aircraft productivity* (Belobaba, 2009). Based on such distinct operationalization, this research conceptualizes *airline productivity* as a second-order latent construct with *employee productivity* and *aircraft productivity* as first order latent constructs. "A second order construct is a construct that contains two layers of constructs" (F. Hair Jr et al., 2014, p. 229). Each dimension of productivity is measured using two manifest variables. *Employee productivity* is measured using available seat miles per employee and number of aircraft per employee. It should be noted that available seat miles per employee is one of the most commonly used measures of *employee productivity* (Belobaba et al., 2009; Liedtka, 2002; Windle and Dresner, 1992). Available Seat Miles (ASM) are determined by multiplying the number of seats in an aircraft by the number of miles flown, regardless of whether the aircraft seats are occupied by passengers or not. The proportion of airline employees to the number aircraft in its operating fleet is an indicator of airline productivity and its workforce (Liedtka, 2002). Thus, this research also uses the number of aircraft per employee as an additional measure of *employee productivity*.

This research measures *aircraft productivity* using two major aspects of productivity: daily fleet utilization, or average daily block hours, and number of departures (flights) per day (Belobaba et al., 2009). Average daily block hours capture the average daily number of hours an aircraft has been in service. Average number of flights per day measures the efficiency of airlines in utilizing their aircraft. The repeated indicator approach is used to measure the contribution of employee productivity and aircraft productivity to airline productivity. A repeated indicator approach involves assigning each of the indicators of the first order constructs (indicators of employee productivity and airline productivity) to each of the other first constructs, as well as to the second order constructs (F. Hair Jr et al., 2014). Table 1 provides a summary of the relevant literature which uses these measures.

Table 1. Measure of Airline Productivity and Related Literature

Productivity Measures	Prior Research
Available seat miles per employee	Windle and Dresner 1992; Liedtka, 2002; Belobaba 2009
Aircraft per employee	Liedtka, 2002; Belobaba 2009
Fleet utilization (airborne hours per day)	Tsikriktsis 2007; Belobaba 2009
Number of departures per day	Belobaba 2009

Notes: This table presents the four indicators for measuring airline productivity. These indicators are determined based on the insights of prior literature, as summarized in this table. For instance, Windle and Dresner (1992) argue that available seat miles is one of the most widely applied measures of employee productivity. Liedtka (2002) applies available seat miles and aircraft per employee when assessing the information content of nonfinancial performance measures in the US airline industry. Belobaba (2009) also suggests these as measures of employee productivity and aircraft productivity.

4.1.1.2. Measures of Airline Service Quality

Prior empirical studies have typically used different proxies (such as on time arrival, flight cancellation, involuntary denied boarding, and mishandled baggage) to measure airline service quality (Behn and Riley, 1999; Riley Jr et al., 2003; Tsikriktsis, 2007). Since 1991 the Wichita State University has been publishing the Airline Service Quality rating every month. This study takes this report as source for airline service quality. It contains details of on time arrival, number of lost baggage reports, number of complaints, and number of involuntarily denied boarding. Moreover, service quality related data taken from the US Department of Transportation (DOT) is used to triangulate the airline service quality rating data. Table 2 provides a summary of the relevant literature where researchers have used these measures previously. Following prior research (Choi et al., 2015; Liedtka, 2002; Riley Jr et al., 2003; Steven et al., 2012; Suzuki et al., 2001), this research adopts on time arrival, lost baggage, involuntarily denied boarding, and number of complaints as measures of service quality[6]. These measures are used individually as manifest variables of service quality.

Table 2. Measures of Airline Service Quality and Related Literature

Service Quality Measures	**Prior Research**
On time arrival	Liedtka, 2002; Suzuki et al. 2001; Steven et al. 2012; Choi et al, 2015
Number of lost baggage reports	Liedtka, 2002; Tsikriktsis, 2007; Choi et al, 2015
Number of involuntarily denied boarding	Liedtka, 2002; Steven et al., 2012; Choi et al, 2015
Number of complaints	Liedtka, 2002; Riley et al. 2003; Steven et al.; Choi et al, 2015

Notes: This table presents the four indicators for measuring airline service quality. These indicators are determined based on the insights of prior literature, as summarized in this table. For example, on time arrival has been used as a proxy measure of airline service quality by Steven et al., (2012) in their study that investigates the relationship between customer service, customer satisfaction, and performance in the US airline industry. The number of lost baggage reports has been used as a proxy measure of service quality by Tsikriktsis (2007) in his investigation into the effect of operational performance on the profitability of US airlines. Similarly, the number of involuntarily denied boarding and the number of complaints have been used as measures of service quality by Liedtka (2002) and Choi et al., (2015).

4.1.1.3. Measures of Customer Satisfaction

This research uses the American Customer Satisfaction Index (ACSI) to measure *customer satisfaction*. Following its introduction in the 1990s by Anderson and Fornell, the ACSI is regarded as a "market based performance measure for firms, industries, economic sectors, and national economies" (Sun and Kim, 2013, p.2). CSI has been widely used in management

[6]The raw data used to measure service quality contains data about on time arrival of flights, lost baggage reports, involuntarily denied boarding, and passenger complaints. With the exception of on time arrival, the three measures show poor/negative aspects of service quality. On time arrival however, shows a positive aspect of service quality. This research uses these measures to assess the service quality of the airlines. To make the measures consistent, on time arrival has been reverse coded to show the percentage of flights which fail to arrive on time. For example, American Airlines on time arrival in 1995 was 0.78, this shows that 78% of the flights arrived on time in 1995. Correspondingly, the percentage of flights that did not arrive on time is calculated at 1-0.78 = 0.22. On time arrival for all the airlines covered by this study has been reverse coded to show the percentage of flights that failed to arrive on time.

accounting research which investigates the link between nonfinancial and financial performance measures (Ittner and Larcker, 1998a; Bryant, Jones and Widener, 2004; Smith and Wright, 2004). Accordingly, this research collects the customer satisfaction index from the American Customer Satisfaction Index (ACSI) website.

4.1.2 Measurement of Financial Performance

The accounting principles applied by different firms pose a huge challenge with regard to the use of secondary information to evaluate performance (Venkatraman and Ramanujam, 1986). One way to address this limitation is to use relative measures instead of absolute amounts (Tsikriktsis, 2007). Following prior research, this study uses operating margin (Steven et al., 2012). Operating profit margin is the ratio of operating profit to sales. Additional measures of financial performance are used in this research based on a review of similar studies (Tsikriktsis, 2007; Windle and Dresner, 1992). Thus, return on assets, return on equity (Sun and Kim, 2013), and return on investment (Anderson et al., 1997) are included as additional measures of financial performance. Table 3 provides a summary of the relevant literature which uses these measures.

Table 3. Measures of Financial Performance and Related Literature

Financial Performance Measures	Research
Operating Margin	Tsikriktsis, 2007; Windle and Dresner, 1992
Return on Assets	Sun and Kim, 2013
Return on Equity	Sun and Kim, 2013
Return on Investment	Anderson et al., 1997

Notes: This table presents the four indicators for measuring financial performance. These indicators are determined based on the insights of prior literature, as summarized in this table. Operating margin has been used in prior studies with a particular focus on the airline industry (Tsikriktsis, 2007; Windle and Dresner, 1992). Return on assets and return on equity, are used based on a recent study by Sun and Kim (2013) on the hospitality industry. Return on investment is used based on Anderson et al., (1997) who investigate the relationship between productivity, customer satisfaction, and profitability.

4.1.3 Control Variables

Control variables are included based on prior studies. Airlines are categorized as *network* and *low cost* based on their business model. Airlines are also classified as *hub and spoke* and *point to point* based on the routes structure they operate (Aguirregabiria and Ho, 2010). Hub and spoke airlines fly to multiple destinations via several connecting hubs. For this reason, hub and spoke airlines are also referred to as network airlines (Brueckner, 2004). Point to point airlines, on the other hand, focus on transporting passengers from one point to another. American Airlines, United Airlines, Delta Airlines, Continental Airlines, Northwest Airlines, and US Airways are network, or hub and spoke, airlines, while Southwest Airlines is a low cost airline (Tsikriktsis, 2007). To control the effect of different business models among these airlines, a dummy variable is included to categorize the airlines into network and low cost airlines (Parast and Fini, 2010).

Leverage, liquidity, and capital intensity are also added as control variables (Sun and Kim, 2013). The leverage variable controls for the difference in capital structure among the airlines. The liquidity ratio controls for the variation among the airlines in terms of their capacity to settle short term obligations. Capital intensity, the ratio of total assets to total sales, is included in the model to control for any other factors that affect financial performance. Total assets are included to control for the effect of firm size. (Sun and Kim, 2013). Load factor is also included in the model to control for the effect of capacity utilization on financial performance because prior studies suggest that it is positively linked with airline profitability (Tsikriktsis, 2007). Airline performance demonstrates a great degree of seasonality - summer is the peak season while demand falls in the winter. To control for the effect of such variations in performance, this research uses annual data following Lapré and Scudder (2004). Fuel expense per available seat miles and passenger yield are also added as control variables. Passenger yield is defined as the average ticket price per passenger per mile. A summary of the definition and data source of all the indicators discussed above is presented in Table 4.

Table 4. Definition of Measures

Measures	Definition
Average daily block hours (ADBH)	The number of hours an aircraft is in revenue generating activity
Average number of flights per day per (ANDF)	Number of flights an aircraft performed per day
Available seat miles (ASM)	The total number of aircraft miles flown multiplied by the total number of seats available
ASM per employee (ASME)	Total ASM divided by the total number of employees
Aircraft per employee (AIRE)	Total Aircraft divided by total number of employees
Mishandled baggage (MSBG)	Number of lost/mishandled baggage reports per 1000 passengers. The rate is based on the total number of reports each carrier receives from passengers concerning lost, damaged, or delayed baggage.
On time arrival (ONTA)	Percentage of flights arriving on time. A flight is counted as "on time" if it operated less than 15 minutes after the scheduled time shown in the carriers' Computerized Reservations Systems (CRS).
Involuntarily denied boarding (INVD)	The number of passengers per 100,000 passengers denied boarding. This rate is related to the number of passengers who hold confirmed reservations and are denied boarding ("bumped from") a flight because it is oversold.

Measures	Definition
Number of complaints (COMP)	Number of complaints per 100,000 passengers. This data shows the number of consumer complaints filed with the US Department of Transpiration in writing, by telephone, via e-mail, or in person.
Customer satisfaction (CSI)	Customer satisfaction index as provided by the American Customer Satisfaction Index (ACSI). ACSI determines the index by conducting annual surveys. The indices range between 0-100, those closer to 100 show a high level of customer satisfaction.
Operating Margin (OPMAR)	Operating revenue divided by operating cost
Return on Investment (ROI)	Operating income after depreciation divided by invested capital
Return on Assets (ROA)	Operating income after depreciation divided by total assets
Return on Equity (ROE)	Operating income after depreciation divided by stockholders equity
Leverage	Total liabilities divided by total assets
Liquidity	Current assets divided by current liabilities
Capital intensity	Total assets divided by total sales
Size	Total assets
Business model	Dummy variable of 1 for network airlines and 0 for low cost airlines
Load factor	Percentage of seats occupied by passengers
Fuel expense per available seat miles	Total fuel expense divided by total available seat miles
Passenger yield	Total passenger revenue divided by revenue passenger miles.

4.2 Sample and Data

The sample of this study consists of all major US airlines operating during the period under study, 1995-2009. A major airline is one which generates at least 1% of the total annual domestic passenger revenue (Tsikriktsis, 2007). The starting point of 1995 is when airline data became publicly available through the Massachusetts Institute of Technology Airline Data Project. Accounting data is collected from COMPUSTAT. Section 4.2.1 presents the procedure followed to select the sample of this research.

4.2.1 Sample Selection

To ensure all major airlines are included in the study, I collected a list of US airlines as reported by the US Department of Transportation (DOT) and a further list of US airlines from the Massachusetts Institute of Technology Airline Data Project (ADP). In addition, I merged the list of US Airlines in the American Customer Satisfaction Index (ACSI).

I use the following four criteria to derive the final sample for empirical testing.

1. For an airline to be included in the sample, it has to be active in the airline operation.
2. Only major airlines are included.
3. Airlines that are not covered by the American Customer Satisfaction Index (ACSI) are excluded as the customer satisfaction index is one of the indispensable measures in this study.
4. Mergers and acquisitions tend to affect the performance of airlines. Mergers in the industry after 2009, for example, Southwest and Air Tran Airways, United and Continental, American and US Airways, may impact the findings of this research. For this reason, the sample is limited to airlines that were operating as independent entities between 1995 and 2009.

Accordingly, the final sample has been narrowed down to seven major airlines, namely, American, United, Continental, Northwest, Delta, US Airways, and Southwest. All the required data related to these airlines are available at COMPUSTAT database, the US Department of Transportation (DOT), and the Massachusetts Institute of Technology (Airline Data Project, and the American Customer Satisfaction Index (ACSI) to measure all the constructs necessary for this study over the sample period of 1995-2009.

4.2.2 Data Collection

This research uses publicly available archival data. Data related to *airline productivity* is obtained from Massachusetts Institute of Technology Airline Data Project. Airline service quality data is obtained from two sources. The Airline Quality Rating published by the Wichita State University provides *service quality* related data. The Air Travel Consumer Report issued by the US Department of Transportation also contains information about on time arrival, mishandled baggage, involuntarily denied boarding, and passenger complaints. Customer satisfaction data are obtained from the annual reports of the American Customer Satisfaction Agency. The data are triangulated to ensure accuracy and consistency.

Data related to *financial performance* are obtained from three sources. Financial data relevant to compute profitability of the airlines are obtained from COMPUSTAT. The US DOT publishes quarterly financial performance reports of the major airlines. Thus, financial data are collected from these two sources. The data collected are then merged together into a cross sectional data set covering all the indicators over a period of 15 years. Thus, the sample of this research contains 105 annual panel data. Variable definitions are presented in Table 4. Table 5 provides a summary of the data used in this research along with the sources.

Table 5. Sources of Data

Data	Source
Available seat miles Total number of employees Total number of aircraft Total block hours Number of departures per day	US Department of Transportation; Massachusetts Institute of Technology Airline Data Project
On time arrival Number of lost baggage reports Number of involuntarily denied boarding Total number of complaints	US Department of Transportation; Consumer Air Travel Report; Airline Quality Rating Reports from Wichita State University
Customer Satisfaction Index	American Customer Satisfaction Agency
Operating Margin Return on Assets Return on Equity Return on Investment	COMPUSTAT, Annual reports

Notes: This table presents the various sources from which the data are collected. As indicated in the above table, available seat miles, total number of employees, total number of aircraft, total block hours and number of departures per day are collected from the US Department of Transportation and the Massachusetts Institute of Technology Airline Data Project. Data related to service quality, such as on time arrival, number of lost baggage reports, number of involuntarily denied boarding, and total number of complaints are collected from the consumer travel report provided by the US Department of Transportation and compared with the data collected from the Airline Quality Rating Reports issued by Wichita State University. Customer satisfaction data are obtained from the American Customer Satisfaction Agency which issues a customer satisfaction index for many American companies, including airlines. Financial performance data are collected mainly from COMPUSTAT and triangulated with the annual reports of the airlines.

4.3 Comparison of Analytical Tools

The type of research question posed determines the conceptualization and the subsequent components of research design. It is widely acknowledged in the academic arena that the selection of an appropriate analytical tool should be based on the nature of the research question with an emphasis on the theoretical justification. This research develops an integrative framework to explore the simultaneous effect of *airline productivity*, *service quality*, and *customer satisfaction* on *financial performance*. To test this integrative theoretical framework, I consider both first generation tools (the suite of tools that includes Multivariate Regression Analysis), and second generation tools (the suite of tools that includes CB-SEM, and Partial Least Squares). Furthermore, model assumptions across these analytical tools are closely examined via statistical tests. If these assumptions are violated, the credibility of the findings could be flawed (Tabachnick and Fidell, 2007). Thus, it is important for researchers to test the assumptions underlying the analytical tool(s), before applying them to the theoretical model used for research, to ensure the appropriateness of such tool(s) for the research question under consideration.

In this research, three potential data analysis tools are considered, Multivariate Regression Analysis, SEM, and PLS. This section compares these three approaches to determine the most appropriate analytical tool that fits the research question and the characteristics of the data used in the research.

Section 4.3.1 discusses one of the statistical tools considered, multivariate regression analysis. It starts with a discussion of the nature of multivariate regression analysis and an overview of its basic assumptions. Sections 4.3.1.1 - 4.3.1.4 discuss the assumptions of normality, linearity, homoscedasticity and multicolinearity. This section ends with a summary of the test of the assumptions of multivariate regression analysis.

4.3.1 Multivariate Regression Analysis

Multivariate Regression Analysis is one of the first generation analytical tools and is one of the most commonly used methods of data analysis (Lee et al., 2011). One of the main assumptions of Multivariate Regression Analysis is that all variables are observable, and contain no measurement error (Musil et al., 1998). Thus, a number of predictors can be modeled to predict their effect on a single dependent variable. However, this is possible only for observable variables. Unobservable latent variables cannot be directly tested using regression techniques (Nusair and Hua, 2010). Furthermore, Multivariate Regression Analysis does not directly allow simultaneous testing of the relationship among multiple (and mediating) independent and multiple dependent variables (Nusair and Hua, 2010).

Table 6 provides the assumptions of each of the three analytical techniques, namely, the Multivariate Regression Analysis, Covariance Based Structural Equation Modeling (CB-SEM), and the Partial Least Square Approach to Structural Equation Modeling (PLS-SEM). As shown in Table 6, Multivariate Regression Analysis requires the data to be normally distributed (normality), the independent and dependent variables to be linearly correlated, the data to be free of errors (reliability), and the variance of errors to be normally distributed (homoscedasticity) (Tabachnick and Fidell, 2007).

Table 6. Summary of Statistical Assumptions Required by Multivariate Regression Analysis, CB-SEM and PLS-SEM

Assumptions	**Multivariate Regression Analysis**	**CB – SEM**	**PLS -SEM**
Linearity	Required		
Statistical independence	Required		
Homoscedasticity	Required		
Multicolinearity	Required	Required	
Normality	Required	Required	
Sample size	Large[a]	Large[b]	Small[c]
Complete data		Required	
No specification error *(the model should be correctly specified)*		Required	
Testing a theory		Yes	No
Predictive (exploratory)			Yes

Notes: This table presents a summary of the statistical assumptions required by multivariate regression, CB-SEM, and PLS-SEM.

a. Multivariate regression anlysis requires a sufficient sample size to estimate the predicted relationship between the independent vairables and the outcome variable. To test a regression model with multiple independent vairables, Green (1991) suggests the following formula be used to determine the minimum sample size: 50 + 8(*k*), where k is the number of independent variables. This research uses nine dependent variables. The minimum sample size therefore is 50 + (8 x 9) = 122. The sample size of this research is 105, thereby falling short of the minimum estimated sample size.
b. Scholars suggest a minimum sample size of 200 for structural equations (Mentzer, 1999; Hoelter 1983).
c. PLS SEM is not constrained by sample size. The rule of thumb in PLS SEM is 10 times the maximum number of arrows pointing at a construct (Hair et al, 2012). The maximum number of arrows pointing at a construct in this research is three (i.e., the path linking productivity and financial performance, service quality and financial performance, and customer satisfaction and financial performance). Thus, the minimum sample size for PLS-SEM is 30 (3 x 10).

This research has four latent variables with several manifest variables. As discussed in the preceding sections, *airline productivity* has two second order constructs, *employee productivity* and *aircraft productivity*, and each of these have two manifest variables. *Service quality* is measured using four manifest variables, while *customer satisfaction* is measured using one manifest variable. *Financial performance* is the dependent variable and is measured using four manifest variables. Multivariate Regression Analysis does not facitilitate the assessment of latent variables. Therefore, for the purpose of testing the assumptions of Multivariate Regression Analysis, all the mainfest variables of *airline productivity, service quality,* and *customer satsifaction* are considered as independent variables. The four mainfest variables of *financial performance* are considered as dependent variables. Thus, four models are constructed in order to consider each of the mainfest variables of *fiancial performance,* namely, operating margin (OPMAR), return on assets (ROA), return on equity (ROE), and return on investment (ROI) as a dependent variable.

The four regression models are presented as below:

Model 1: $OPMAR_{it} = \alpha_0 + \alpha_1 ASME_{it} + \alpha_2 AIRE_{it} + \alpha_3\ ANFD_{it} + \alpha_4 ADBH_{it} + \alpha_5 ONTA_{it} + \alpha_6 INVD_{it} + \alpha_7 MSBG_{it} + \alpha_8 COMP_{it} + \alpha_9\ CSI_{it} + \varepsilon_{it}$

Model 2: $ROS_{it} = \alpha_0 + \alpha_1 ASME_{it} + \alpha_2 AIRE_{it} + \alpha_3\ ANFD_{it} + \alpha_4 ADBH_{it} + \alpha_5 ONTAA_{it} + \alpha_6 INVD_{it} + \alpha_7 MSBG_{it} + \alpha_8 COMP_{it} + \alpha_9\ CSI_{it} + \varepsilon_{it}$

Model 3: $ROA_{it} = \alpha_0 + \alpha_1 ASME_{it} + \alpha_2 AIRE_{it} + \alpha_3\ ANFD_{it} + \alpha_4 AADBH_{it} + \alpha_5 ONTAA_{it} + \alpha_6 INVD_{it} + \alpha_7 MSBG_{it} + \alpha_8 COMP_{it} + \alpha_9\ CSI_{it} + \varepsilon_{it}$

Model 4: $ROI_{it} = \alpha_0 + \alpha_1 ASME_{it} + \alpha_2 AIRE_{it} + \alpha_3\ ANFD_{it} + \alpha_4 ADBH_{it} + \alpha_5 ONTAA_{it} + \alpha_6 INVD_{it} + \alpha_7 MSBG_{it} + \alpha_8 COMP_{it} + \alpha_9\ CSI_{it} + \varepsilon$

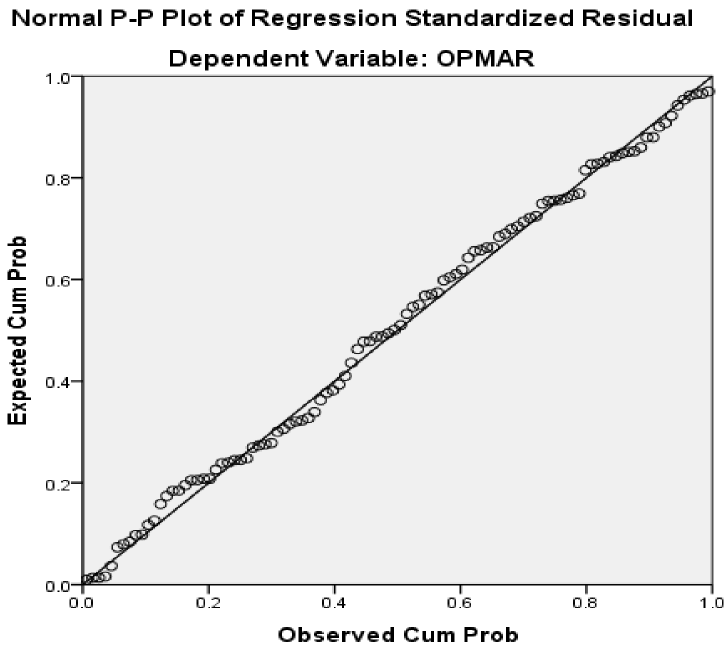
where, for firm *i* at time *t*: OPMAR, ROS, ROA, and ROI are operating margin, return on equity, return on assets, and return on investment, respectively; ASME is available seat miles per employee; AIRE is aircraft per employee; ANDF is departure per day per airacraft; ADBH is average daily block hours; ONTA is on time arrival; MSBG is the number of mishandled baggage reports; INVD is the number of involuntarily denied boardings; COMP is the number of complaints; and CSI is the customer satsifaction index.

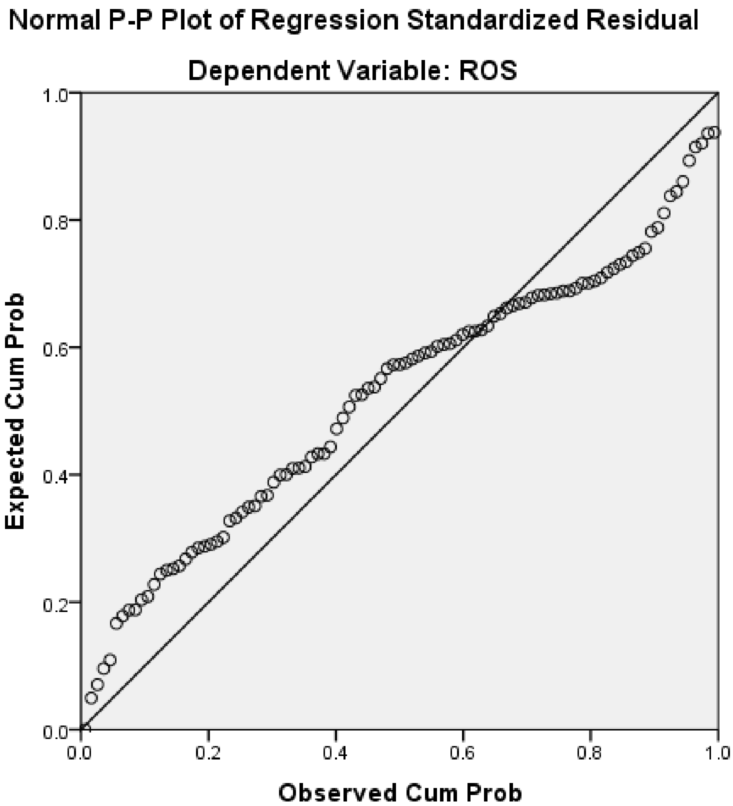
SPSS is used to test the four models to ascertain whether assumptions of Multivariate Regression Analysis have been violated or not, using the US airline industry dataset. The following section presents and discusses the SPSS output for each model against the assumption of Multivariate Regression Analysis.

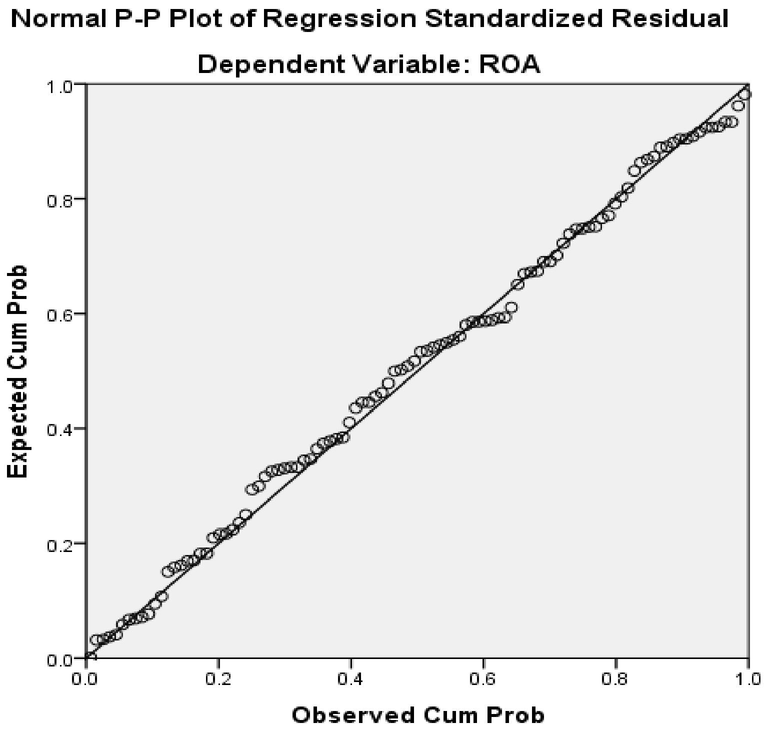
4.3.1.1 Assumption of Normality

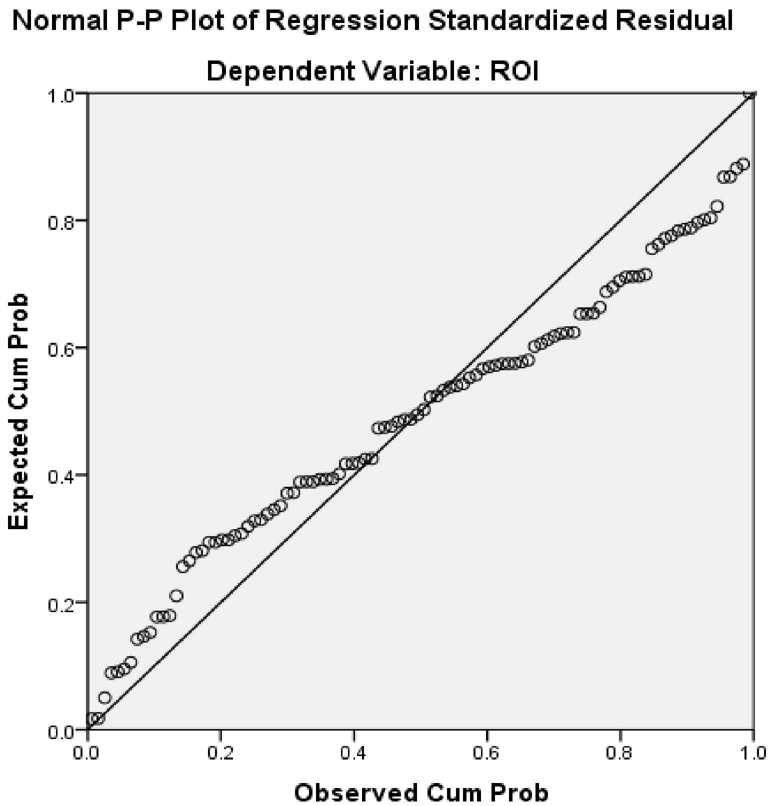
The assumption of normality can be tested in two ways, visually and statistically (Berry and Feldman, 1985). Visual observation of P-P plots and histograms provides researchers with sufficient basis to infer the normality of the distribution of the variables (Osborne and Waters, 2002). Figure 8 shows the normal P-P plots of the standardized residuals of each of the four regression models (Models 1 - 4 as described above), with operating margin (OPMAR), return on sales (ROS), return on assets (ROA), and return on investment (ROI) respectively as dependent variables. The results show that Model 1 (OPMAR as dependent varaible), and Model 3 (ROA as dependent varaible), satisfy the normality assumption as the standardized residuals are closely scattered around the estimated regression line. However, the normal P-P plots of the residuals of Model 2 (ROS as dependent variable), and Model 4 (ROI as dependent varaible), seem to deviate significantly from the estimated regression line, suggesting a possible violation of the normality assumption.

Figure 8. P-P plots for Model 1 (OPMAR), Model 2 (ROS), Model 3 (ROA), and Model 4(ROI)









Notes: The above four figures show the normal P-P plot of the four models developed to test the assumptions of Multivariate Regression Analysis. These models are:

Model 1*:* $OPMAR_{it} = \alpha_0 + \alpha_1 ASMEMP_{it} + \alpha_2 AIREMP_{it} + \alpha_3\ DEPDAY_{it} + \alpha_4 AVDBLOHRS_{it} + \alpha_5 ONTIME_{it} + \alpha_6 INVD_{it} + \alpha_7 MISBAG_{it} + \alpha_8 COMPLAIN_{it} + \alpha_9\ CUSAT_{it} + \varepsilon_{it}$

Model 2: $ROS_{it} = \alpha_0 + \alpha_1 ASME_{it} + \alpha_2 AIRE_{it} + \alpha_3\ ANFD_{it} + \alpha_4 ADBH_{it} + \alpha_5 ONTA_{it} + \alpha_6 INVD_{it} + \alpha_7 MSBG_{it} + \alpha_8 COMP_{it} + \alpha_9\ CSI_{it} + \varepsilon_{it}$

Model 3: $ROA_{it} = \alpha_0 + \alpha_1 ASME_{it} + \alpha_2 AIRE_{it} + \alpha_3\ ANFD_{it} + \alpha_4 ADBH_{it} + \alpha_5 ONTA_{it} + \alpha_6 INVD_{it} + \alpha_7 MSBG_{it} + \alpha_8 COMP_{it} + \alpha_9\ CSI_{it} + \varepsilon_{it}$

Model 4: $ROI_{it} = \alpha_0 + \alpha_1 ASME_{it} + \alpha_2 AIRE_{it} + \alpha_3\ ANFD_{it} + \alpha_4 ADBH_{it} + \alpha_5 ONTA_{it} + \alpha_6 INVD_{it} + \alpha_7 MSBG_{it} + \alpha_8 COMP_{it} + \alpha_9\ CSI_{it} + \varepsilon$

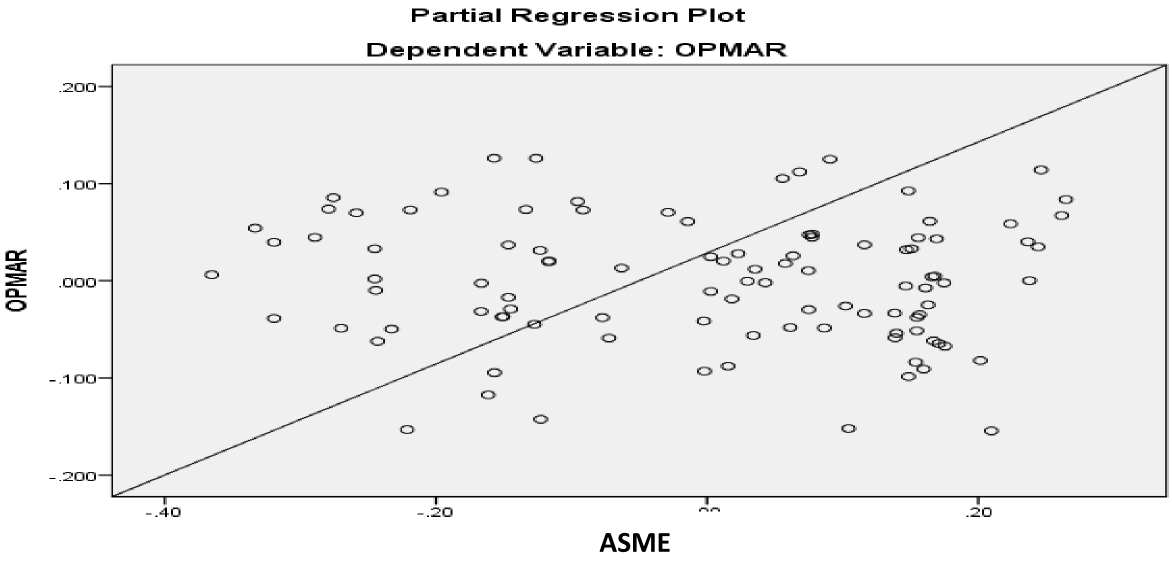
The figures depict the standardized residuals. As can be seen, the standardized residuals of model 1 (dependent variable - OPMAR) and model 3 (dependent variable - ROA) are scattered around the estimated regression line suggesting that these two models meet the assumption of normality. The figures also show that model 2 (dependent variable – ROS) and model 4 (dependent variable – ROI) do not meet the normality assumption as the standardized residuals are dispersed from the regression line.

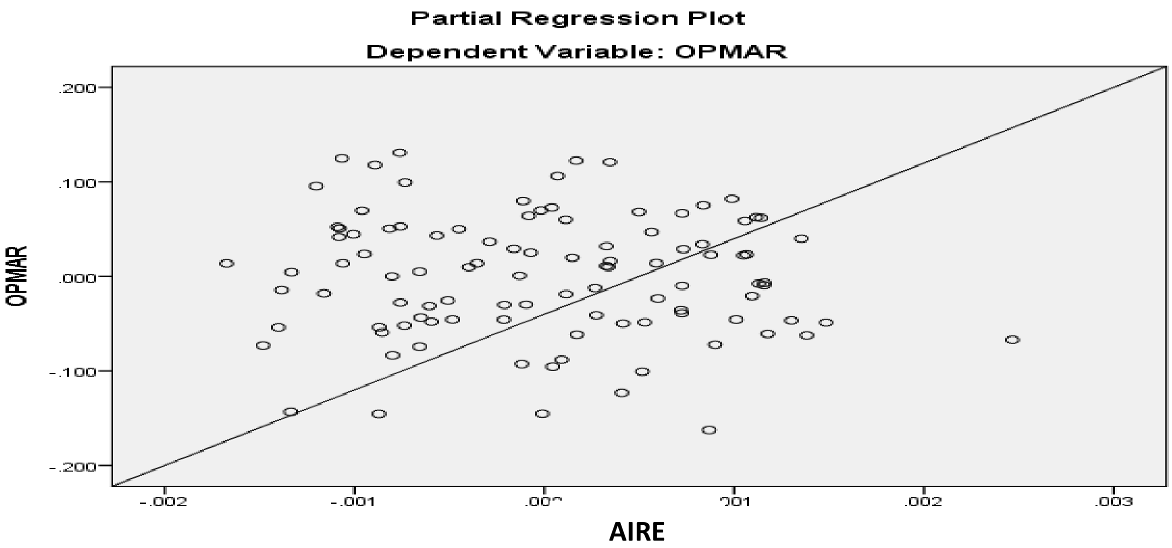
4.3.1.2 Assumption of Linearity

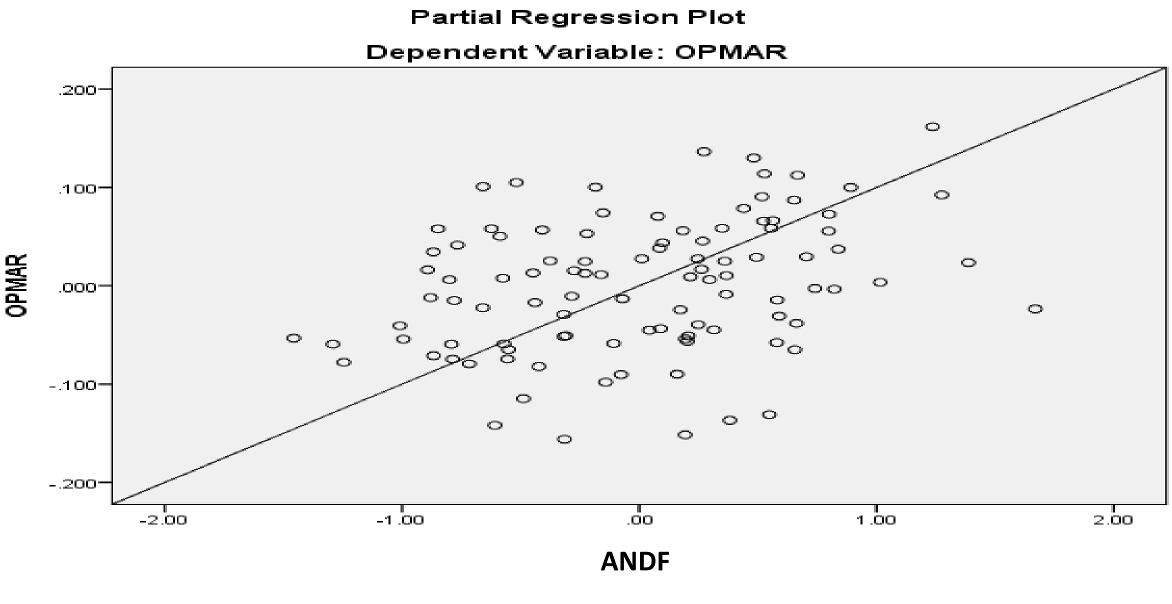
Multiple Regression Analysis assumes a linear relationship between dependent and independent variables (Osborne and Waters, 2002). Three methods have been documented in the literature to test the linearity assumption: (1) conducting several regression tests incorporating the curvilinear compnonents, (2) using established theory (or prior studies) to justify the linear relationship, and (3) observing the plots of the residuals (Osborne and Waters, 2002).

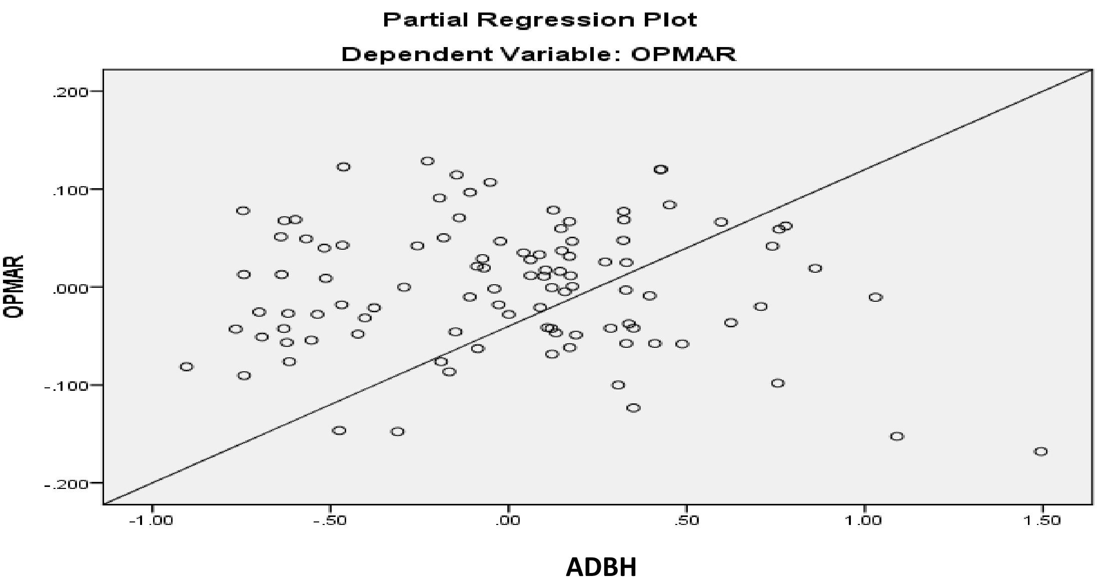
Data points roughly condensed to the centre evidence the existence of a linear relationship between the predicited and the outcome variables (Osborne and Waters, 2002). I test whether the relationship between the independent variables and the depedent variables is linear by using a partial regression plot. Figures 9 to 12 show the partial regression plots for each of the four models. A fit line has been added to each plot for clarity of interpretation. Figure 9 shows Model 1 (OPMAR as dependent varaible); Figure 10 shows Model 2 (ROS as dependent variable); Figure 11 shows Model 3 (ROA as dependent varaible) and Figure 12 shows Model 4 (ROI as dependent varaible). These plots suggest that the relationship between dependent and independent variables is not linear as the data points are scattered sparsely over the fit line, thereby model assumption of linearity is violated.

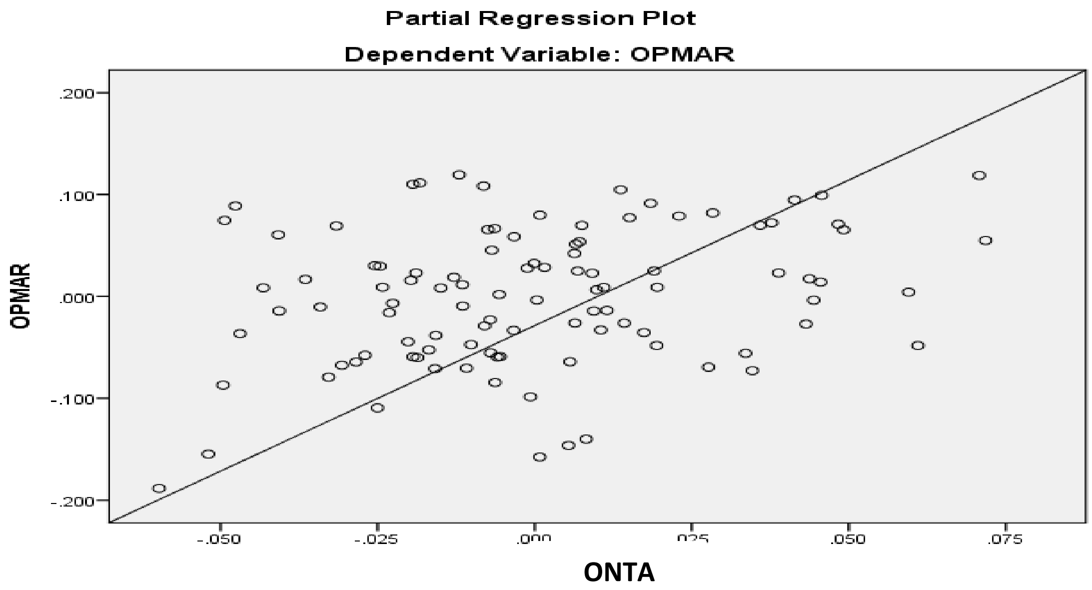
Figure 9. Scatter Plot of Partial Regression – Model 1 OPMAR as Dependent Variable

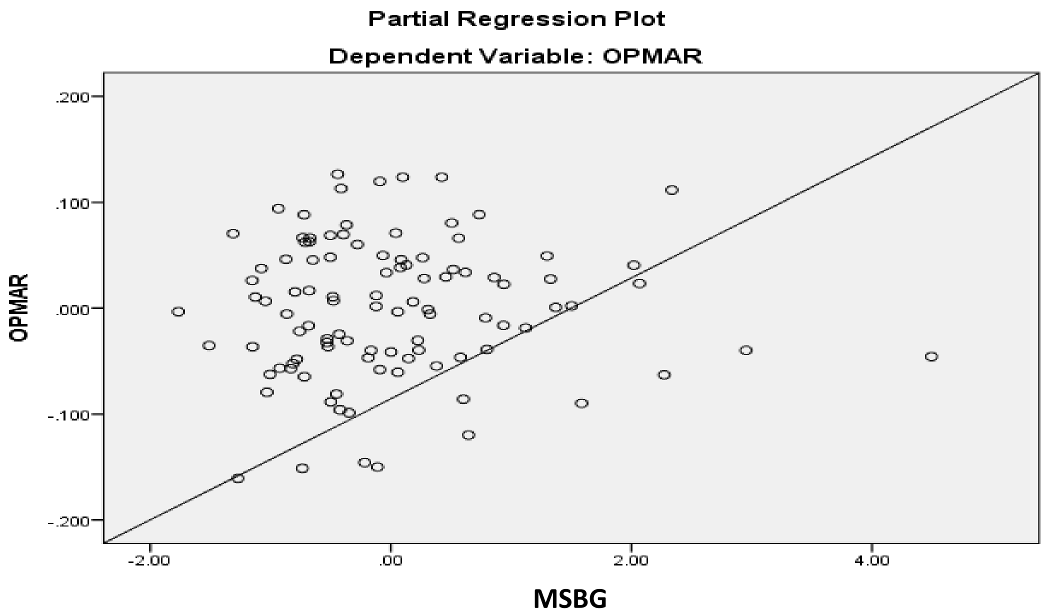






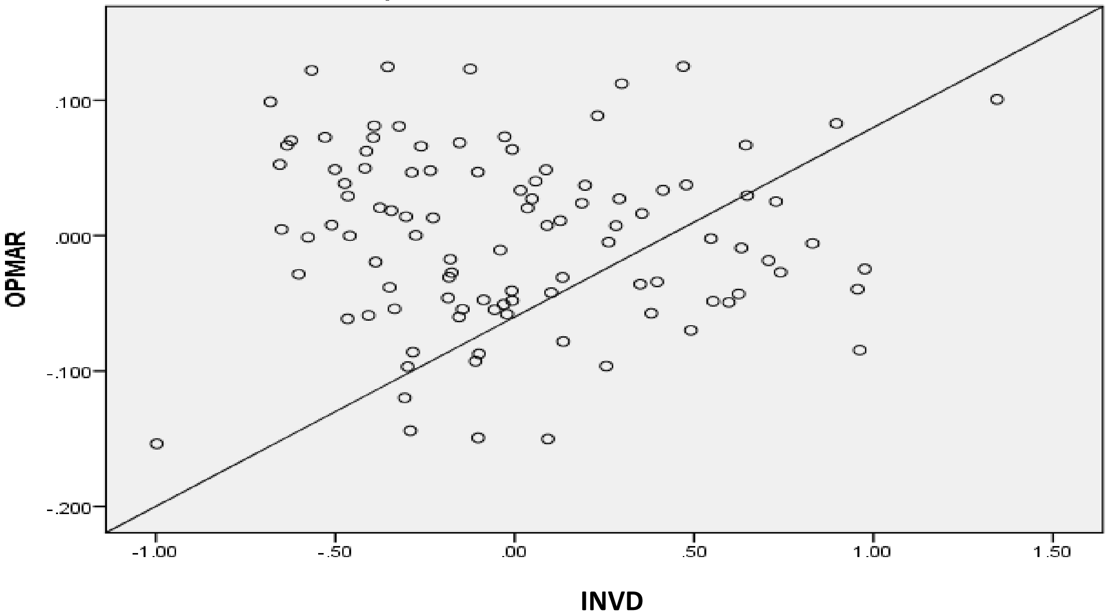

Partial Regression Plot
Dependent Variable: OPMAR
OPMAR
.200
.100
.000
-.100
-.200
-1.00
-.50
.00
.50
1.00
1.50
ADBH


Partial Regression Plot
Dependent Variable: OPMAR
OPMAR
.200
.100
.000
-.100
-.200
-.050
-.025
.050
.075
ONTA


Partial Regression Plot
Dependent Variable: OPMAR
OPMAR
.200
.100
.000
-.100
-.200
-2.00
.00
2.00
4.00
MSBG

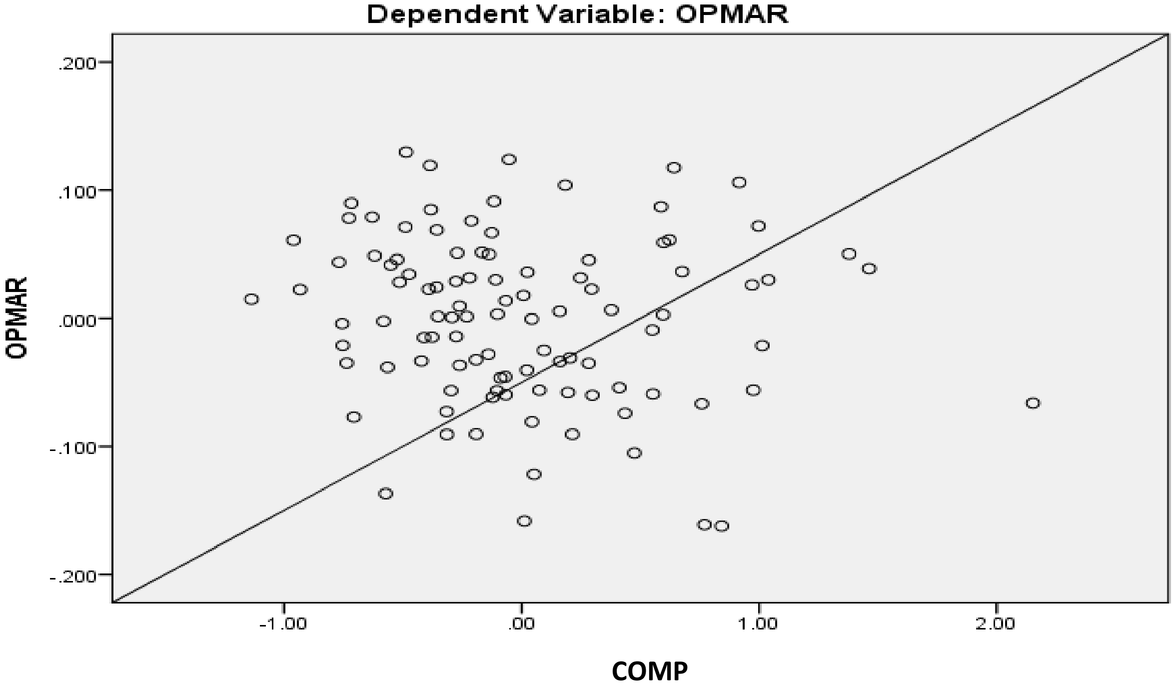
Partial Regression Plot

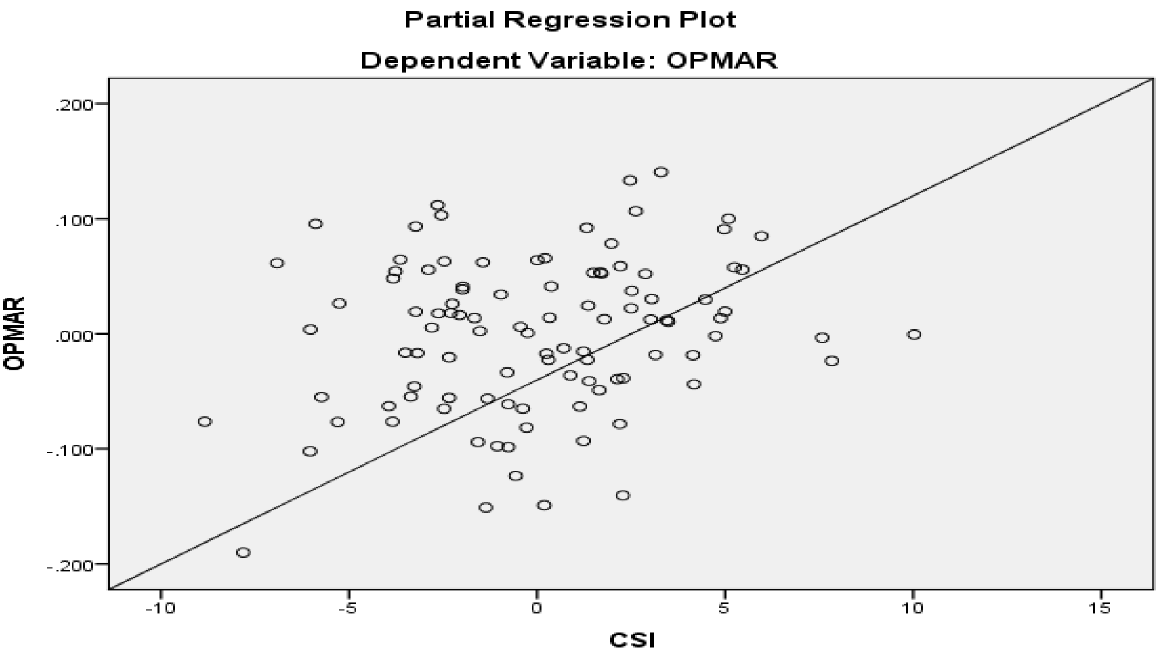
Dependent Variable: OPMAR



Partial Regression Plot

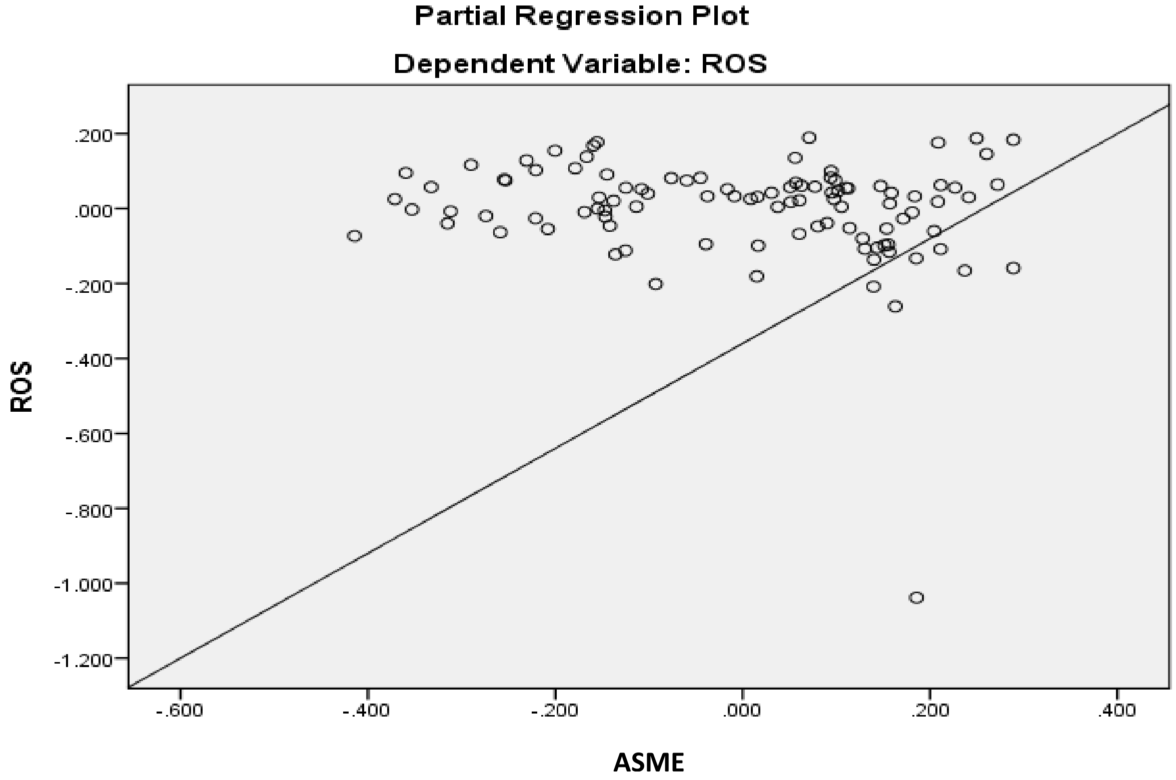
Dependent Variable: OPMAR

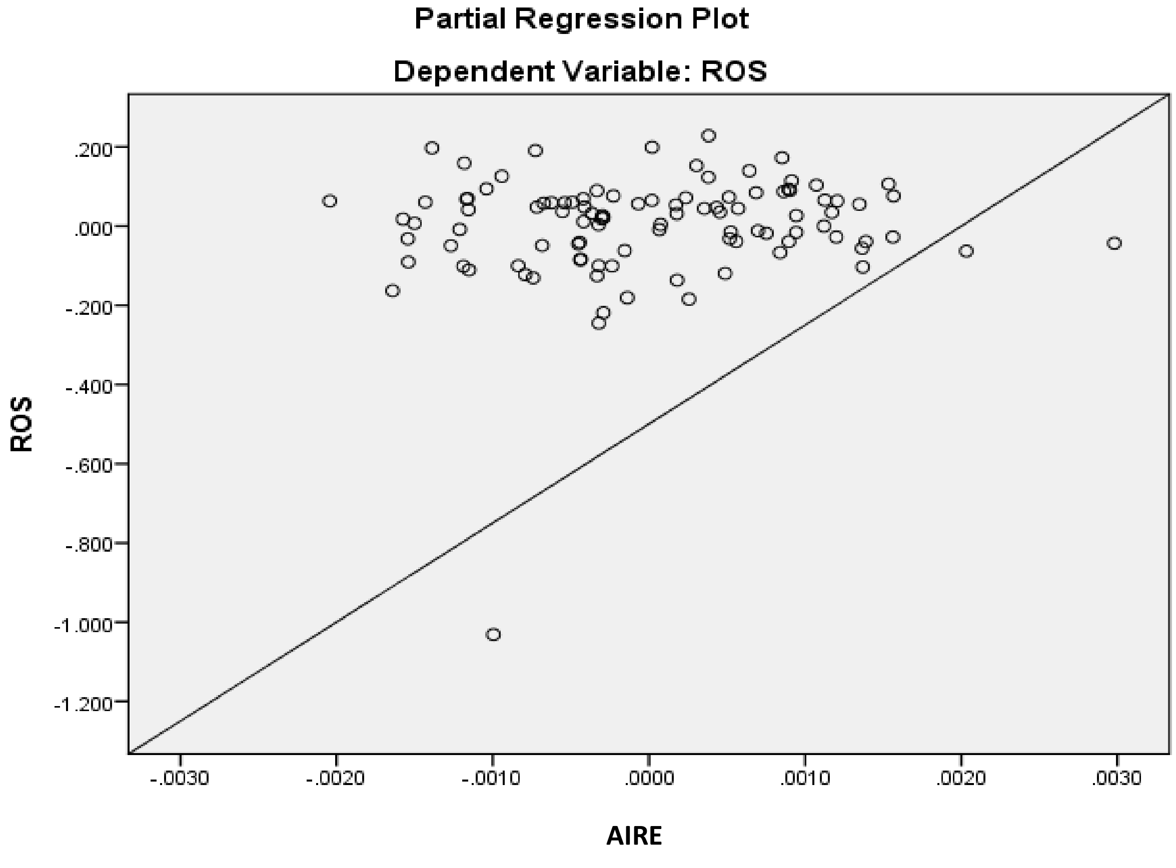




Notes: The above nine figures show the SPSS results of the test of linearity assumption related to the first model that takes operating margin (OPMAR) as the dependent variable with nine independent variables. The independent variables are: available seat miles per employee (ASME), aircraft per employee (AIRE), average daily block hours (ADBH), average number of flights per day (ANFD), number of complaints (COMP), on time arrival (ONTA), number of mishandled baggage reports (MSBG), involuntarily denied boarding (INVD), and customer satisfaction index (CIS). The figures show the statistical relationship between each of the nine independent variables and the operating margin (OPMAR). As can be seen from the figures, none of them show a linear relationship between the independent and dependent variable.

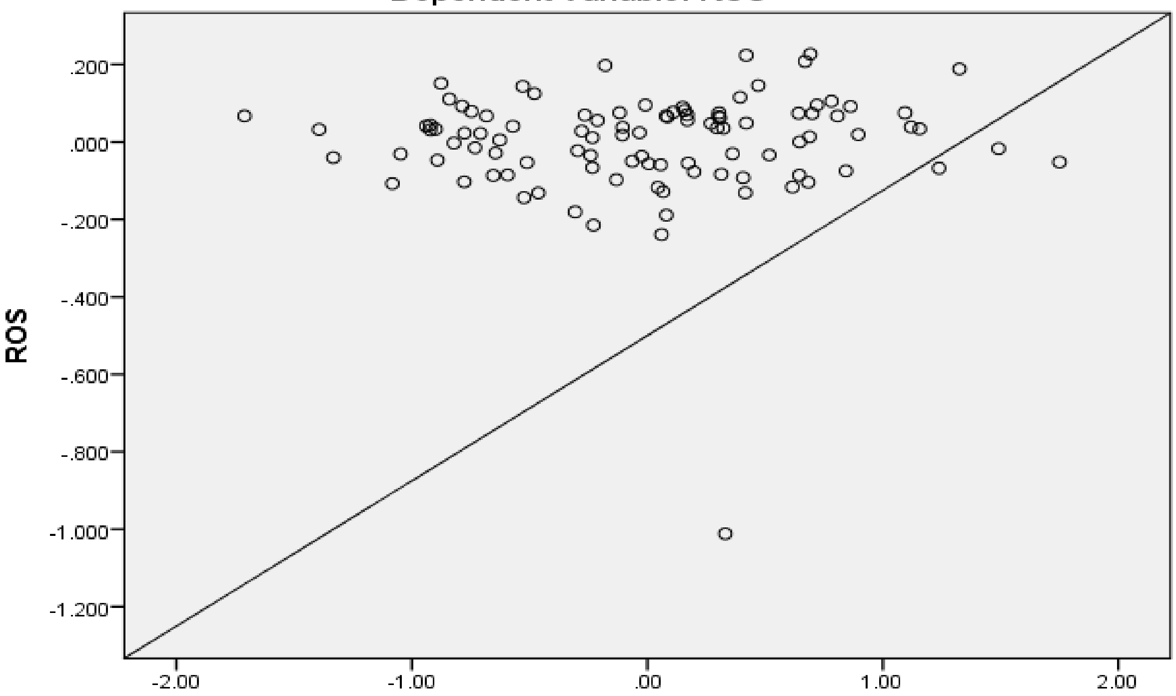
Figure 10. Scatter Plot of Partial Regression – Model 2 ROS as Dependent Variable





Partial Regression Plot

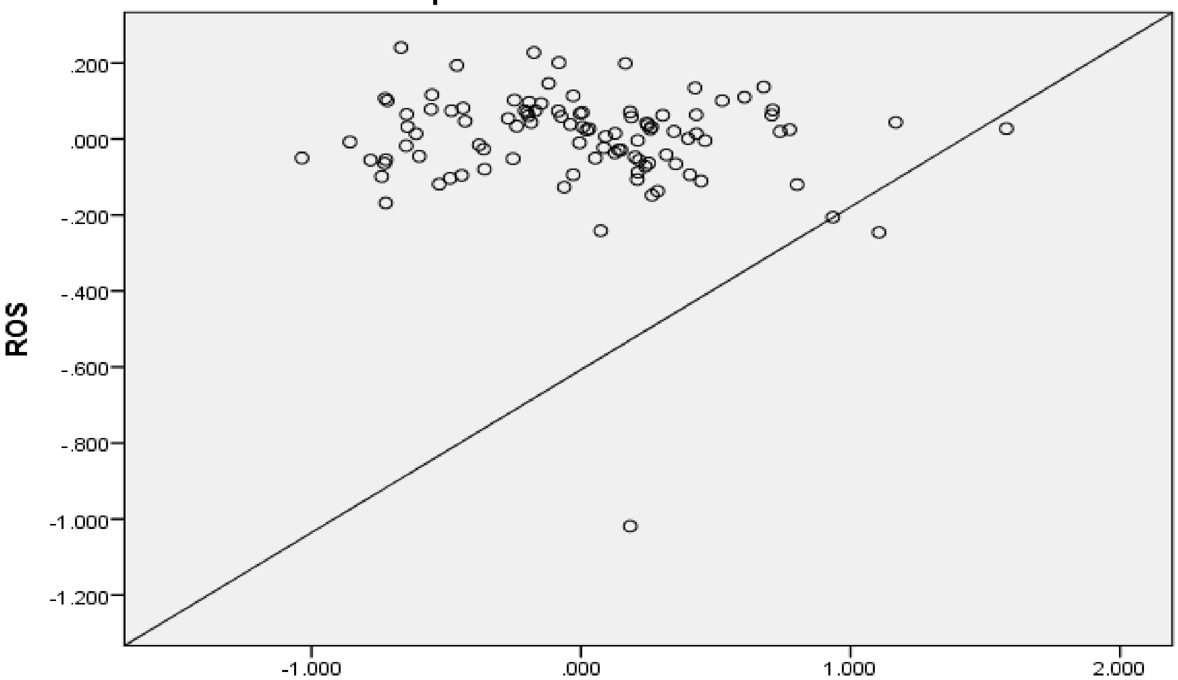
Dependent Variable: ROS



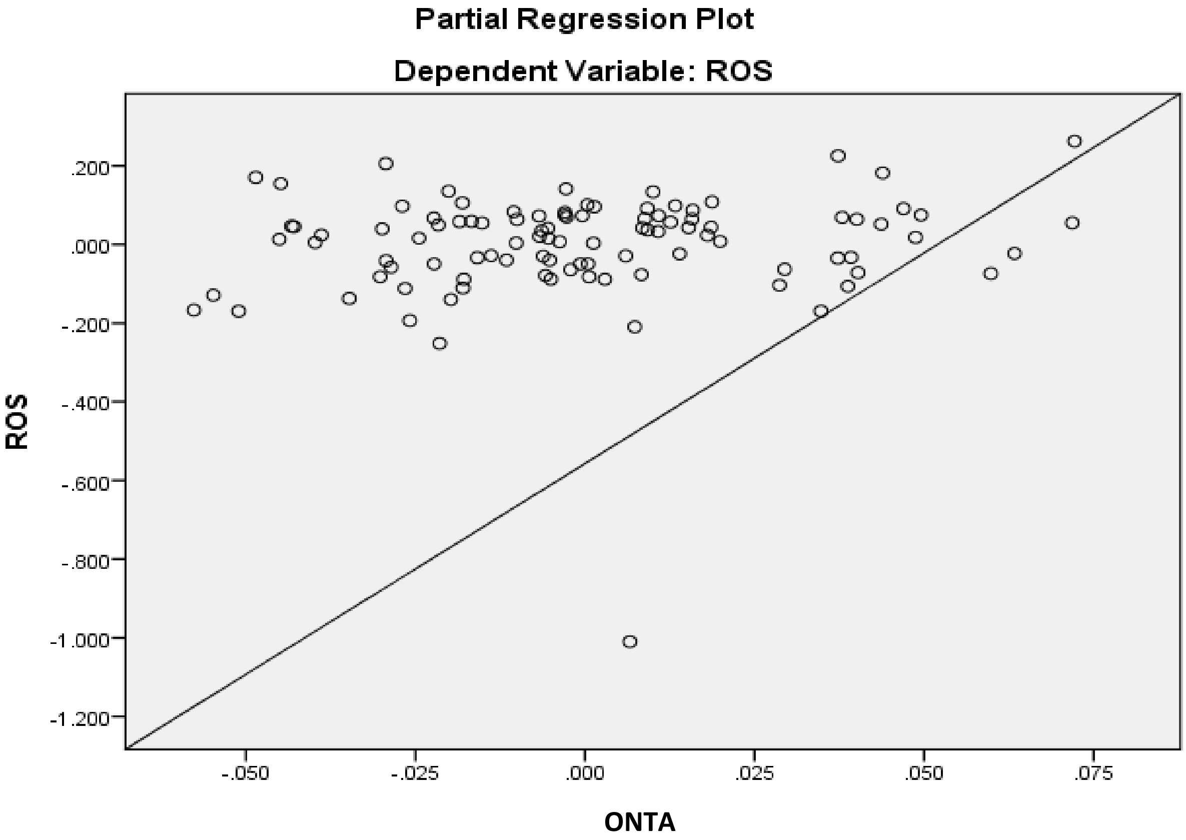
ANDF

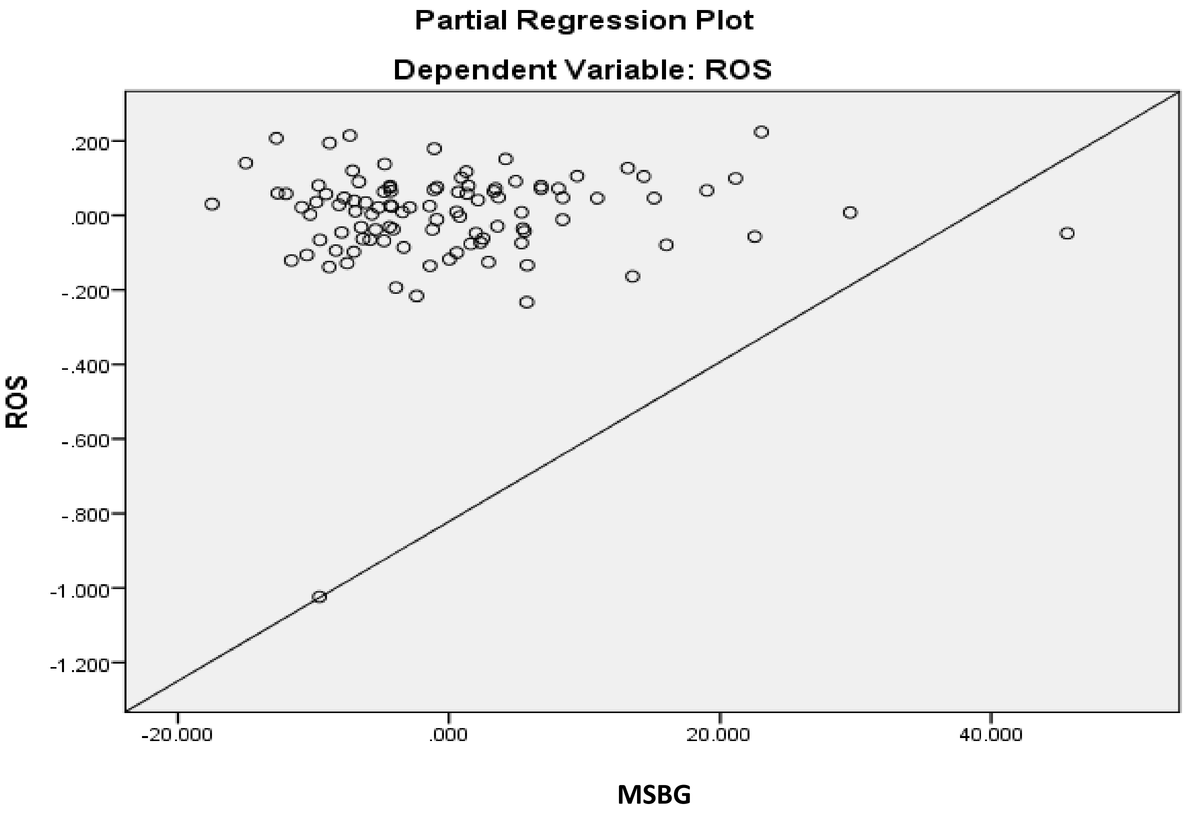
Partial Regression Plot

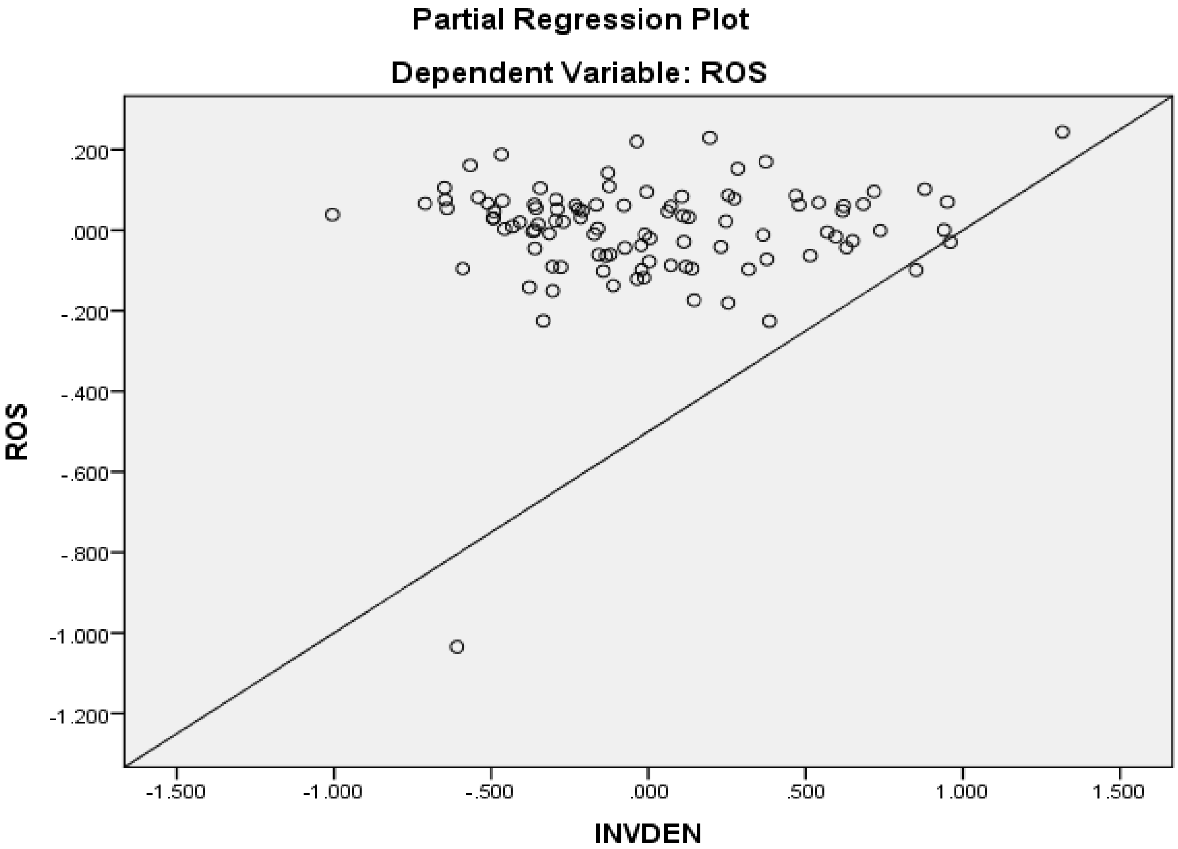
Dependent Variable: ROS

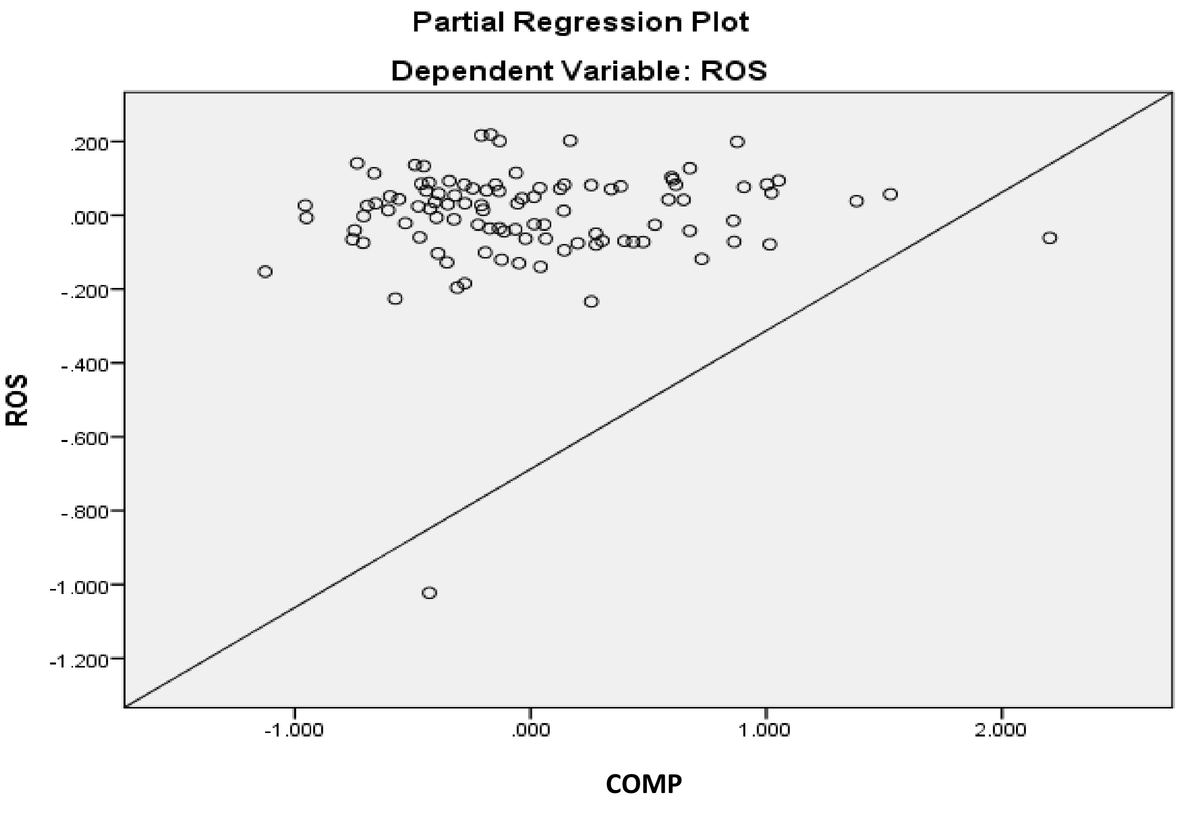


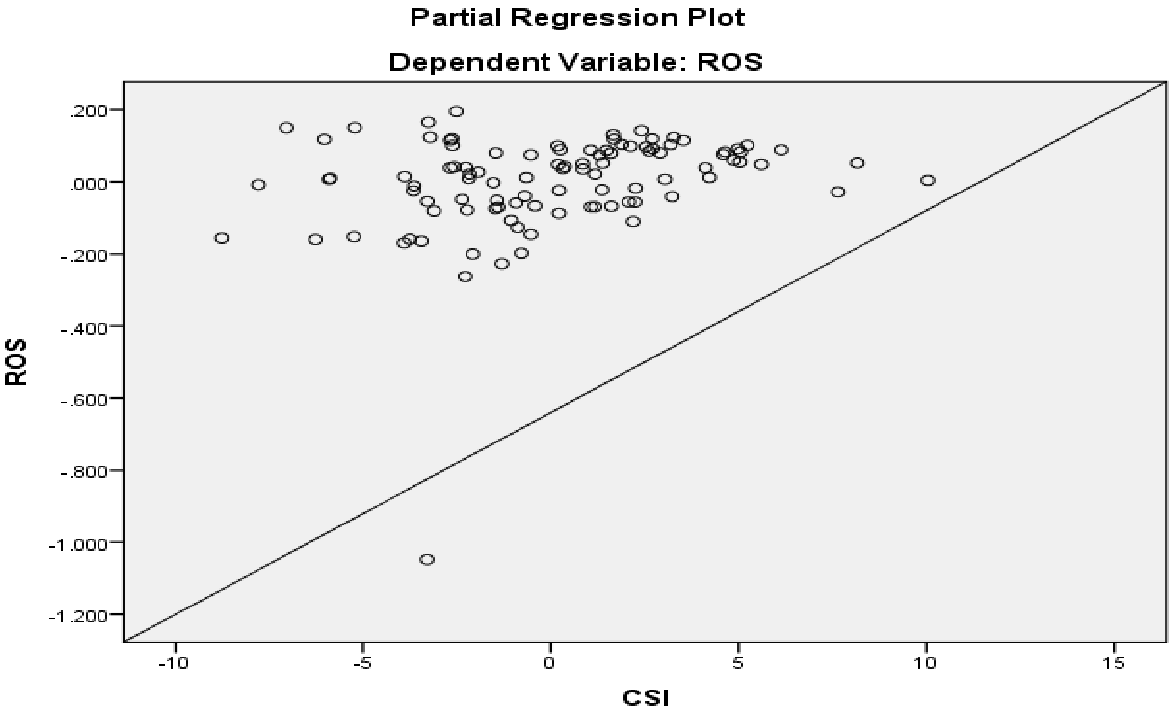
ADBH


Partial Regression Plot
Dependent Variable: ROS
ROS
.200
.000
-.200
-.400
-.600
-.800
-1.000
-1.200
-.050
-.025
.000
.025
.050
.075
ONTA


Partial Regression Plot
Dependent Variable: ROS
ROS
.200
.000
-.200
-.400
-.600
-.800
-1.000
-1.200
-20.000
.000
20.000
40.000
MSBG

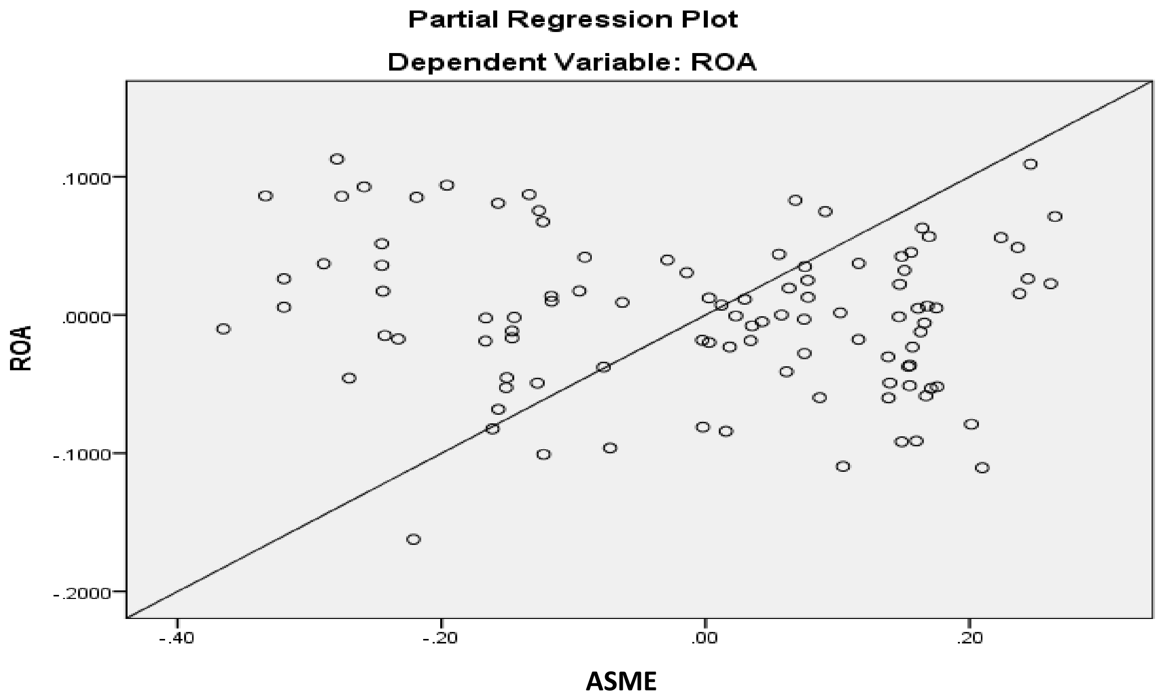

Partial Regression Plot
Dependent Variable: ROS
ROS
.200
.000
-.200
-.400
-.600
-.800
-1.000
-1.200
-1.500
-1.000
-.500
.000
.500
1.000
1.500
INVDEN

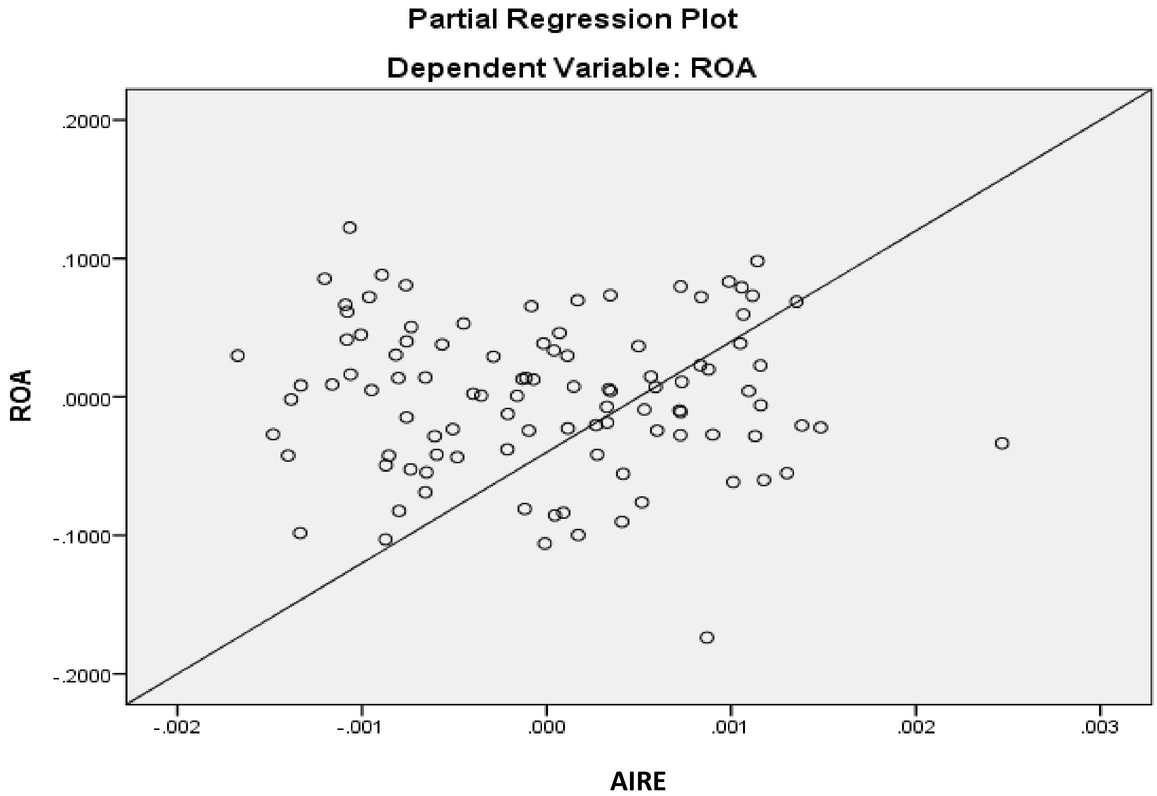

Partial Regression Plot
Dependent Variable: ROS
ROS
.200
.000
-.200
-.400
-.600
-.800
-1.000
-1.200
-1.000
.000
1.000
2.000
COMP

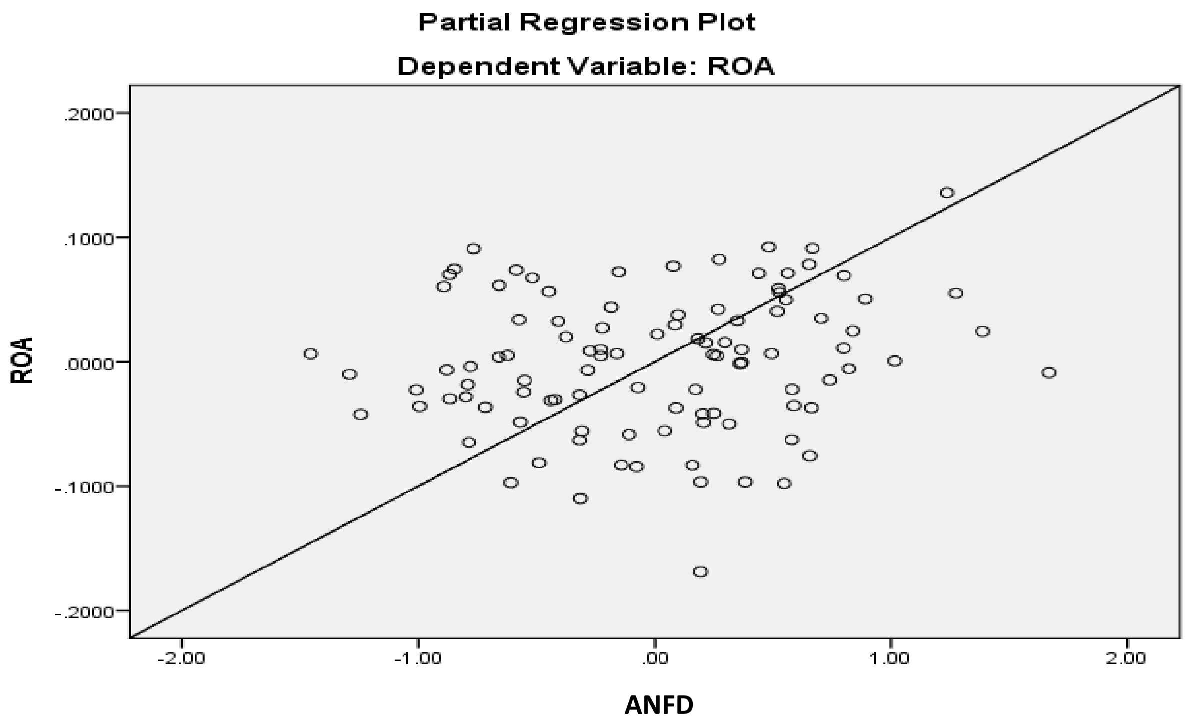


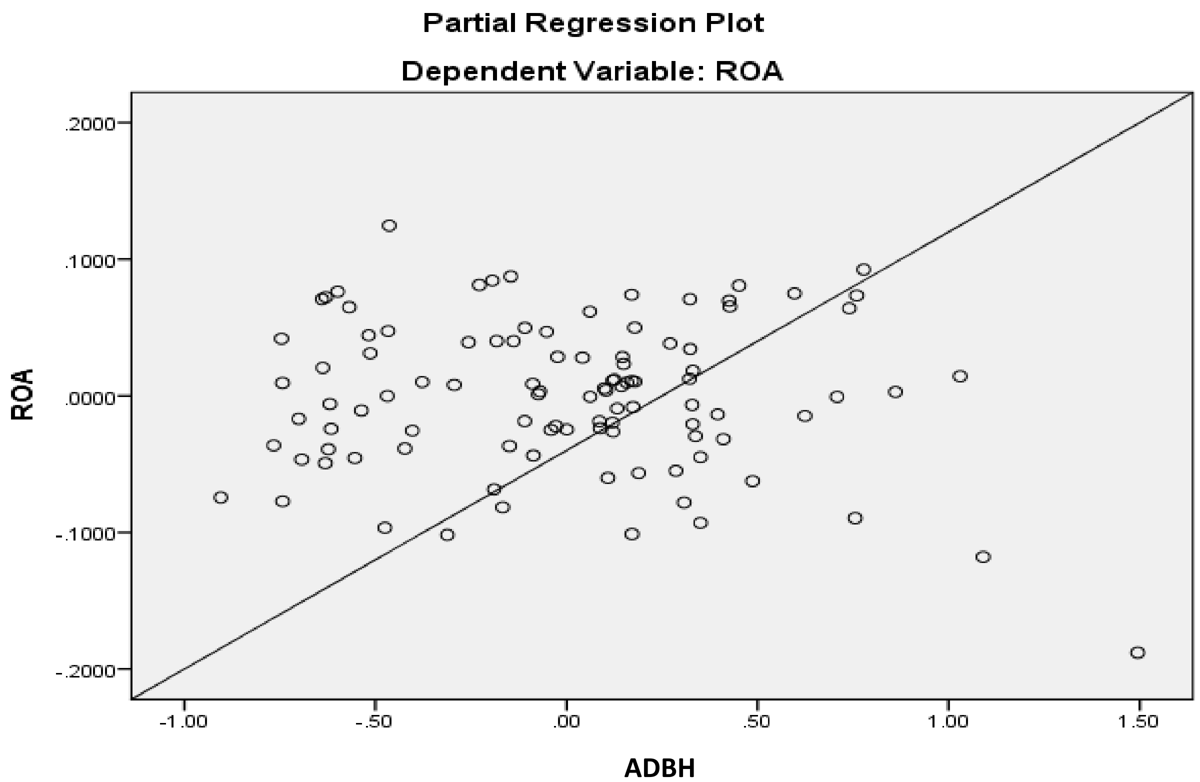
Notes: The above nine figures show SPSS results of the test of linearity assumption related to the second model that takes return on sales (ROS) as the dependent variable with nine independent variables. The independent variables are: available seat miles per employee (ASME), aircraft per employee (AIRE), average daily block hours (ADBH), average number of flights per day (ANFD), and number of complaints (COMP), on time arrival (ONTA), number of mishandled baggage reports (MSBG), involuntarily denied boarding (INVD), and customer satisfaction index (CIS). The figures show the statistical relationship between each of the nine independent variables and return on sales (ROS). The figures show that the second model that takes ROS as the dependent variable does not meet the linearity assumption.

Figure 11. Scatter Plot of Partial Regression – Model 3 ROA as Dependent Variable



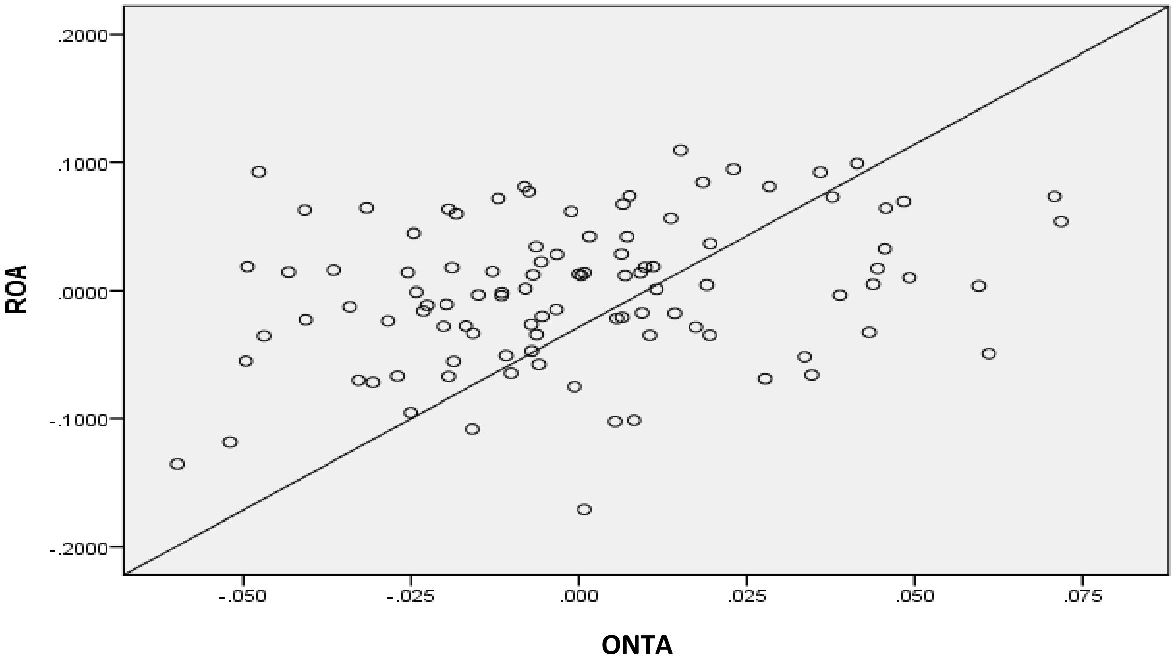



Partial Regression Plot
Dependent Variable: ROA
ROA
.2000
.1000
.0000
-.1000
-.2000
-2.00
-1.00
.00
1.00
2.00
ANFD


Partial Regression Plot
Dependent Variable: ROA
ROA
.2000
.1000
.0000
-.1000
-.2000
-1.00
-.50
.00
.50
1.00
1.50
ADBH

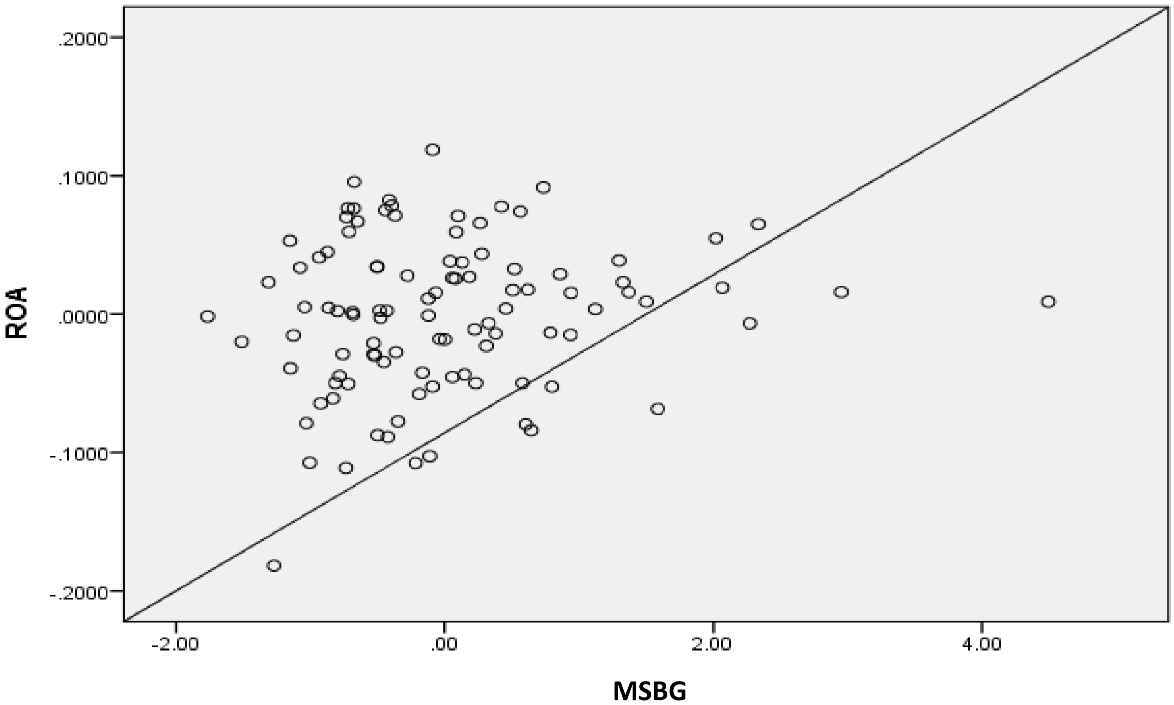
Partial Regression Plot

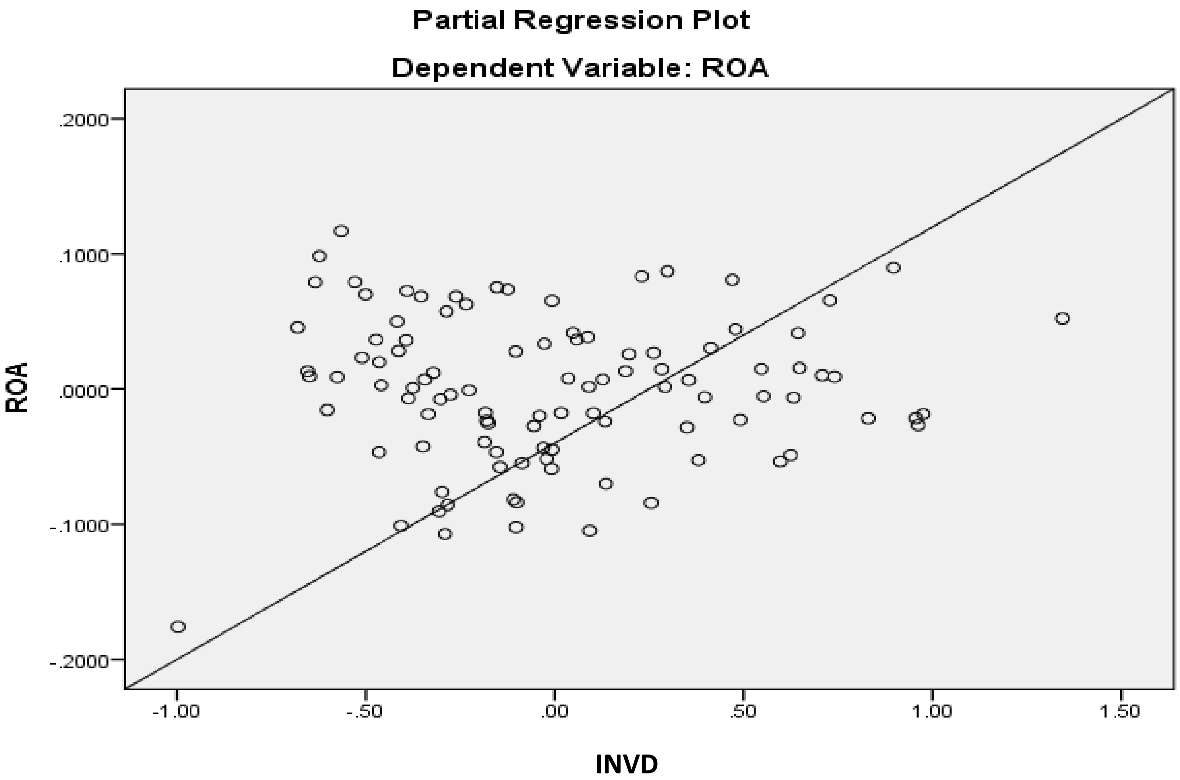
Dependent Variable: ROA

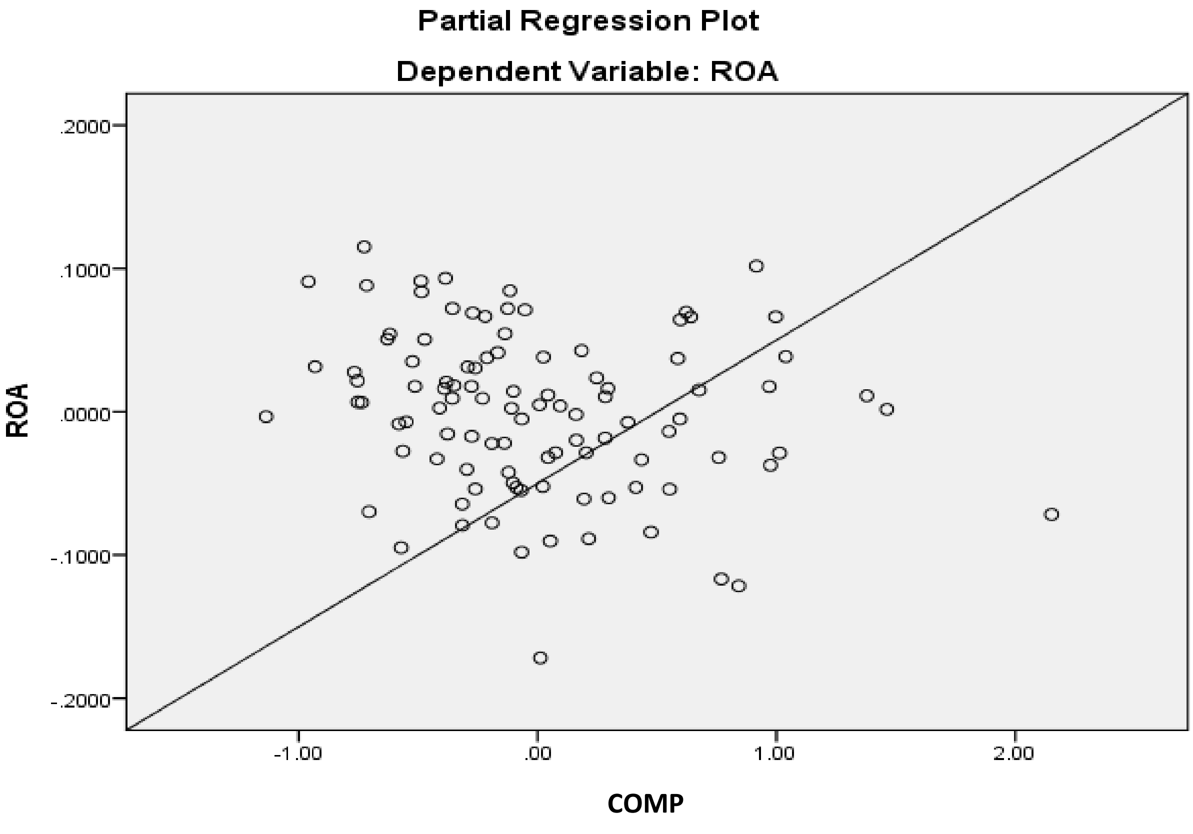


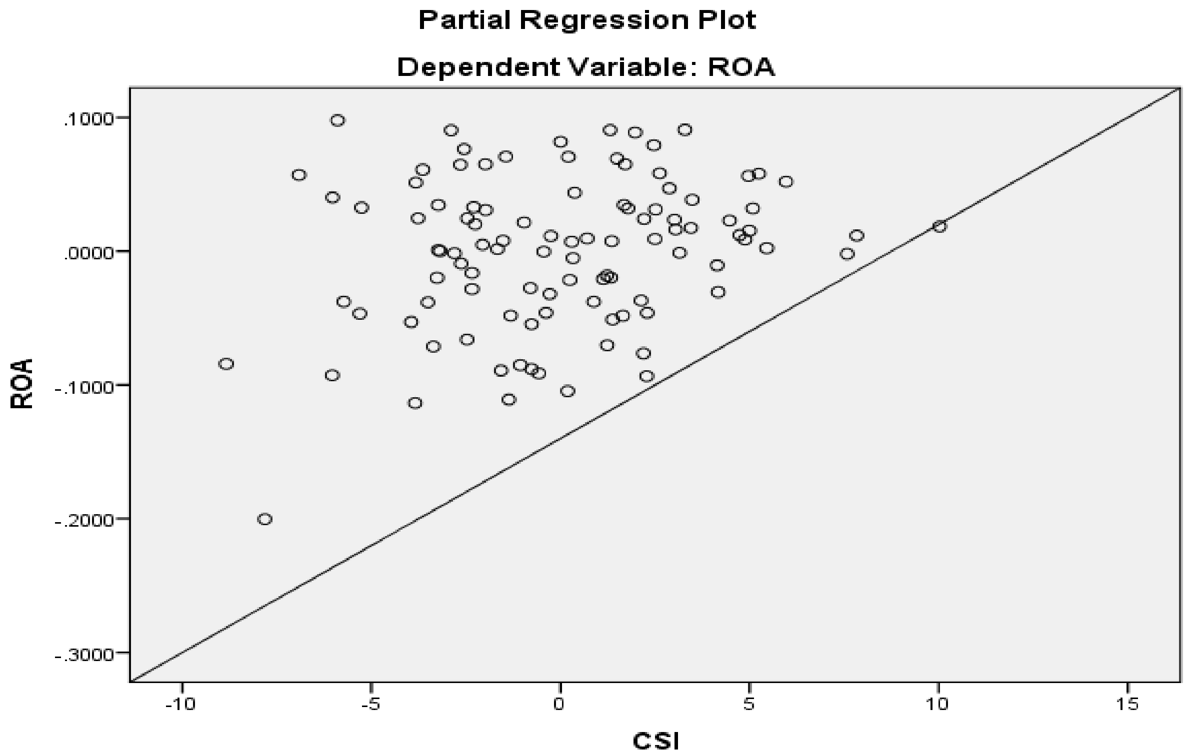
Partial Regression Plot

Dependent Variable: ROA



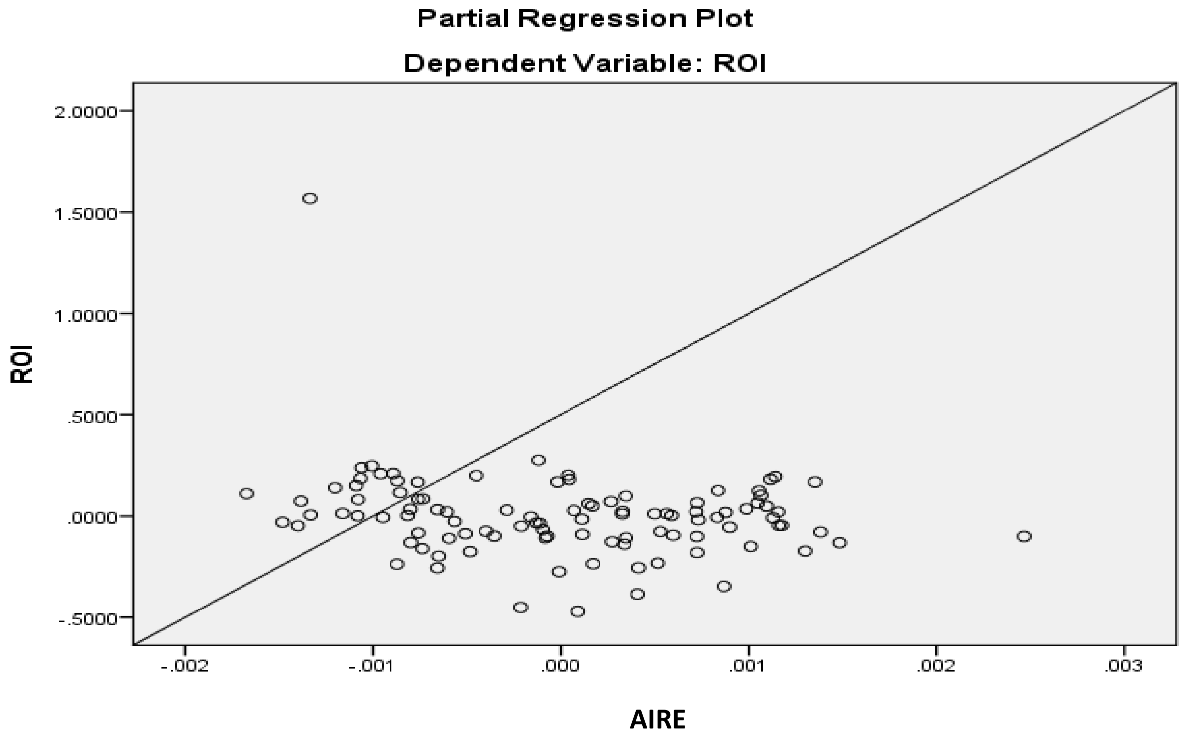

Partial Regression Plot
Dependent Variable: ROA
ROA
.2000
.1000
.0000
-.1000
-.2000
-1.00
-.50
.00
.50
1.00
1.50
INVD

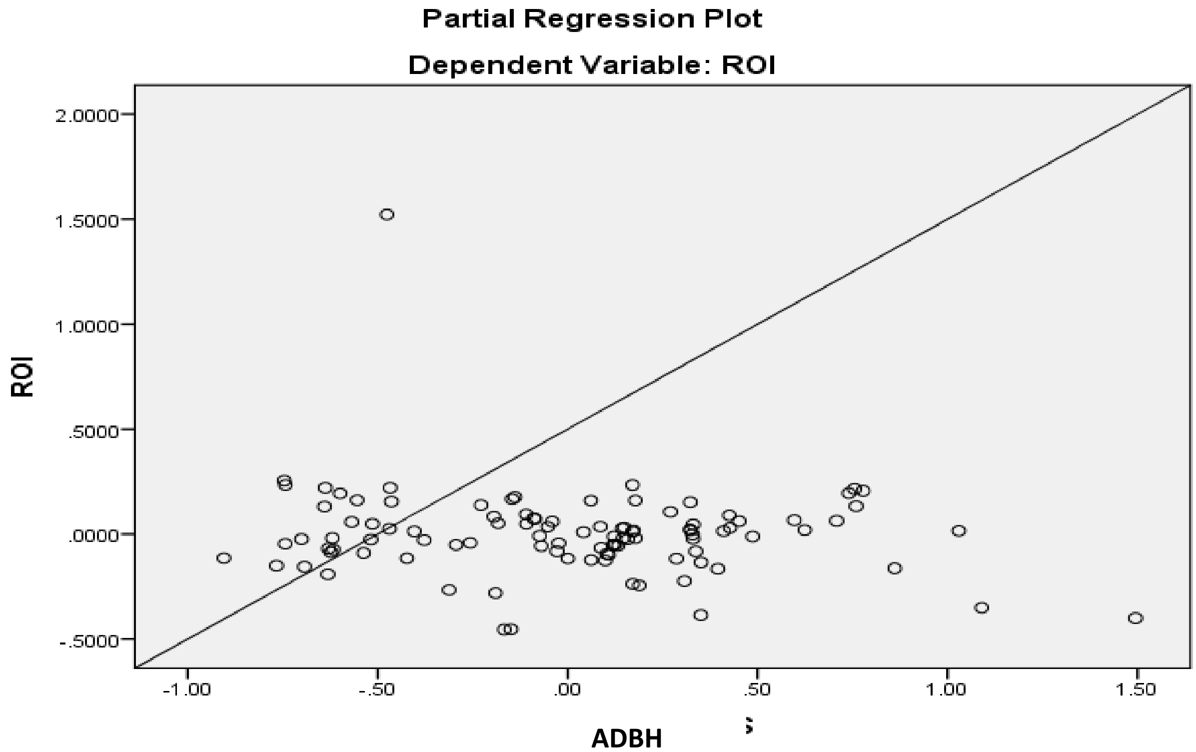

Partial Regression Plot
Dependent Variable: ROA
ROA
.2000
.1000
.0000
-.1000
-.2000
-1.00
.00
1.00
2.00
COMP

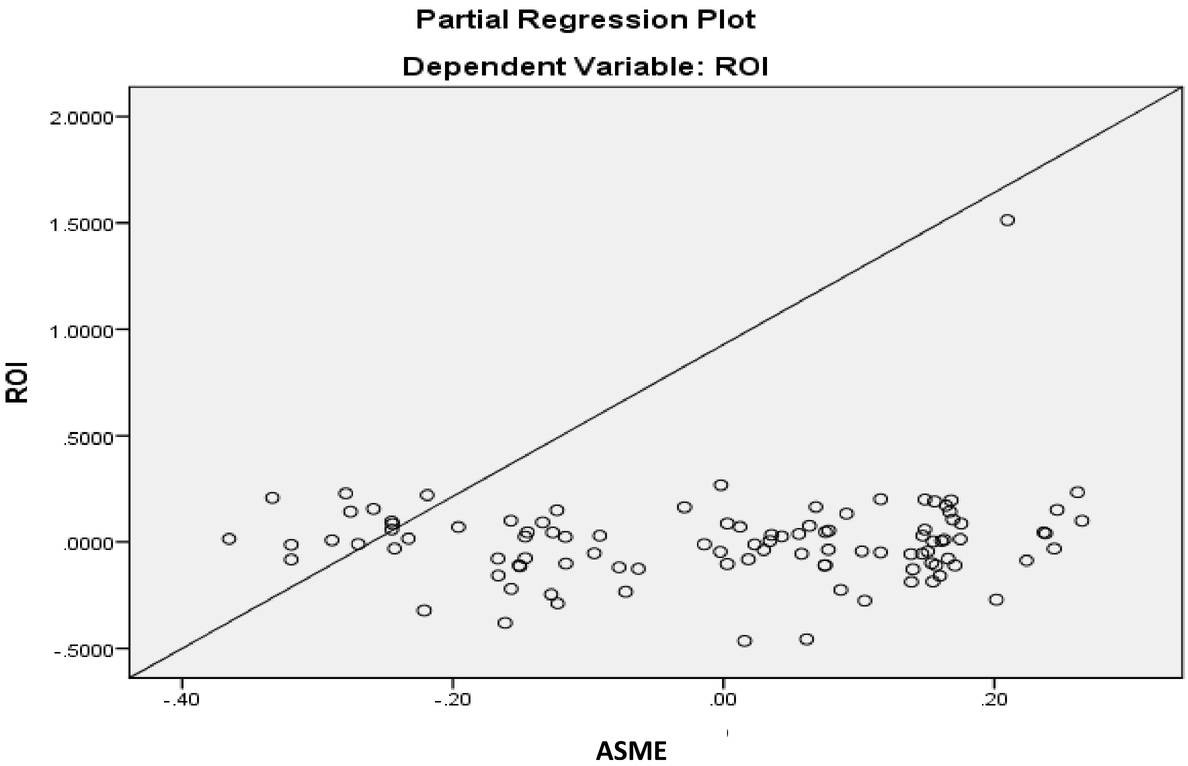


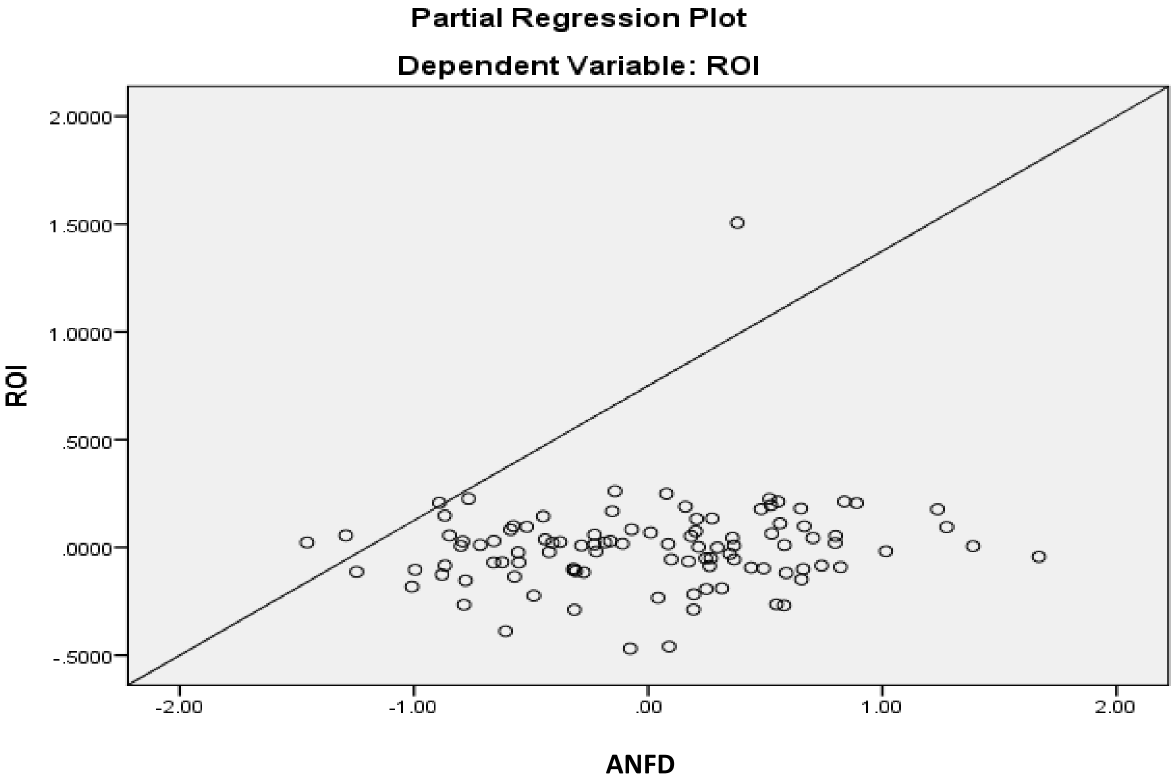
Notes: The above nine figures show SPSS results of the test of linearity assumption related to model 3 that takes return on sales (ROA) as the dependent variable with nine independent variables. The independent variables are: available seat miles per employee (ASME), aircraft per employee (AIRE), average daily block hours (ADBH), average number of flights per day (ANFD), number of complaints (COMP), on time arrival (ONTA), number of mishandled baggage reports (MSBG), involuntarily denied boarding (INVD), and customer satisfaction index (CIS). The figures show the statistical relationship between each of the 9 independent variables and Return on assets (ROA). The figures show that the third model that takes ROA as dependent variable does not meet the linearity assumption.

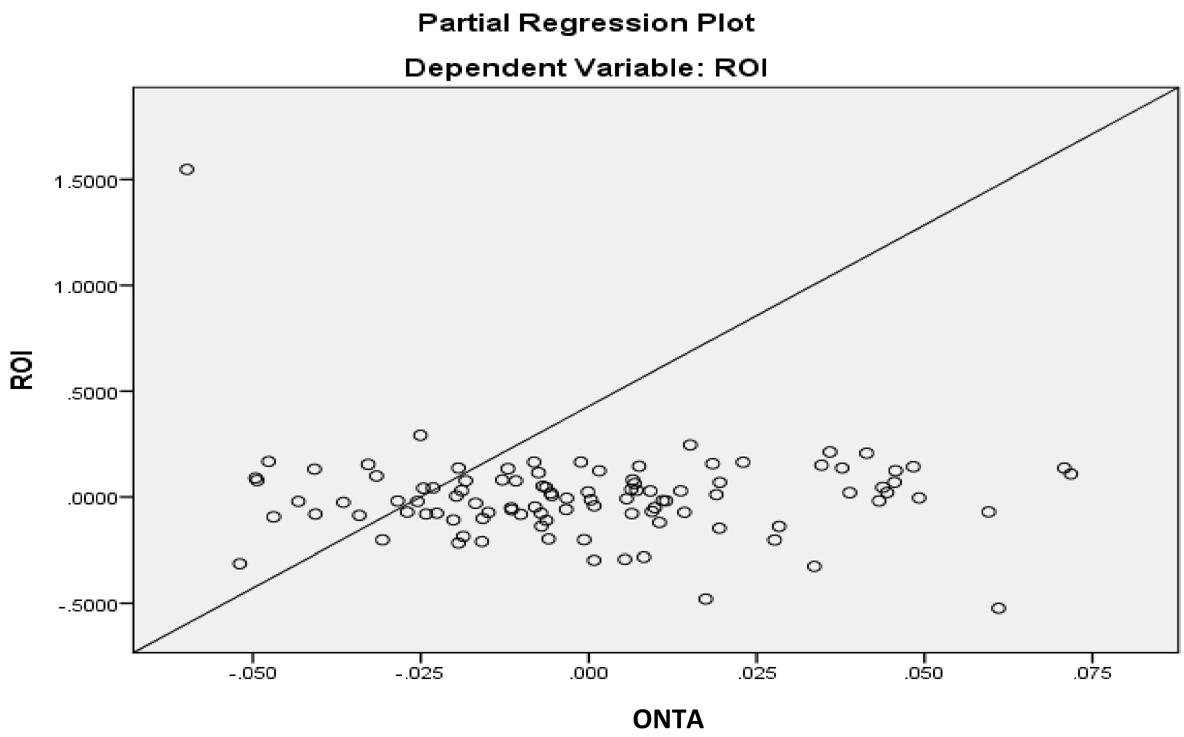
Figure 12. Scatter Plot of Partial Regression – Model 4 ROI as Dependent variable

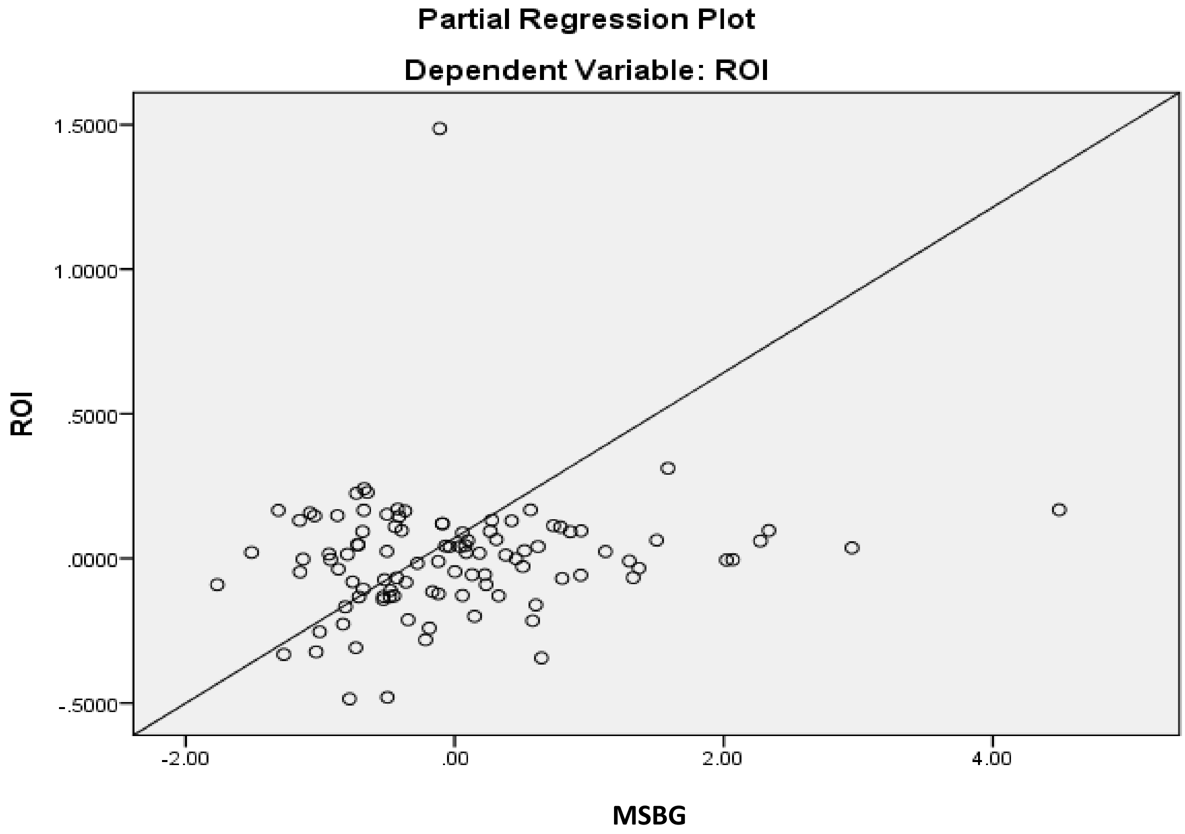


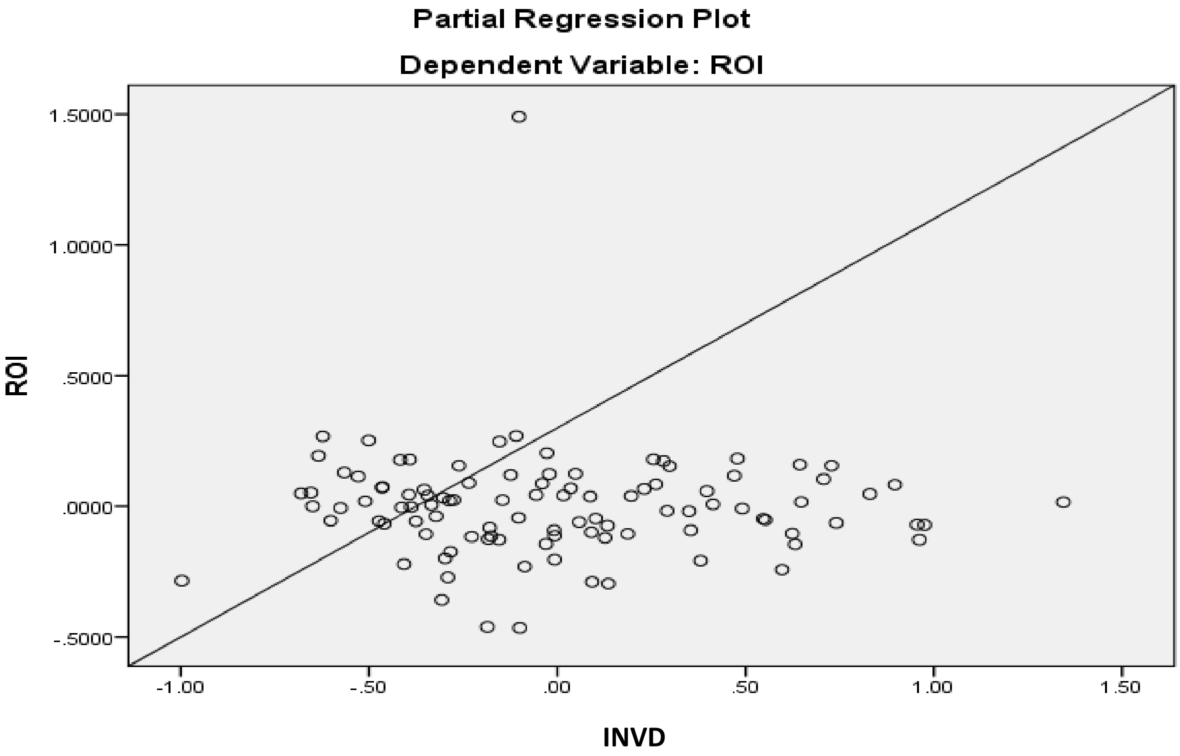


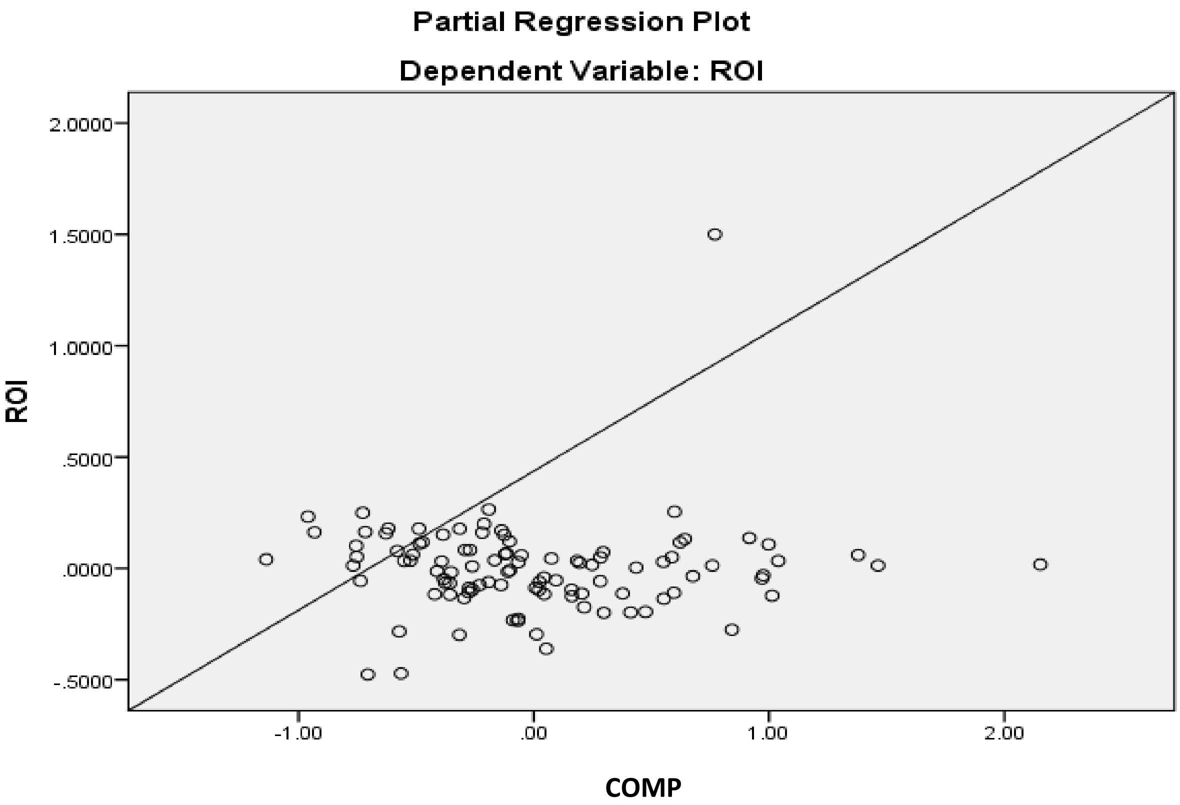

Partial Regression Plot
Dependent Variable: ROI
2.0000
1.5000
1.0000
.5000
.0000
-.5000
ROI
-.40
-.20
.00
.20
ASME

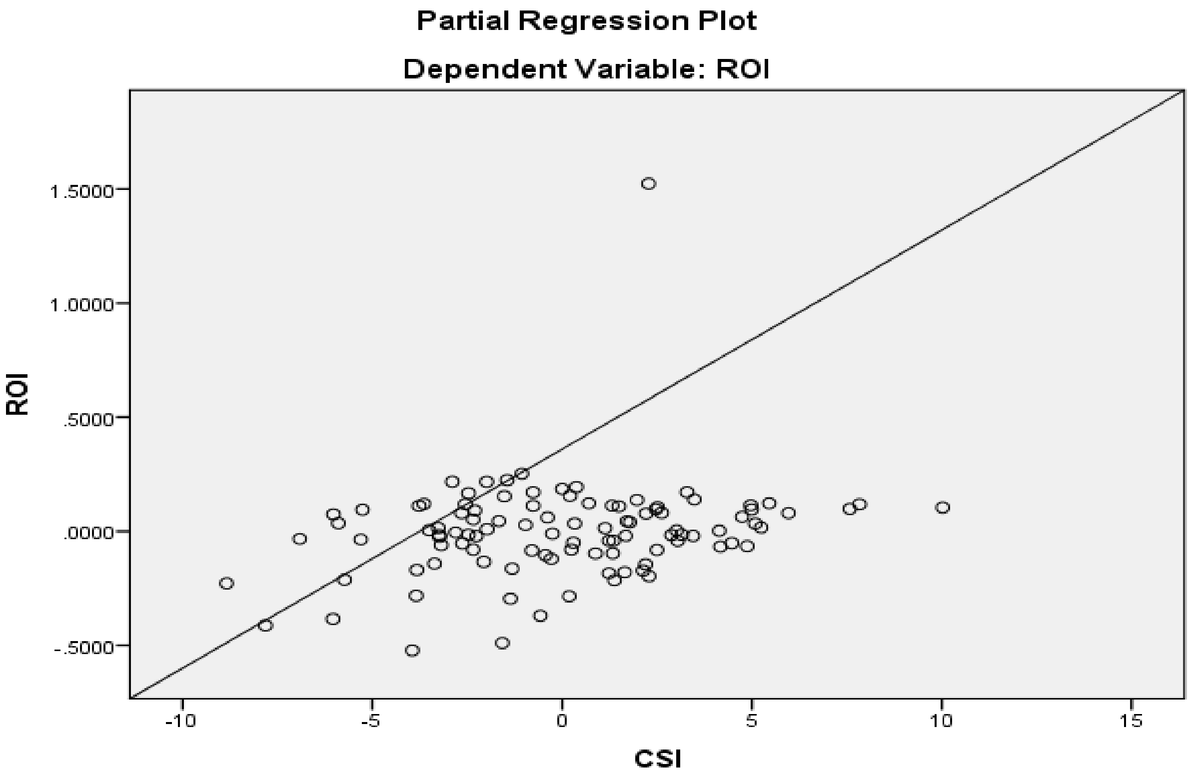

Partial Regression Plot
Dependent Variable: ROI
2.0000
1.5000
1.0000
.5000
.0000
-.5000
ROI
-2.00
-1.00
.00
1.00
2.00
ANFD


Partial Regression Plot
Dependent Variable: ROI
1.5000
1.0000
.5000
.0000
-.5000
ROI
-.050
-.025
.000
.025
.050
.075
ONTA


Partial Regression Plot
Dependent Variable: ROI
1.5000
1.0000
.5000
.0000
-.5000
ROI
-2.00
.00
2.00
4.00
MSBG


Partial Regression Plot
Dependent Variable: ROI
1.5000
1.0000
.5000
.0000
-.5000
ROI
-1.00
-.50
.00
.50
1.00
1.50
INVD


Partial Regression Plot
Dependent Variable: ROI
2.0000
1.5000
1.0000
.5000
.0000
-.5000
ROI
-1.00
.00
1.00
2.00
COMP

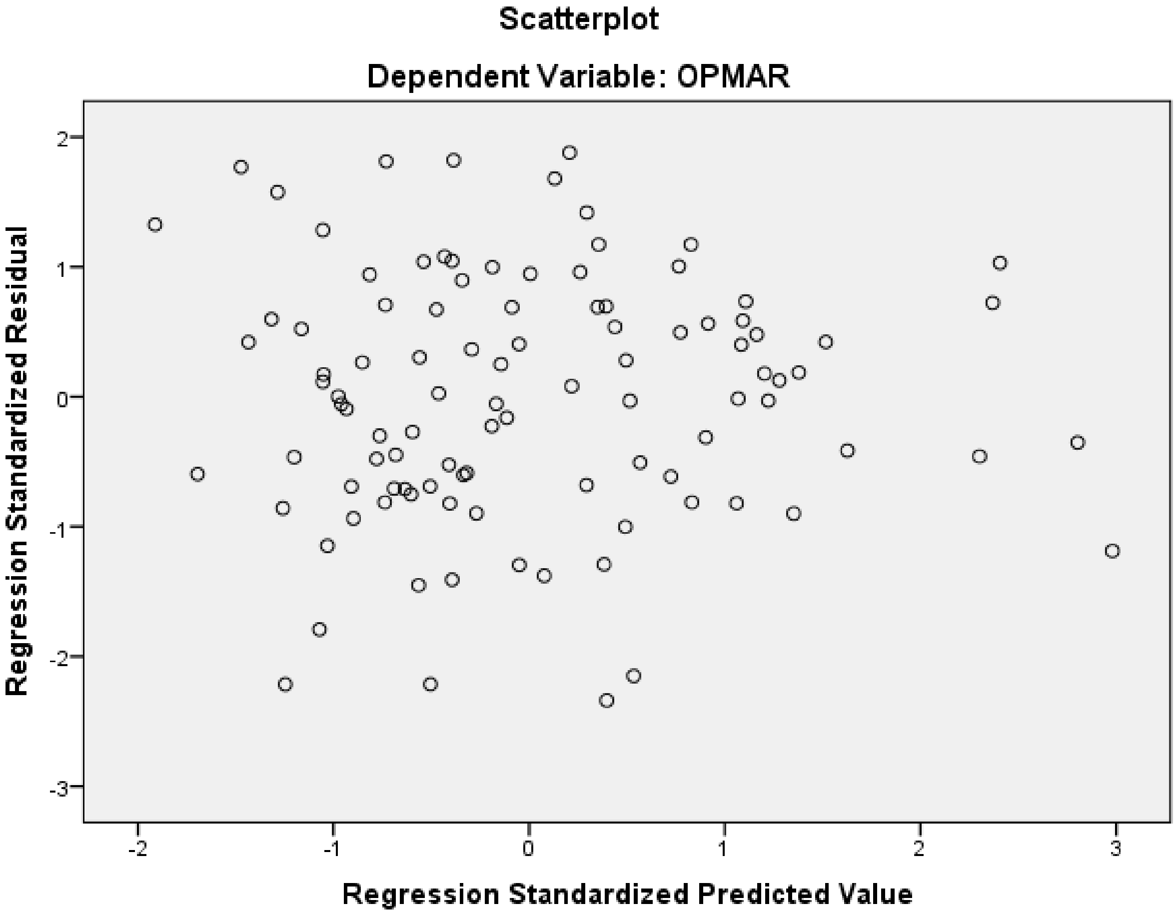


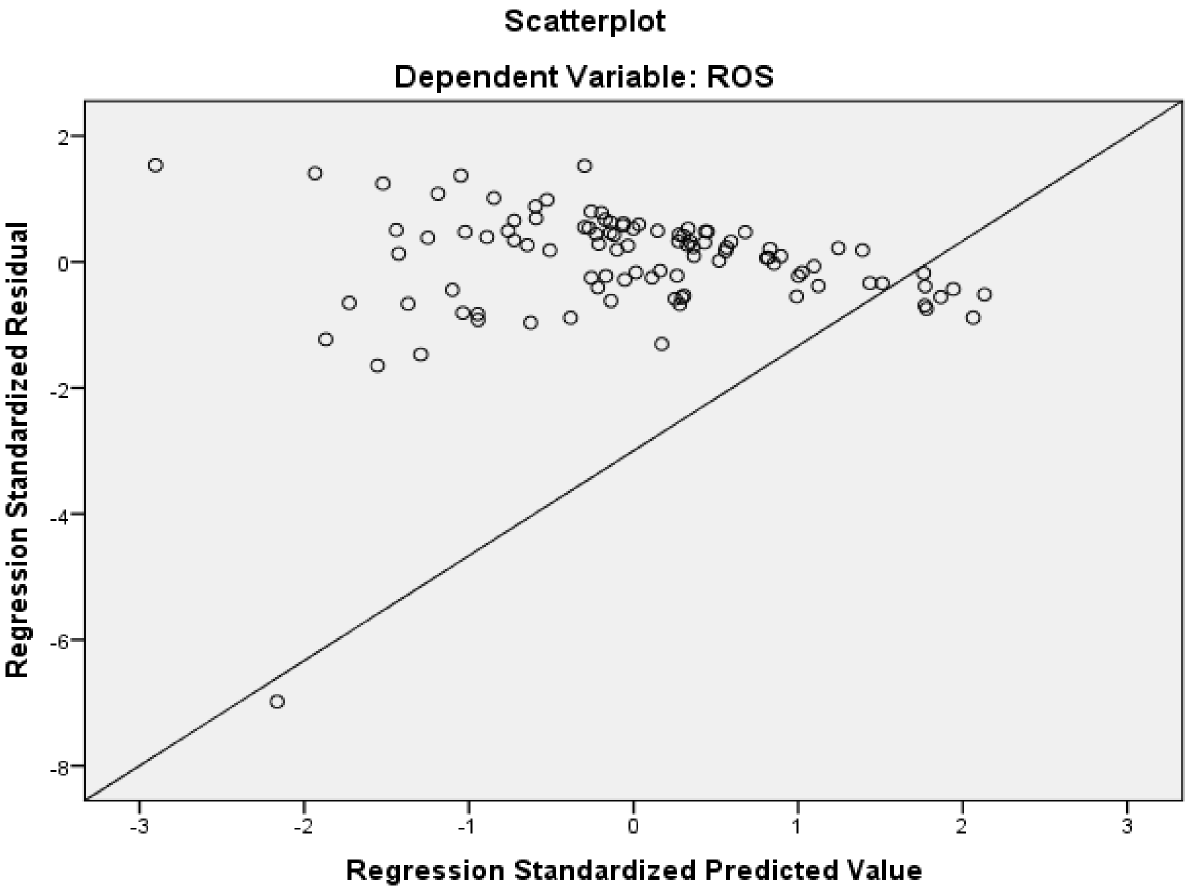
Notes: The above nine figures show SPSS results of the test of linearity assumption related to the fourth model that takes return on Assets (ROI) as the dependent variable with nine independent variables. The independent variables are: available seat miles per employee (ASME), aircraft per employee (AIRE), average daily block hours (ADBH), average number of flights per day (ANFD), number of complaints (COMP), on time arrival (ONTA), number of mishandled baggage reports (MSBG), involuntarily denied boarding (INVD), and customer satisfaction index (CIS). The figures show the statistical relationship between each of the nine independent variables and return on assets (ROA). The figures show that the second model that takes ROA as dependent variable does not meet the linearity assumption.

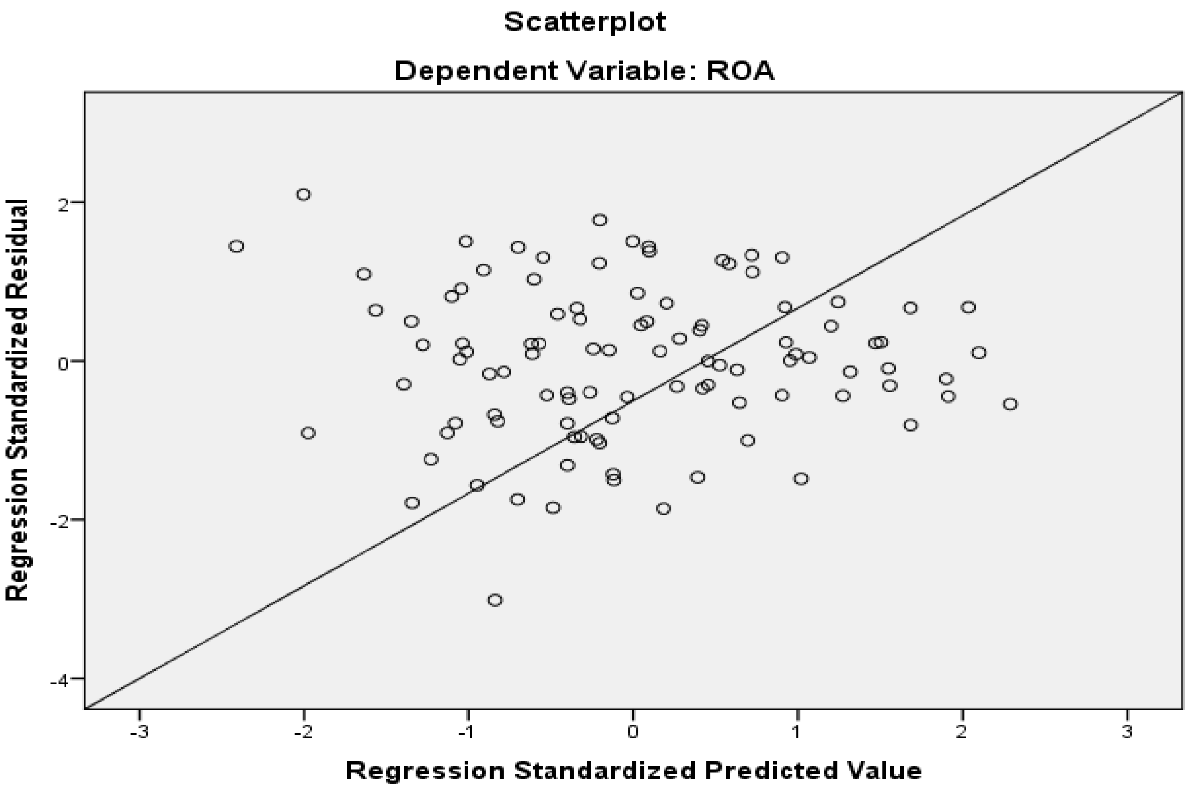
4.3.1.3 Homoscedasticity

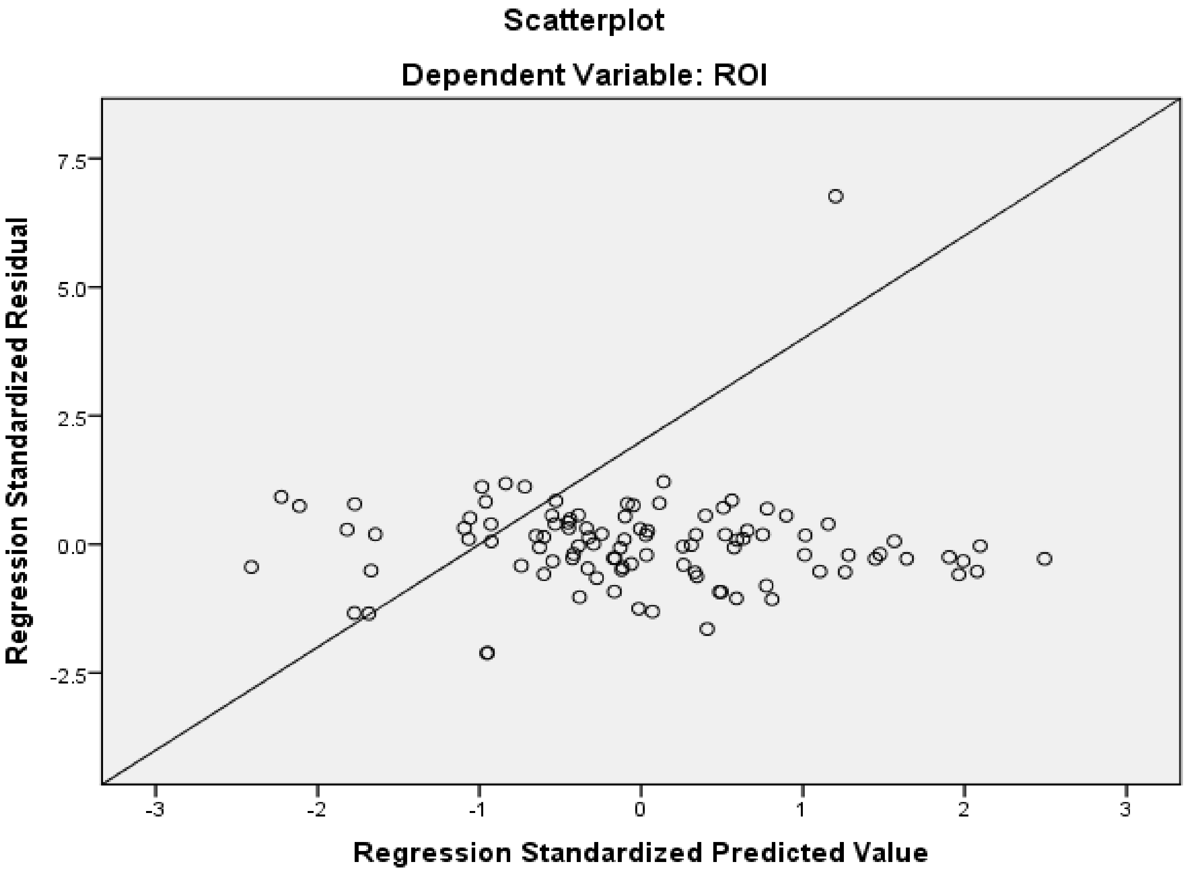
The assumption of homoscedasticity requires that the residuals of a regression model should be randomly plotted showing the variance of the errors to be the same over all levels of the outcome variable (Berry and Feldman, 1985). Homoscedacticity can be checked by visually observing the scatter plot of the residuals. A random plot of residuals shows homosedaciticy and if the data points follow some kind of systematic pattern the regression model is considered to be hetroscedacitic (Osborne and Waters, 2002). Figure 13 shows the scatter plot of the four models. As can be seen, the scatter plots of Model 1 (OPMAR as dependent variable), and Model 3 (ROA as dependent variable), show that the residuals are randomly plotted, which suggests that the models are free of hetroscedacity. However, the scatter plots of Model 2 (ROS as dependent variable), and Model 4 (ROI as dependent variable), show that the data points are concentrated towards the center which suggests they suffer from hetroscedacitity, and have thereby violated the assumption of homoscedasticity.

Figure 13. Scatter Plots of Residuals




Scatterplot
Dependent Variable: ROS
Regression Standardized Residual
Regression Standardized Predicted Value


Scatterplot
Dependent Variable: ROA
Regression Standardized Residual
Regression Standardized Predicted Value



Notes: The above four figures show SPSS results of the test of homoscedasticity assumption of the four models, namely, Model 1 - Operating margin, Model 2 - Return on sales, Model 3 - Return on assets, and model 4 - Financial performance. Homoscedasticity is tested by looking at the scatter plots of the residuals. The above figures show that Models 1 and model 3 meet the assumption of homoscedasticity. However, Models 2 and 4 fail to meet this assumption.

4.3.1.4 Multicolinearity

The multicolinearity assumption requires researchers to ensure that there is no overlap between the predicting variables (Musil et al., 1998). Three critera are suggested to test whether the assumption of multicolinearity has been met: correlation matrix, tolerance, and variance inflation factor (VIF) (Keith, 2006). Large values of correlation coefficents, greater than 0.9, suggest the existence of redundancy in the predicting variables, i.e., these variables are measuring the same thing (Shieh, 2010). Alternatively, a variance inflation factor (VIF) of less than 10 is used to check whether multicolinearity exists. If VIF is higher than 10, the assumption of multicolinearity is considered to be violated (Keith, 2006). The dataset used for this research has been processed through SPSS to obtain VIF values. Table 7 presents the VIF and the tolerance value of each of the independent variables, it shows VIF values for all nine indepdent vairables are less than 10, with a tolerance value above 0.1. These results suggest that the data is free of multicolinearity.

Table 7. VIF and Tolerance Value (Test of Multicolinearity)

	Test of Multicolinearity	
	Tolerance	VIF
Available seat miles (ASME)	0.21	4.70
Aircraft per employee (AIRE)	0.20	5.02
Average number of flights per day (ANDF)	0.21	4.68
Average daily block hours (ADBH)	0.32	3.09
On time arrival (ONTA)	0.49	2.06
Number of mishandled baggage (MSBG)	0.63	1.59
Number of involuntarily denied boarding (INVD)	0.78	1.29
Number of complaints (COMP)	0.41	2.44
Customer satisfaction (CSI)	0.44	2.28

Notes: This table presents the SPSS results of the test of multicolinearity among the dependent variables. Multicolinearity is tested by observing the "tolerance" and the "*VIF*" values. Research suggests that a *tolerance* value below 0.1 and/or *VIF* value above 10 provide evidence of the existence of multicolinearity among the dependent variables. The values presented in the above table show that the tolerance values are well above 0.1, while the VIF values are below 10, which suggests that the data is free of multicolinearity problems.

Multivariate Regression Analysis also assumes that there is no measurement error in the variables, yet scholars argue that it is almost impossible to completely avoid measurement error – especially in social science research (Lee et al., 2011; Musil et al., 1998). This assumption therefore limits the robustness of a multiple regression model as it can lead to biased conclusions (Nusair and Hua, 2010). In conclusion, findings of the tests of the assumptions of Multivariate Regression Analysis seem to suggest that the model assumptions are generally not satisfied using our dataset of the US airline industry. As summarized in Table 8**,** only the assumption of multicolinearity has been met. Most importantly, the assumption of linearity has been violated, regardless of which model specification is used. Further, the normality and homoscedasticity assumption are met only in Models 1 and 4. Taken together, the results suggest that Multivariate regression is not suitable for this research.

Table 8. Summary of Results - Tests of Multivariate Regression Assumptions

Model (dependent variable)	**Assumptions**			
	Normality	Linearity	Homoscedasticity	Multicolinearity
Model 1 (OPMAR)	Yes	No	Yes	Yes
Model 2 (ROS)	No	No	No	Yes
Model 3 (ROA)	No	No	Yes	Yes
Model 4 (ROI)	Yes	No	No	Yes

Notes: This table presents a summary of the statistical assumptions required to be met in order to justify the use of multivariate regression analysis.

“Yes” shows the regression model assumption has been satisfied, e.g., the table shows that in Model 1 the assumptions of normality, homoscedasticity, and multicolinearity are met. “No” indicates the assumption has not been met. For example the linearity assumption has not been met by any of the regression models used in the study.

4.3.2 Structural Equation Modelling

Structural Equation Modeling (SEM) is a second generation analytical tool that enables researchers to simultaneously assess the measures and investigate the hypothesized relationship of multiple independent and dependent constructs with several indicators (Hair et al., 2012a). SEM is

> "preferred over first-generation techniques such as principal components analysis, factor analysis, discriminant analysis, or multiple regression because of the greater flexibility that a researcher has for the interplay between theory and data" (Chin, 1998p. vii).

SEM also allows the analysis of unobservable constructs through observable (manifest) measures (Lee et al., 2011).

Due to the limitations of regression analysis, there is a growing interest in using SEM in accounting research (Christian, 2014). SEM is preferred over other methods because: (1) it allows researchers to assess the measures and investigate the hypothesized relationship between multiple dependent and independent variables simultaneously; (2) it allows the researcher to investigate the relationship between constructs that cannot be directly measured; (3) it takes into consideration measurement errors (Hair et al., 2012a; Lee et al., 2011).

There are two approaches to SEM: covariance based structural equation modeling (CB-SEM), and variance based partial least squares (PLS-SEM) (Hair et al., 2012b). The two approaches are based on different underlying assumptions and research aims (Hair et al., 2012a). "CB-SEM is a confirmatory approach that focuses on the model's theoretically established relationships and aims at minimizing the difference between the model-implied covariance matrix and the sample covariance matrix. In contrast, PLS-SEM is a prediction-oriented variance-based approach that focuses on endogenous target constructs in the model and aims at maximizing their explained variance" (Hair et al., 2012a, p. 312).

The CB-SEM shares some of the model assumptions of Multivariate Regression Analysis. The model assumptions for this technique include normality and measurement reliability, and a large sample size is also required when using CB-SEM (Bentler, 1987). Partial Lease Squares (PLS), however, does not require data normality or a large sample size and is robust enough to accommodate measurement errors (Fornell and Bookstein, 1982).

4.3.3 PLS-SEM

The PLS-SEM is a variance based approach to SEM that simultaneously estimates the measurement model and the structural model (Hair et al., 2012b). It is the underlying metric "for modelling complex multivariable relationships among observed and latent outcomes" (Vinzi et al., 2010, p.1). As noted earlier, this research aims to investigate the causal linkages among airline productivity, service quality, customer satisfaction, and financial performance. The PLS-SEM is suitable for this research as it allows "the prediction of a causal theoretical network of relationships linking latent complex concepts, each measured by means of a number of observable indicators" (Vinzi et al., 2010, p.2).

PLS-SEM was first introduced by Wold (1982) as a *soft* modeling method for structural equation modeling (F. Hair Jr et al., 2014). It is referred to as a *soft* modeling method due to its flexibility in accommodating violations of data normality assumptions. Moreover, PLS-SEM provides robust results regardless of whether data is normally distributed or not (Ringle et al., 2012). Moreover, PLS-SEM can be applied to both metric data, ordinal scale and equidistant points (F. Hair Jr et al., 2014).

PLS-SEM is a preferred analytical tool when the sample is not normally distributed, the number of observations is relatively small, as in this research, and there are multiple first and second order latent variable (Wong, 2013) . Moreover, PLS-SEM has become popular as it is an appropriate analytical tool when the research is set to predict a causal linkage among latent variables and the pertaining theories are yet to be developed (Hair et al, 2014). PLS-SEM is also preferred when researchers use complex models with multiple latent variables and indicators (Vinzi et al., 2010).

The data and sample used in this research match all the characteristics discussed above. Tests of the assumptions of multivariate regression analysis in the above sections demonstrate that the sample is not normally distributed. Furthermore, this research is exploratory in that it aims to investigate the interplay between various latent variables which should be measured by manifest variables. These latent variables have multiple indicators and higher order constructs. PLS-SEM is therefore considered as the most appropriate analytical tool for this research.

Further, PLS-SEM is not constrained by sample size. The minimum sample size required for PLS-SEM is "10 times the largest number of formative indicators used to measure one latent variable, or 10 times the largest number of structural paths pointing at a particular latent variable in the structural model" (F. Hair Jr et al., 2014, p. 20). This research uses reflective indicators only. The maximum number of structural paths pointing at one latent variable is three. Specifically, the structural paths from airline productivity, service quality, and customer satisfaction are directed at financial performance. Thus the minimum sample size of this research is 30 (10 times three). The sample size of this research is 105, hence it meets the minimum requirement of PLS-SEM.

PLS-SEM is suitable for both formative and reflective measurements of latent variables. It is more appropriate than multivariate regression analysis and CB-SEM because it imposes limited statistical restrictions. PLS-SEM can be used where the objective of the research is to develop theory, to predict linkages among latent variables, such as in exploratory research, or to test interactive effects of latent variables (Hair et al., 2012a).

Before running the SmartPLS software, missing data should be identified and their magnitude assessed. PLS-SEM requires the maximum number of missing values not to exceed 5% and all the missing values must be replaced by mean values. The maximum number count of missing values for each indicator in this research is three out of the 105 observations, which represents 2% and therefore meets the requirement. To identify the missing values from the remainder of the observations, they are denoted by 0.99 before the data is uploaded to the SmartPLS software. SmartPLS software considers all the 0.99 values as missing values, and automatically replaces them with the mean values (Hair Jr et al., 2013).

The minimum sample size when using PLS-SEM is 10 times the maximum number of indicators in a formative model, or 10 times the maximum number of structural paths pointing at a specific latent variable in the path model for reflective indicators All indicators used in this research are reflective. Thus the minimum sample size is calculated by identifying the maximum number of structural paths pointing at a specific latent variable in the path and multiplying by 10. In this research, financial performance is the latent variable with the maximum number of structural paths, i.e., altogether three paths (among airline productivity, service quality, and customer satisfaction). Thus the minimum sample size required for PLS-SEM is 30 (three times 10). This study has 105 observations, which suggests that the sample size is above the minimum requirement for PLS-SEM (Hair Jr et al., 2013).

PLS-SEM has some limitations. It is not suitable for theory testing, or when the research involves rigorous confirmatory factor analysis and structuring (Olalere, 2013). PLS-SEM models are recursive. One of the limitations of PLS-SEM is that the algorithm does not allow circular or bi-directional relationships among latent variables (Ringle et al., 2012). However non-recursive models are not common in business research (Hair et al., 2012b). Furthermore, PLS-SEM is highly influenced by outliers and collinearity (Hair Jr et al., 2013). Thus, the data must be carefully scrutinized to identify outliers and the results should be assessed for collinearity (Wong, 2013).

PLS-SEM consists of two fundamental models: the measurement model and the structural model. The relationship between the latent variables and their respective indicators is examined using the measurement model, while the structural model tests the statistical relationship between these latent variables (Ringle et al., 2012). Empirically, scholars suggest two stages be followed in the interpretation of the results of the PLS model (Hair et al., 2012b). The first stage ensures the validity and reliability of the measurement model. This confirms the existence of a valid relationship between indicators and the related constructs (Lee et al., 2011). The second stage tests the strength (statistical significance) of the relationship between the constructs (Hair et al., 2012b; Lee et al., 2011).

Three steps should be followed when using PLS-SEM, specifically: (1) specification of the model, (2) assessment of the measurement model, and (3) assessment of the structural model (F. Hair Jr et al., 2014). Each step is discussed in the following sections. Section 4.3.3.1 discusses the first step in using the PLS-SEM. It presents the guidelines suggested by Hair Jr et al. (2013) when specifying a PLS-SEM model.

4.3.3.1 Specifying the Model – Step 1

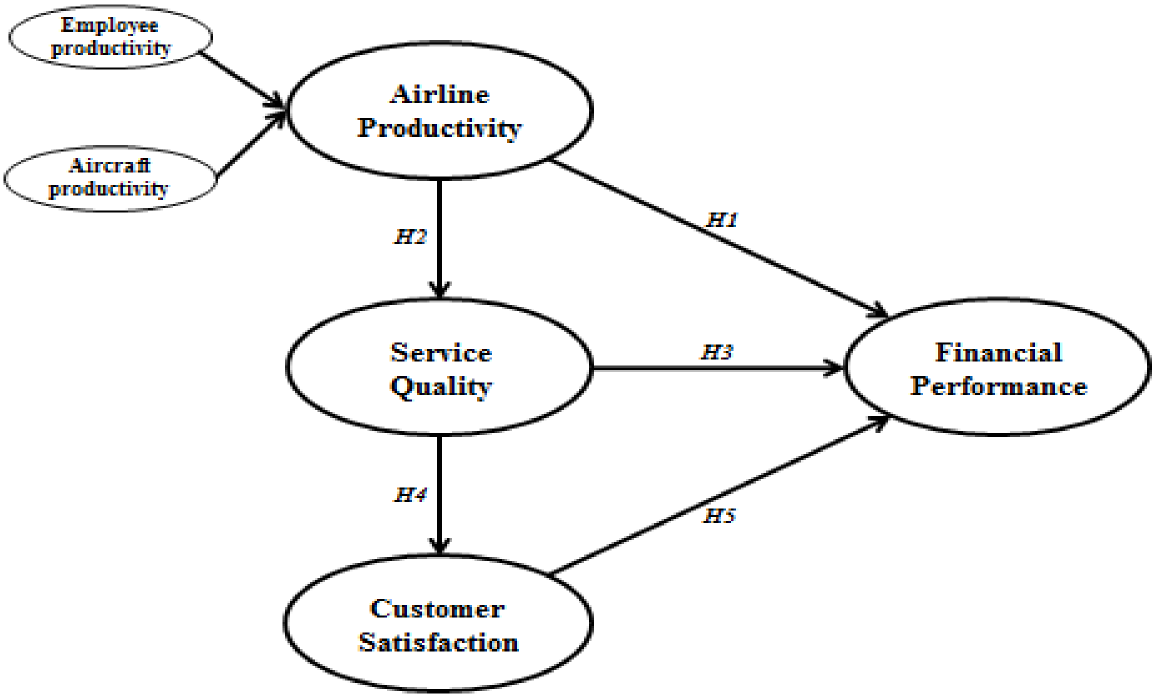
The first step in using PLS-SEM is to specify the hypothesized relationship among the constructs in a path model. A path model is a diagram that shows the hypothesized relationship among the latent variables or the constructs. According to Hair et al. (2012a, p. 212) "the path model has two components: the structural model (inner model) which shows the relationship among the constructs, and the measurement model (outer model) which shows the relationship between the constructs and their respective measures".

4.3.3.1.1 Structural Model (Inner Model) Specification

Step 1 is discussed and completed in Chapter Three where Figure 2 shows the inner model is specified using the path that links *airline productivity*, *service quality*, *customer satisfaction,* and *financial performance*. Latent variables that are modelled as independent variables are known as exogenous variables (F. Hair Jr et al., 2014). For example, *airline productivity* is an exogenous latent variable with two second formative constructs, namely *employee productivity* and *aircraft productivity*. Latent variables that are modelled as both dependent and independent latent variables are referred to as endogenous variables (Wong, 2013). For example, *service quality* is both a dependent and an independent variable. It is a dependent variable because it is predicted by *airline productivity*, and it is an independent variable because it predicts *customer satisfaction* and *financial performance*. Similarly, *customer satisfaction* is both a dependent and an independent variable as it is predicted by *service quality* and it predicts *financial performance*. *Service quality, customer satisfaction* and *financial performance* are, therefore, endogenous latent variables. Finally, *financial performance* is a dependent variable predicted by *airline productivity*, *service quality,* and *customer satisfaction*.

As discussed in the prior section, *airline productivity* is operationalized as a combined outcome of *employee productivity* and *aircraft productivity*. Thus, the path model is specified to illustrate the first order constructs of *airline productivity*. Specifically, *airline productivity* is represented by the first order components of *employee productivity* and *aircraft productivity*. Figure 14 illustrates the structural model.

Figure 14. Structural Model Specification

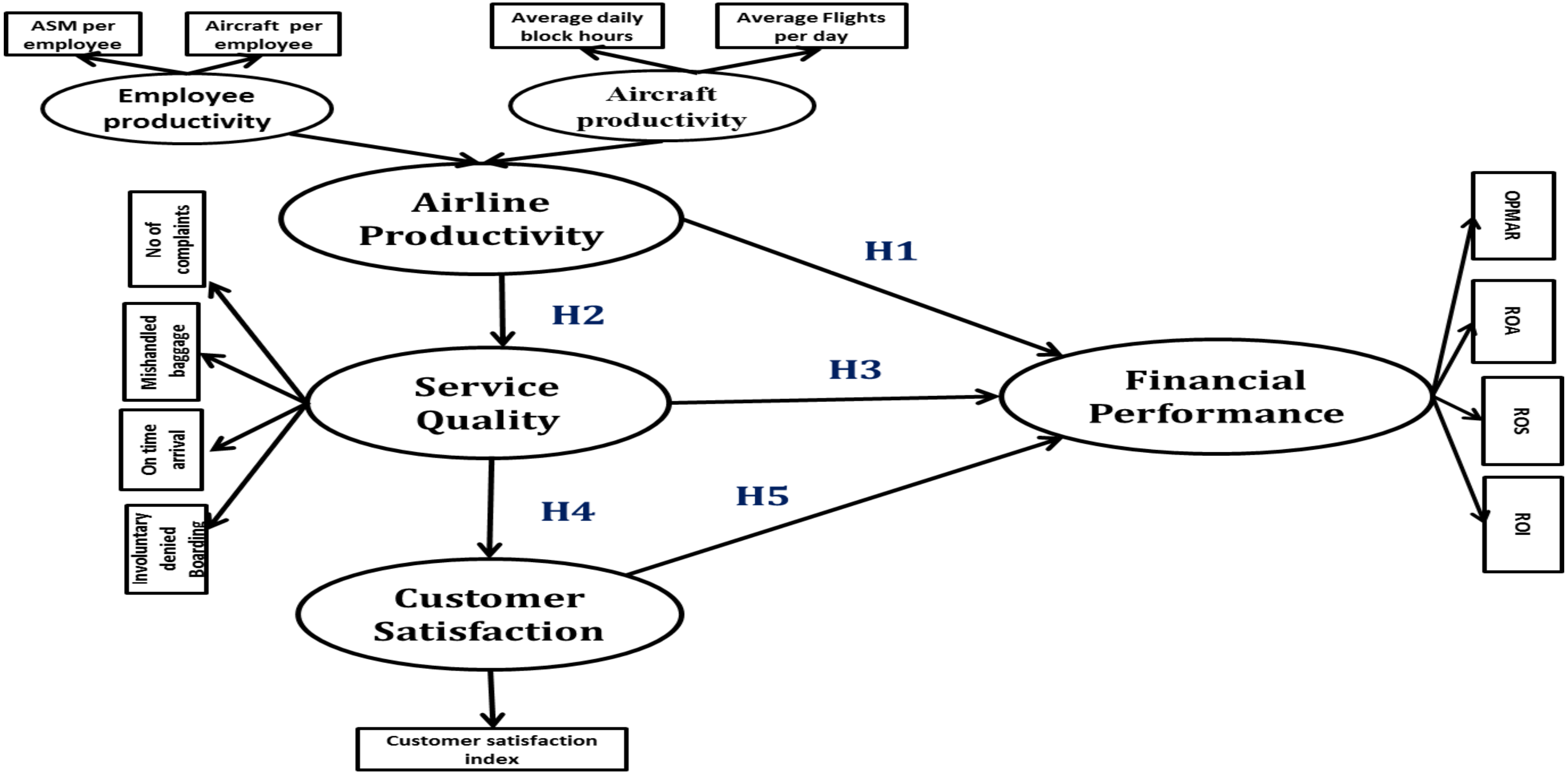


Notes: This figure presents the theoretical model that links productivity, service quality, customer satisfaction, and financial performance. This model is developed based on the combined views of the Resource Based View and Stakeholder Theory. Drawing on the Resource Based View, this model shows that airline productivity is a multidimensional construct with two dimensions. It has been argued that airline productivity is the outcome of employee productivity and aircraft productivity. Accordingly, employee productivity and aircraft productivity are modeled as second order formative constructs of airline productivity. The figure also shows that improvement in airline productivity leads to improved financial performance (H1) and improved service quality by the reduction of service quality related problems (H2). Further, drawing on Stakeholder Theory, the figure shows that problems of service quality will have a negative effect on customer satisfaction (H3) and on financial performance (H4). Customer satisfaction is predicted to have a positive effect on financial performance (H5).

4.3.3.1.2. Measurement Model (Muter Model) Specification

Specification of the predicted relationship among latent variables has been discussed in the preceding section. Once the structural model is specified, the next step is to determine the validity of measures of each latent variable (F. Hair Jr et al., 2014). It has been widely observed that researchers tend to use a combination of measures based on prior research. This research adopts the indicators used in prior literature to measure each latent variable. Multiple indicators are used to measure *airline productivity (employee productivity and aircraft productivity)*, *service quality*, and *financial performance*, except that *customer satisfaction* is a single item construct. *Employee productivity* is measured using available seat miles per employee (ASME) and aircraft per employee (AIRE), while *aircraft productivity* is measured using average daily block hours (ADBH) and average number of flights per day (ANFD). *Service quality* is measured using four indicators, namely mishandled baggage (MSBG), on time arrival (ONTA), involuntarily denied boarding (INDB), and number of complaints (COMP). *Customer satisfaction* is measured using one item – Customer Satisfaction Index (CSI). *Financial performance* is measured using return on assets (ROA), return on sales (ROS), return on investment (ROI), and profit margin (PMAR). Figure 15 presents the measurement model.

Figure 15. Measurement Model Specifications



Notes: This figure presents the theoretical model that links productivity, service quality, customer satisfaction, and financial performance, and the related measures of each latent variable. As indicated in the figure, employee productivity is measured using two indicators: available seat miles per employee (ASME) and aircraft per employee (AIRE). Likewise, aircraft productivity is specified to be measured by average daily block hours (ADBH) and average number of flights per day (ANDF). Four indicators are specified to measure service quality. These are: number of complaints (COMP), on time arrival (ONTA), number of mishandled baggage reports (MSBG), and involuntarily denied boarding (INVD). Customer satisfaction is measured using the customer satisfaction index (CSI). Financial performance is measured using operating margin (OPMAR), return on sales (ROS), return on assets (ROA), and return on investment (ROI).

The second step is to assess the efficacy, or appropriateness, of the measurement model. The third step is to examine the significance of the predicted relationship among the constructs. Steps 2 and 3 are discussed in the following sections. Following specification of the model, the next important step is to ensure that the measures are reliable and valid for use as manifest variables of the constructs. Section 4.3.3.2 discusses the second step in the use of PLS-SEM. As noted earlier, it discusses the criterion suggested by prior literature to assess the measurement model.

4.3.3.2 Assessment of the Measurement Model - Step 2

As discussed in the preceding section, the measurement model shows the latent variables along with their manifest variables, also referred to as indicators. The indicators could be either reflective or formative. When indicators are manifestations of the latent variables, they are modelled as reflective indicators, with the arrows pointing from the latent variable to the indicators (Becker et al., 2012). When indicators are reflective, they share similar characteristics, and thus they are highly correlated (F. Hair Jr et al., 2014). With regard to formative indicators, the latent variable is the outcome of the indicators, and thus the arrows are pointing from the indicators to the latent variable (Wong, 2013). In this research, all the indicators are reflective, and hence, in the Measurement Model presented in Figure 3, all the arrows are pointing from the latent variable, e.g., *customer satisfaction*, to its indicator, e.g., customer satisfaction index (CSI). The measurement model is assessed to "ensure internal consistency reliability, convergent validity and discriminant validity of the indicators" (F. Hair Jr et al., 2014, p. 96). Section 4.3.3.2.1 below presents the guidelines and criteria for the assessment of the reflective measurement models.

The PLS-SEM model estimation provides results that show the link between the indicators and the latent variables, and the relationship among the latent variables. These results enable researchers to empirically evaluate the theoretical relationship between the latent variables and the indicators, as well as the relationship among the latent variables (F. Hair Jr et al., 2014). In this way it is possible to evaluate whether the suggested indicators can actually measure the latent variables, and similarly, to evaluate whether there is a valid empirical relationship among the latent variables. This section presents the guidelines and criteria for assessing the PLS-SEM results of the measurement model. The PLS-SEM output results are presented separately in Section 5.2**.**

A PLS-SEM model with indicators pointing at a given latent variable is referred to as a formative model, while a model with indicators pointing from the latent variable is known as a reflective one. Figure 3 shows that the measurement model used in this research is a reflective model. Reflective models need to be assessed for internal consistency reliability and convergent validity by specifically looking at the PLS-SEM estimation values for internal consistency reliability, convergent validity, and discriminant validity (Hair Jr et al., 2013).

4.3.3.2.1 Internal Consistency Reliability

Internal consistency reliability of a reflective indicator can be assessed using the Cronbach's alpha that requires each indicator to have equal outer loadings on the respective latent variable (Wong, 2013). However, Cronbach's alpha is criticized for understating the internal consistency as it considers all indicators to be of equal importance in measuring a given latent variable (Hair Jr et al., 2013). Alternatively, PLS-SEM uses composite reliability to assess internal consistency reliability because it recognizes that indicators have different levels of reliability when measuring a given latent variable (Henseler et al., 2009). Consequently, composite reliability values provided by PLS-SEM are used in this research to assess the internal consistency reliability of the measurement indicators.

The values of composite reliability range between 0 and 1. Indicators with composite reliability values close to 1 are regarded as highly reliable. Specifically, composite reliability values of 0.7 or higher are considered acceptable, while values higher than 0.95 are no longer considered reliable because this means that the indicators are highly correlated and thus are measuring the same thing (F. Hair Jr et al., 2014).

4.3.3.2.2 Convergent Validity

Under a reflective measurement model, the different indicators (e.g., mishandled baggage (MSBG), on time arrival (ONTA), involuntarily denied boarding (INDB), and number of complaints (COMP)) of a specific latent variable (e.g., *service quality*) are expected to be highly correlated, which suggests that the indicators should "have much in common" (F. Hair Jr et al., 2014) (Hair et al, 2014). In other words, a given latent variable should explain more than 50% of variance of its indicators (ibid). Convergent validity is looked at to check whether this is the case when using PLS-SEM.

Convergent validity is assessed at both indicator and latent variable level. At an indicator level, convergent validity is established by looking at the factor loadings (Hair et al., 2012a). PLS-SEM provides outer loadings of each indicator and average variance extracted (AVE) of each latent variable. It is widely acknowledged that higher outer loadings on a latent variable show higher indicator reliability because higher outer loadings suggest that the indicators have more common characteristics that are captured by the latent variable (Hair Jr et al., 2013).

An indicator is considered as reliable when its outer loading is higher than 0.7, which suggests that at least 50% of its variance is explained by the related latent variable. Indicators with outer loadings within the range of 0.4 and 0.7 can be either removed, in order to improve the AVE of a construct (Hair et al., 2012a), or retained, in order to ensure content validity of a construct (Wong, 2013). Further, when the outer loading is below 0.4, the indicators are considered as unreliable to measure the construct and should be removed (Hair et al., 2012a).

Convergent validity at a latent variable level is assessed using the average variance extracted (AVE), which shows the extent of the variance explained by the latent variable. Accordingly, an AVE value of 0.5 or above is acceptable as it suggests that the latent variable explains at least 50% of the variance of its indicators. On the other hand, an AVE value of less than 0.5 is unacceptable as it suggests the latent variable shows more errors than the variance of the indicators (F. Hair Jr et al., 2014).

4.3.3.2.3 Discriminant Validity

A measurement model is considered reliable and valid when each latent variable is distinctively different from all the other latent variables in the model (Hair et al, 2012). This is measured by the assessment of the discriminant validity of the measurement model. There are two approaches to assess discriminant validity – one is to examine the cross loadings, and the other is to look at the Fornell–Larcker criteria (Christian, 2014).

Under the cross loading approach, discriminant validity is considered as being met when the outer loading of a specific indicator, e.g., mishandled baggage (MSBG), on its respective latent variable, e.g., *service quality*, is higher than its outer loading on any other latent variable, e.g., *airline productivity*, *customer satisfaction*, and *financial performance*, in the model (Wong, 2013). The Fornell–Larcker criterion suggests that the square root of AVE of a specific latent variable, e.g., *service quality*, should be higher than the intercorrelation between a specific latent variable and any other latent variable in the model, e.g., the correlation between *service quality* and *airline productivity, service quality and customer satisfaction, and service quality and financial performance* (Hair Jr et al., 2013).

4.3.3.2.4 Assessment of Formative First Order Constructs

As discussed in Chapter Three, *airline productivity* is operationalized as a multidimensional construct with two second order constructs - *employee productivity* and *aircraft productivity*. This relationship is modelled using hierarchical modelling where *airline productivity* is a higher order component, while *employee productivity* and *aircraft productivity* are the lower order components. Further, the lower order components are modelled as formative constructs with two reflective indicators. The multi-level indicators approach is widely used to establish the higher order component model (Hair et al, 2013). The measurement model presented in Figure 15 shows that *airline productivity* uses available seat miles per employee (ASME), aircraft per employee (AIRE), average daily block hours (ADBM) and average number of flights per day (ANFD), which are indicators of its underlying second order constructs.

When a multi-level measurement approach is applied, the number of indicators of each second order construct should be the same to avoid any bias in the results due to any imbalance in the number of indicators (Becker et al, 2012). Accordingly, equal numbers of indicators are used to measure each second order construct, e.g., *employee productivity* and *aircraft productivity*, in this study. Further, the criteria for the assessment of a measurement model, discussed in section 4.5.2 above, are applicable in the assessment of the second order measurement model, with the exception of the discriminant validity (Hair et al, 2013). The discriminant validity of a higher order component is assessed by calculating the AVE manually. This is done by dividing the sum of the square of the correlation between each second order construct and the first order construct by two (MacKenzie et al., 2011).

Accordingly, the AVE of *airline productivity* is computed manually taking the average of the correlation between *employee productivity* and *airline productivity* and the correlation between *aircraft productivity* and *airline productivity* and dividing the result by two. Detailed discussion is further presented in Section 5.2.2 where the results of this study are discussed.

4.3.3.3 Assessment of the Structural Model – Step 3

The third step in using PLS-SEM is the assessment of the structural model (see Figure 14). The structural model is assessed to ensure the model is "fit" to predict the hypothesized relationship among the constructs. The structural model is examined based on the coefficient of determination (R^2), the predictive relevance (Q^2), and the size and significance of the path coefficients (Hair et al, 2013).

4.3.3.3.1 Coefficient of Determination (*R2*)

The R^2 is one of the most widely used metrics for the assessment of the predictive ability of the structural model (Hair Jr et al., 2013). R^2 shows the amount of variance of the independent variable(s) explained by the dependent variable(s). In other words, the coefficient of determination reflects the total "*effect"* of the independent variables on a given dependent variable in the model (Ringle et al., 2012). The value of the coefficient of determination (R^2) ranges between 0 and 1. R^2 values that are closer to 1 suggest a stronger predictive capability of a variable with a minimum acceptable value of 10% (Camisón and Ana Villar, 2010). In this research, *service quality, customer satisfaction,* and *financial performance* are modelled as dependent or endogenous latent variables. The coefficient of determination of each of the endogenous variables is discussed in Chapter Five where the results of the PLS-SEM estimation are presented.

4.3.3.3.2 Predictive Relevance (Q2)

In addition to the coefficient of determination (R^2), the predictive capacity of a structural model can also be assessed using the Q^2. The Q^2 is used as a criterion to assess the predictive relevance for reflective and single item latent variables, e.g., *customer satisfaction*, modelled as dependent variables (Hair et al, 2013). The predictive accuracy of the measurement model is determined by comparing the predicted and the actual values. This is performed using the Blindfolding function in the SmartPLS software.

"Blindfolding is an iterative process that repeats until each data point has been omitted and the model re-estimated"(Hair Jr et al., 2013, p.178). This procedure is applicable to endogenous variables with reflective indicators and single item endogenous variables. Two approaches are commonly used in computing the Q^2 - the cross validated redundancy approach and the cross validated communality (Henseler et al., 2009). The cross validated approach is preferred because it determines the Q^2 based on the estimates of the structural model and the measurement model, and thus fits the PLS-SEM. The cross validated communality approach, however, focuses only on the latent variable scores (Hair Jr et al., 2013). As a result, the cross validated approach of blindfolding is used in this research to determine the predictive relevance (Q^2). Q^2 values that are higher than 0 for the indicators (for example, Customer Satisfaction Index (CSI) of a reflective dependent variable (For example, *customer satisfaction*) suggest the greater relevance of the path model to predict the specific latent variable.

4.3.3.3.3. Size and Significance of Path Coefficients

The PLS-SEM algorithm provides estimates of the path coefficients. These path coefficients have standardised values between -1 and +1, illustrating the hypothesized relationship among the latent variables (Becker, et al 2012). According to Becker et al. (2012) a path coefficient between 0 and +1 is considered to indicate a strong positive relationship, while a path coefficient between 0 and -1 represents a strong negative relationship among the latent variables. Path coefficients close to 0 suggest an insignificant or no relationship among the latent variables examined.

The significance of the path relationship among latent variables is determined by the standard error obtained from bootstrapping (Hair et al, 2013). The bootstrapping function in the SmartPLS software provides both *t* statistics and *p* values. The significance of a path coefficient is determined by the *t* statistics and *p* value obtained through bootstrapping. The acceptable levels of significance are 10% (*t* value 1.65), significance level of 5% (*t* value, 1.96) and significance level of 1% (*t* value 2.57) (Hair Jr et al., 2013).

In this study, the significance of the path coefficients among the latent variables, i.e., the relationships between *productivity* and *financial performance*, between *airline productivity* and *service quality*, between *service quality* and *financial performance*, between *service quality* and *customer satisfaction*, and between *customer satisfaction* and *financial performance* are assessed. Detailed discussion of the assessment of the path coefficients is presented in Section 5.2.3.

4.4 Summary

This chapter discusses the research design and methodology for this study. A quantitative approach is used to analyse the archival data drawn from the US airline industry. To select the appropriate analytical method, the assumptions of multivariate regression analysis and covariance based structural equation modelling (CB-SEM) have been compared and discussed using the data set collected for the study. Results suggest that the sample is not normally distributed and it fails to meet some of the important assumptions of Multivariate Regression

Analysis. Thus Multivariate Regression Analysis is not a suitable analytical tool for this research.

Furthermore, this research uses multiple latent variables with respective manifest variables. It is concluded that the structural equation modelling (SEM) approach is the most appropriate analytical tool to test the relationship among multiple latent variables. The SEM has two approaches: covariance based (CB-SEM) and variance based (PLS-SEM). The CB-SEM requires a relatively larger sample size and that the data be normally distributed and free of errors. The results from the test of the Multivariate Regression Analysis reveal that the dataset collected for this research is not normally distributed and the sample size is relatively small. As a result, the variance based structural equation modelling (PLS-SEM) is considered as the most appropriate analytical tool for this research.

PLS-SEM involves three steps: model specification, assessment of the measurement model, and assessment of the structural model. The PLS-SEM model is specified by visually indicating the relationship among the latent variables and their respective indictors. In this research the PLS-SEM model is specified based on the Resource Based View (RBV) and Stakeholder Theory (ST). Therefore, the inner model is specified by linking *airline productivity*, *service quality*, *customer satisfaction* and *financial performance*. The PLS-SEM model used in this research is a reflective model, thus the outer model is specified using four reflective indicators for *airline productivity, service quality*, and *financial performance,* and one indicator for *customer satisfaction*.

Once the PLS-SEM model is specified, the next step requires an evaluation of the reliability and convergent validity of the measures. This is carried out using the indicator loadings, composite reliability, the AVE, and the Fornell and Larcker criteria. Indicator loading and composite reliability of 0.7 and above ensures indicator reliability. The AVE is used to assess convergent validity of the latent variables. Discriminant validity is assessed using the Fornell and Larcker criteria which mean the AVE should be higher than the squared correlation among the latent variables.

The third step in using PLS-SEM is the evaluation of the structural model to ensure its appropriateness to predict the hypothesized relationship among the latent variables. The coefficient of determination (R^2), the predictive relevance (Q^2), and the path coefficients are used to assess the measurement model. The coefficient of determination (R^2) and the predictive relevance (Q^2) are used to evaluate the predictive ability of the structural model. The path coefficients are used to evaluate the significance of the relationship among the latent variables. The next chapter presents and discusses the results of the PLS-SEM model based on the guidelines and criteria discussed above.

CHAPTER FIVE: RESULTS ANALYSIS

This chapter presents the results of the data analysis conducted to test the theoretical framework discussed in Chapter Three.

Section 5.1 provides an overview of the descriptive statistics of the data. This research applies PLS-SEM to test the hypothesized relationship among *airline productivity, service quality*, *customer satisfaction,* and *financial performance* using the ***Smart PLS 3.0.*** PLS-SEM is an analytical tool that enables researchers to assess the reliability and validity of the measurement variables and the significance of the path relationships among the latent variables (Hair et al., 2012a). The statistical results are reported and analysed based on the guidelines and criteria discussed in Chapter Four**,** Section 4.3.3. In Section 5.2, the measurement model is assessed to ensure that the model meets the requirements of reliability and validity, and the structural model is evaluated to check whether it is 'fit' to predict the hypothesized relationship between the latent variables. Section 5.3 presents the PLS-SEM estimation results of the original model with varied lag length on the latent variables. The original model is presented with all the latent variables measured at time *t*. Following prior research, additional analysis is carried out with one and two-year lag lengths to examine the lagged causal relationship among the latent variables. Finally, the chapter briefly summarizes the empirical findings in Section 5.4.

5.1 Descriptive Statistics

Table 9 presents the descriptive statistics of all the indicators used to measure all the latent variables. The available seat miles per employee (ASME) has a mean value of 2.14, a minimum value of 1.39 and a maximum value of 3.98. The average number of aircraft per employee is 0.009, which is slightly lower than the maximum number of aircraft per employee at 0.016, and a minimum value of 0.006. The mean, minimum, and maximum values of departure (flights) per day per aircraft are 4.27, 2.81, and 8.93, respectively. The average daily block hour of the sample airlines is 10.16, with a range of 8.7 to 12.8. It is worthy of note that among the four airline productivity measures, the largest variation from the average occurs in departures per aircraft. There are fewer variations in available seat miles per employee, aircraft per employee, and average daily block hours per day.

Table 9 also shows the average customer satisfaction index of airlines to be 0.64, with a maximum of 0.81 and a minimum of 0.53. This suggests that in the CSI index airlines score at a relatively low level. Further, the data shows the existence of greater variability from the average customer satisfaction index. The sample airlines have managed to achieve an average on time arrival of 78%, or 1-0.22, suggesting that flight delay is one of the biggest challenges to face airlines. On average the operating revenue of the sample airlines is 10% higher than the operating cost which suggests a low level of profitability for airlines. The skewness of each indicator ranges from -4.53 to 1.6, while kurtosis ranges from -0.9 to 30.1. These values suggest the data is not normally distributed as the absolute values of skewness and kurtosis are greater than 3.0 and 10.0 respectively (Mardia, 1970).

Table 9 Descriptive Statistics

Measures	Mean	Median	Standard Deviation	Maximum	Minimum	Kurtosis	Skewness
Available seat miles per employee	2.142	2.054	0.371	2.984	1.386	-0.331	0.319
Aircraft per employee	0.009	0.009	0.002	0.016	0.006	1.692	1.202
Departure per day per aircraft	4.275	3.790	1.416	8.930	2.810	1.907	1.608
Average daily block hours	10.164	10.035	0.824	12.755	8.671	0.686	0.745
On time arrival	0.225	0.220	0.040	0.386	0.137	1.532	0.808
Mishandled baggage	48.751	46.900	12.586	96.200	26.800	1.635	1.073
Involuntarily denied boarding	0.916	0.790	0.515	2.470	0.100	0.124	0.765
Number of customer complaints	1.289	1.030	0.890	5.300	0.140	3.368	1.520
Customer satisfaction index	65.257	64.000	5.451	81.000	53.000	0.254	0.423
Return on Assets	-0.003	0.025	0.127	0.886	-0.316	23.766	2.767
Return on Sales	-0.029	0.023	0.159	0.167	-1.216	30.155	-4.530
Operating margin	1.100	1.106	0.089	1.311	0.875	-0.500	-0.048
Liquidity	0.810	0.781	0.210	1.557	0.478	0.921	0.867
Capital Intensity	1.172	1.130	0.337	1.983	0.595	-0.320	0.554
Leverage	5.860	2.521	38.684	176.710	-243.495	20.612	-1.489

Measures	Mean	Median	Standard Deviation	Maximum	Minimum	Kurtosis	Skewness
Yield	12.623	12.386	1.664	20.922	10.172	7.166	2.294
Fuel expense per available seat miles	0.020	0.014	0.012	0.061	0.008	0.949	1.307
Load factor	0.743	0.731	0.054	0.848	0.638	-0.904	0.194
Firm size	14545.57	12955.00	8907.59	45014.00	1438.95	0.84	0.73
Fleet size	165.988	168.541	20.347	195.032	130.555	-1.237	-0.369

Notes: This table presents the descriptive statistics of the data used in this research. Average daily airborne hours are the number of hours an aircraft is in revenue generating activity; this is the length of time between when an aircraft gate closes at the departure point, and the time an aircraft gate opens at the destination. Average number of flights per day is the total number of departures divided by the total number of aircraft days. Available seat miles (ASM) are the total number of aircraft miles flown multiplied by the total number of seats available. ASM per employee is the total ASM divided by the total number of employees. Aircraft per employee is the total number of aircraft divided by the total number of employees. Mishandled baggage is the total number of mishandled baggage reports per 1000 passengers. On time arrival is the percentage of flights arriving on time. Involuntarily denied boarding is the total number of passengers denied boarding because of ticket over-sales. Complaints are the total number of complaints per 100,000 passengers. Customer satisfaction is the customer satisfaction index obtained from ACSI. The index ranges between 0-100; values closer to 100 show a high level of customer satisfaction. Operating margin is operating revenue divided by operating cost. Return on Investment is computed by dividing operating income after depreciation by invested capital. Return on Assets is operating income after depreciation divided by total assets. Return on Equity is determined by dividing operating income after depreciation by stockholders equity. Leverage is total liabilities divided by total assets. Liquidity is the ratio of total current assets to current liabilities. Capital intensity is total assets divided by total sales. Size is the natural log of total assets. Business model is a dummy variable, 1 for network airlines and 0 for low cost airlines. Load factor is the percentage of aircraft seats occupied by passengers. Fuel expense per available seat miles is total fuel expense divided by total available seat miles. Passenger yield is the total passenger revenue divided by revenue passenger miles.

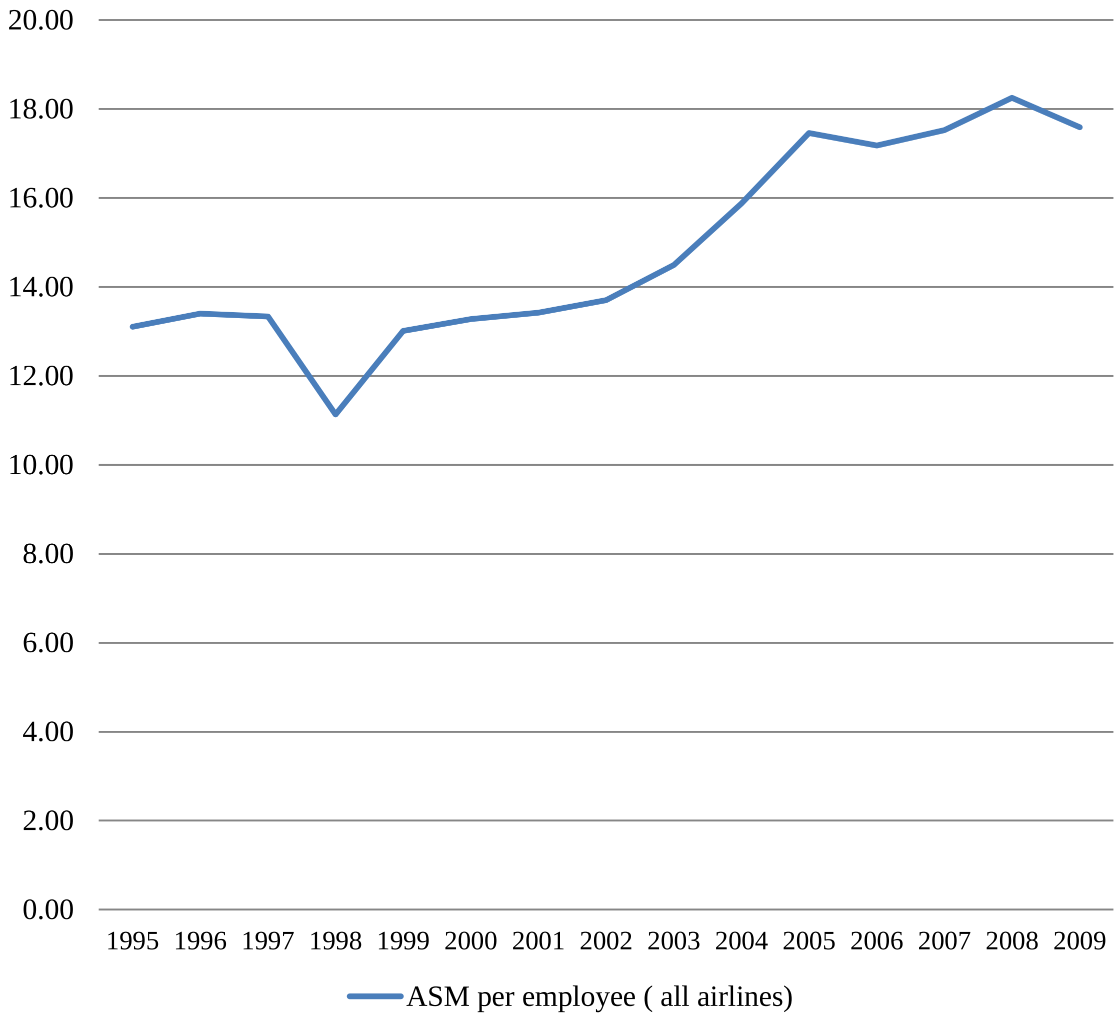
5.1.1 Airline Productivity

As discussed in the paragraphs above, airlines use human, physical, and organizational resources as inputs to provide services to their customers. As such, there are two commonly used measures of *airline productivity*: *employee productivity* and *aircraft productivity* (Belobaba, 2009). *Employee productivity* is measured using the number of available seat miles produced per employee (ASME) and aircraft per employee (AIRE). *Aircraft productivity* is measured using average daily airborne hours (ADAH) and number of flights per day (ANFD). One of the most widely known measures of airline output is ASME (Belobaba, 2009), where one unit of Available Seat Miles refer to one aircraft seat flown per mile, whether the seat is occupied or not[7].

As presented in Figure 16, Available Seat Miles per employee (ASME) have been steadily rising from 14 million miles per employee in 1995, to 18 million miles per employee in 2009, with an average growth of 28.5% over 15 years, with the exception of a slight decline in 1998. Overall, the figure shows that the industry has enjoyed continuous and steady improvement in employee productivity over the sample period, with the exception of 2001. The total Available Seat Miles (ASME) produced by the sample airlines during 1995-2009 were 11,229 billion. The data suggests that American Airlines leads the rest of the airlines by producing 2,438,642 million (21.7%) ASM, while US Airways has the lowest available seat miles, 886,547 million (8%) (Please see Figures 17 and 18).

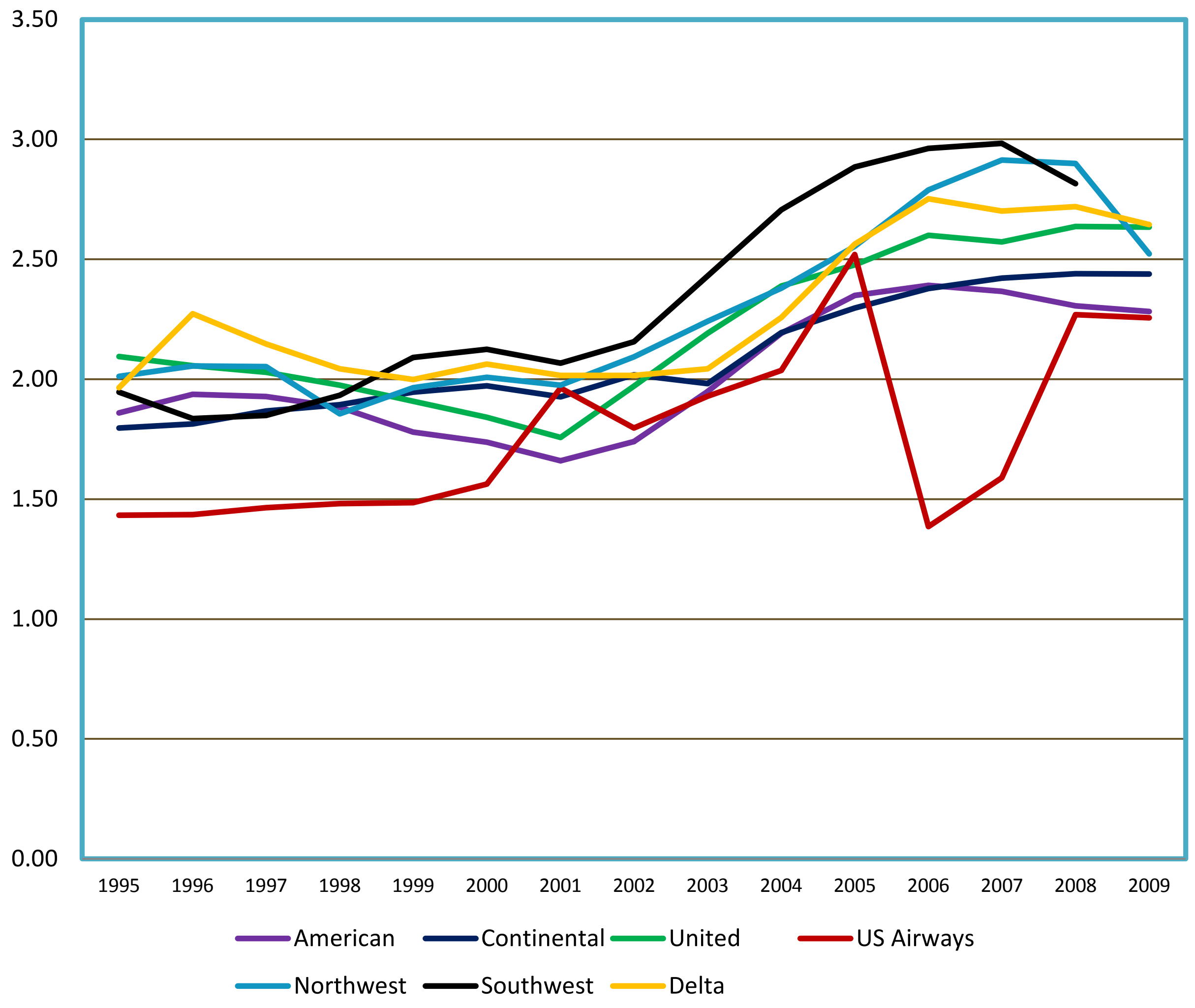
[7] http://web.mit.edu/airlinedata/www/Res_Glossary.html

Figure 16. Available Seat Miles per Employee (ASME) (in millions)



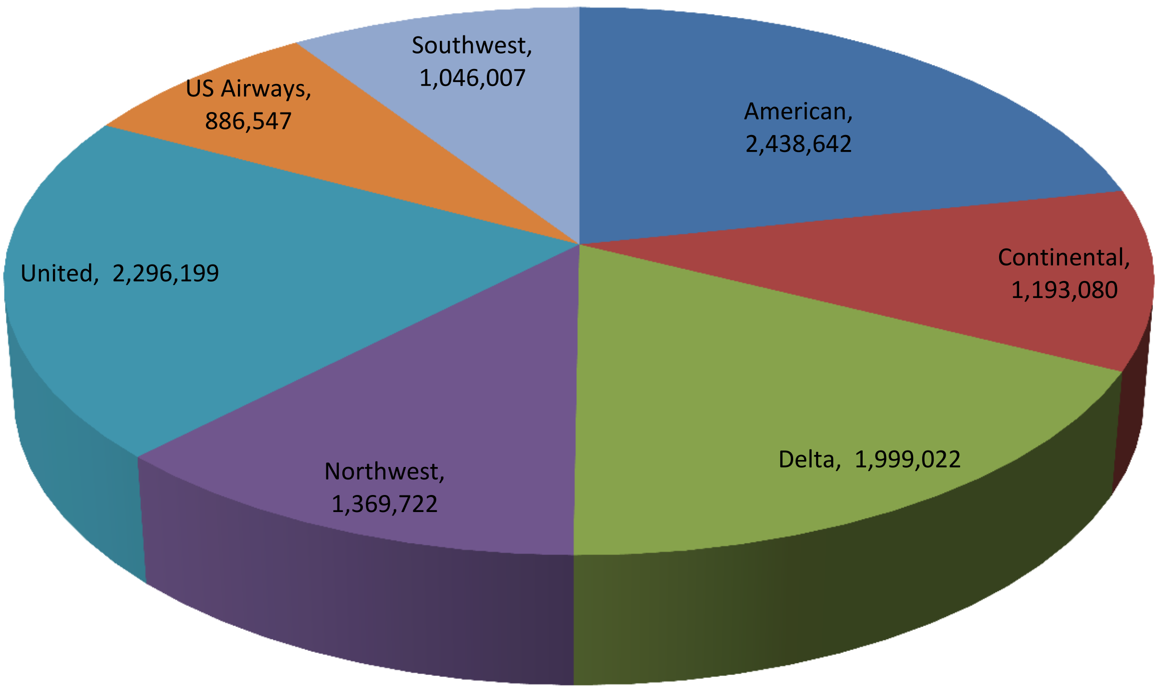
Notes: Figure 16 shows the amount of available seat miles produced by each airline over 15 years (1995 – 2009). The data also shows that Southwest is leading the other six US airlines with respect to the amount of available seat miles produced per employee. This suggests that Southwest has been the most productive airline in terms of employee productivity.

Figure 17. Available Seat Miles per Employee (ASME) (in millions) (all airlines)



Notes: This figure shows the total ASM produced by each of the major US airlines during 1995-2009. It shows the seven major US Airlines produced over 3 million ASM over 15 years. Overall, the figure shows growth in ASM over the study period with a declining trend in 2001. The possible reason for this decline could be the result of the general decline for air travel due to the 2001 terrorist attacks in the US. The figure also shows Southwest leads the other airlines while US Airways is the worst performer in terms of ASM per employee.

Figure 18. Total ASM Produced by each Airline (1995-2009)

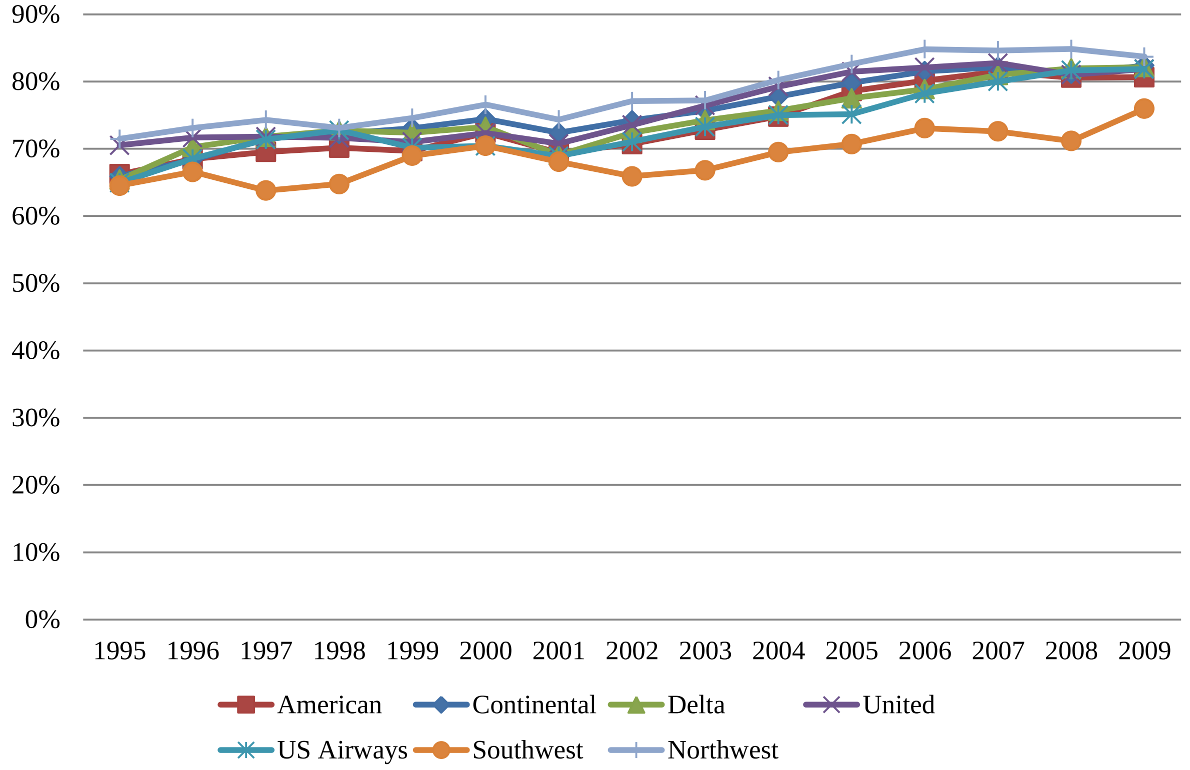


Notes: This figure shows US airlines have produced over 11 million available seat miles over the last 15 years (1995-2009). The largest volume of available seat miles was produced by American Airlines (2,438,642) representing 22% of the total available seat miles produced by the sample airlines. On the other hand, US Airways has the lowest value in terms of total available seat miles (8%).

5.1.2 Load Factor

Load factor is one of the most widely used measures of capacity utilization in the airline industry. Load factor measures the percentage of aircraft seats occupied by passengers. Overall, continuous growth in the load factor has been observed during the years 1995-2009 for the major US airlines (see Figure 19). It is interesting to observe that Southwest Airlines is the most productive in terms of available seat miles per employee (ASME), even though it has the lowest load factor amongst the sample airlines.

Figure 19. Load Factor (1995-2009)

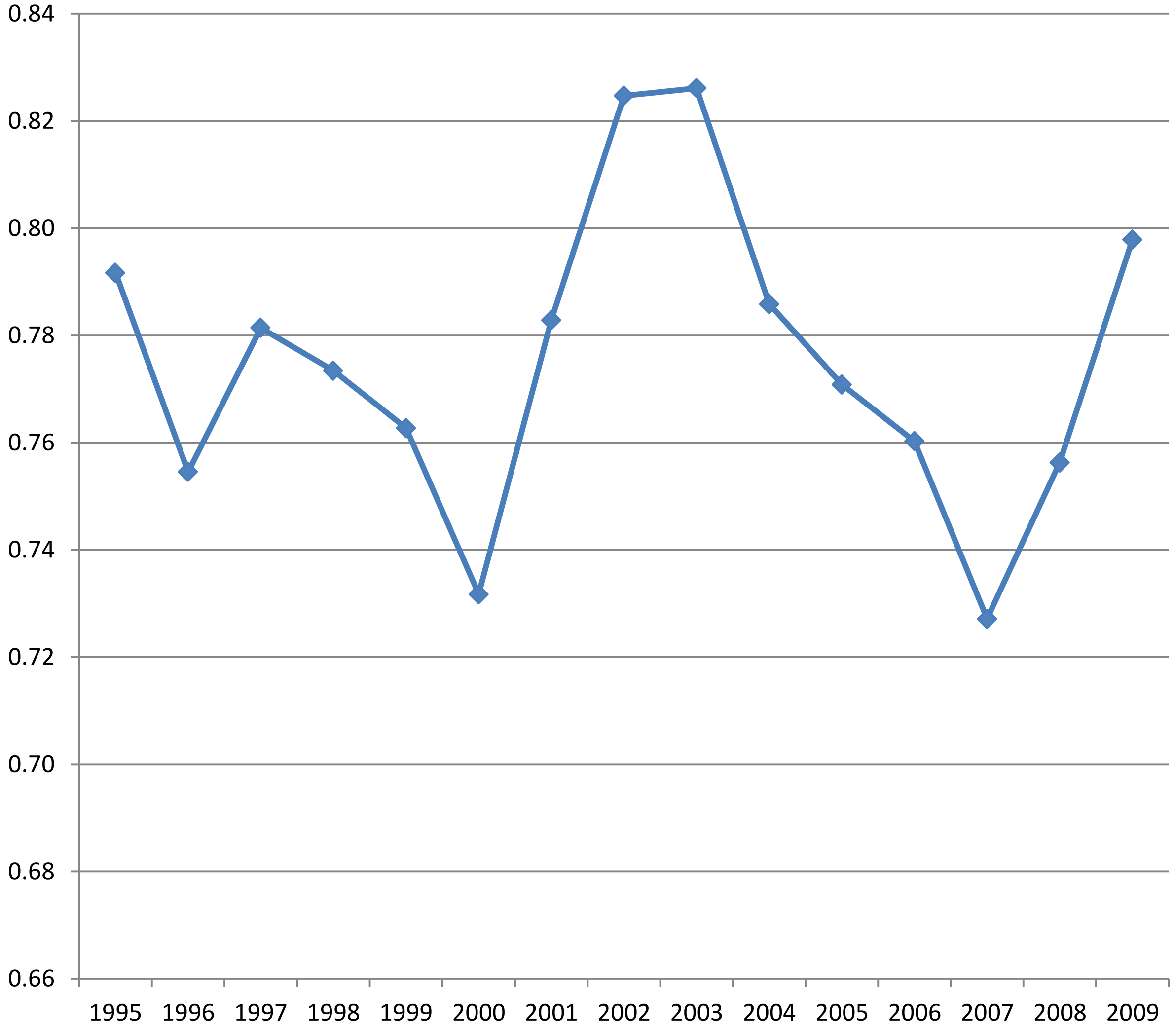


Notes: This figure shows the annual load factor of each airline during 1995- 2009. Overall, the figure shows all airlines have improved their load factor over the time period. This is observed from the increasing trend in the load factor of each airline. The figure also shows that Northwest is the most productive in terms of managing to fill its aircraft with passengers (71 % to 85%). Northwest's performance also shows a steady growth over the 15 years from 71% in 1995 to 84% in 2009. On the other hand, Southwest is the worst performer when it comes to load factor with a minimum value of 64% in1997 and a maximum of 76 % in 2009.

5.1.3 Service Quality

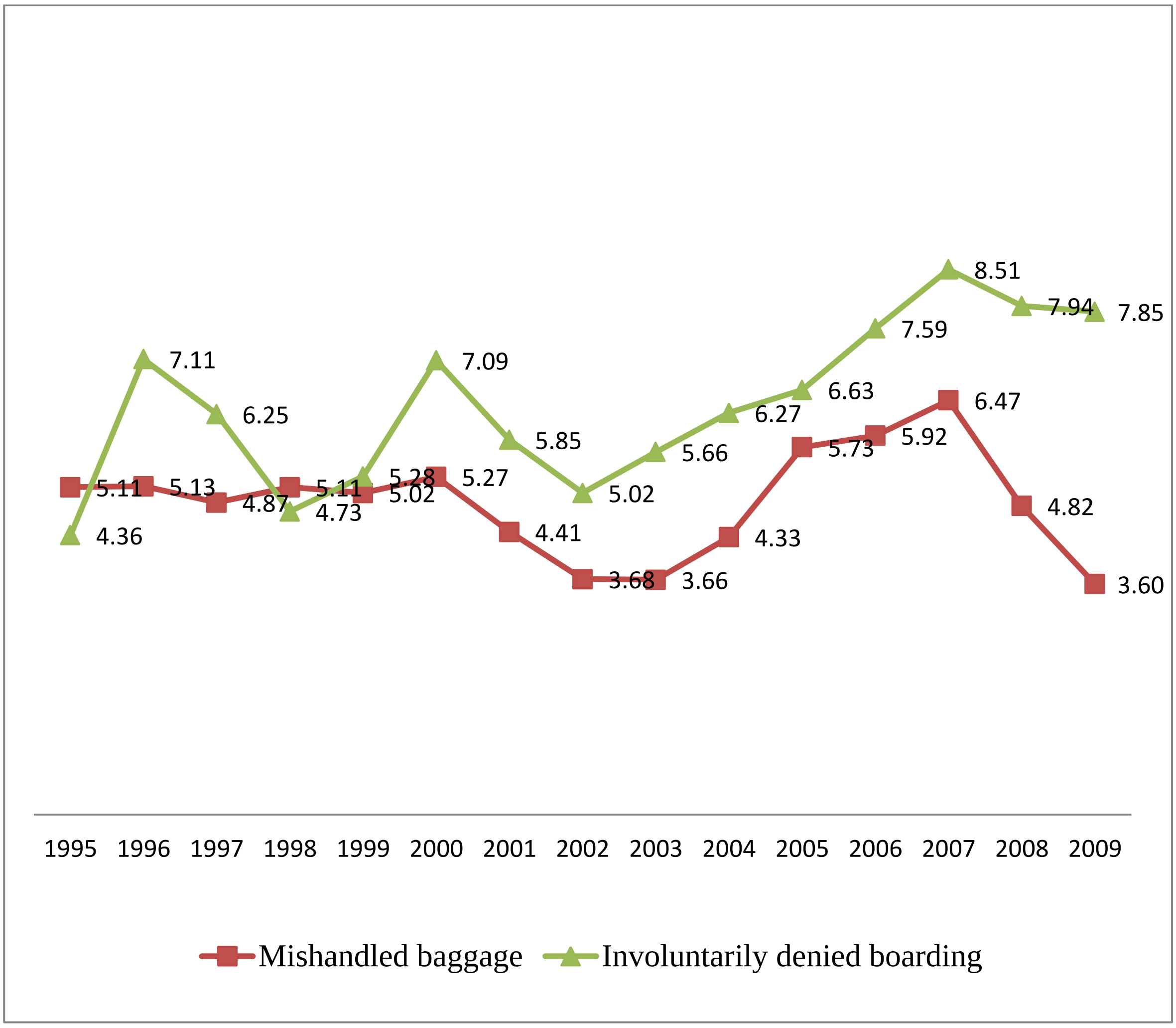
Airline service quality has become an important strategic element of an airline's performance. Over the last decade, the service quality of airlines has seen tremendous changes. The trend is presented below in Figure 20 in terms of the percentage of on time arrivals of the seven airlines. Figure 21 shows service quality trends as measured by the percentage of mishandled baggage and involuntary denied boarding. The figures show that the highest average on time arrival was in 2004, at 83%, and the lowest in 2006, at 73%. Mishandled baggage rates and the number of involuntarily denied boardings show continuous improvement during 2002-2009.

Figure 20. On-time Arrival (1995-2009)



Notes: This figure shows the average on time arrival of the seven major airlines over the period (1995-2009). As can be seen, the performance of airlines in terms of on time arrival is volatile. For instance, the figure shows a sharp decline from 79% (1995) to 75 % (1996). After a slight improvement in 1997, on time arrival declines for four consecutive years, i.e., 1997, 1998, 1999, and 2000, registering on time arrival at 78%, 77%, 76%, and 73% respectively. Furthermore, this figure shows that the highest performance was achieved in 2003 with an average on time arrival of 83%.

Figure 21. Mishandled Baggage and Involuntarily Denied Boarding (1995-2009)

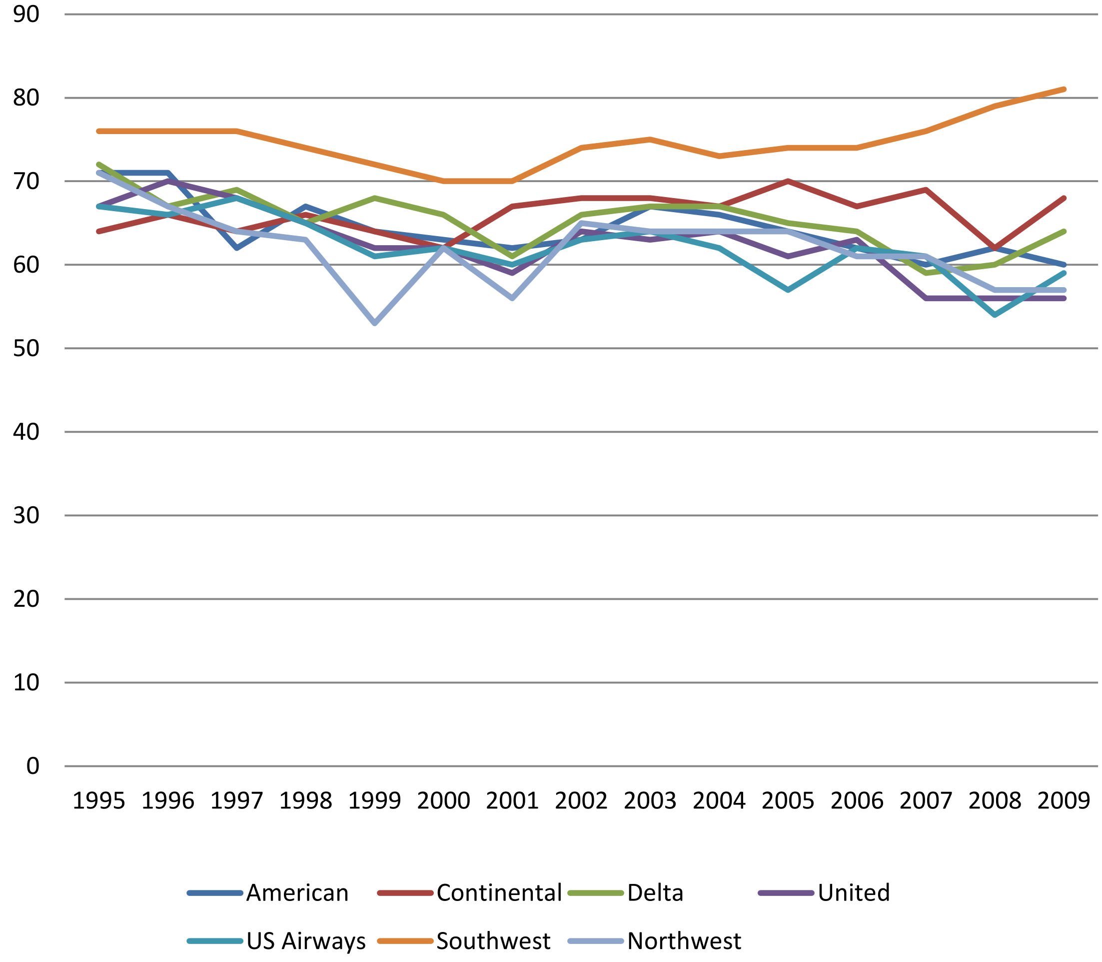


Notes: This figure shows the number of mishandled baggage reports and the number of passengers involuntarily denied boarding. The figure shows a declining trend over the years 1995-2002. However, the figure shows an increasing trend during the years 2004 – 2007. From 2007 onwards, the figure shows improvement in baggage handling as the number of mishandled baggage reports is declining. The second graph in this figure shows the number of involuntarily denied boardings. As can be seen, the performance of airlines over the 15 year period covered by the study follows a similar trend with their performance for mishandled baggage. After a sharp rise, from 4.36 in 1995 to 7.11 in 1996, the number of passengers denied boarding declines for two consecutive years (1997, 1998). The figure further shows an increasing trend in the number of passengers denied boarding involuntarily over the remaining years (1999-2009), with slight declines in 2002 and 2008.

5.1.4 Customer Satisfaction

The American Customer Satisfaction Agency (ACSI) issues the Customer Satisfaction Index (CSI) for many industries in the US including the airline industry. **Figure 22** presents the CSI for each airline for the period 1995-2009. The figure shows that Southwest airline customers were relatively satisficed (81 out of 100) compared to other airlines.

Figure 22. Customer Satisfaction Index (1995-2009)



Notes: This figure shows the level of customer satisfaction (customer satisfaction index) of each airline over 1995-2009. The figure reveals that the maximum level of customer satisfaction index is 81%, achieved by Southwest in 2008, while the lowest is 56% achieved by Northwest in 2001. Overall, the figure shows that Southwest is leading the other airlines in the sample by registering a relatively higher customer satisfaction index, followed by Continental Airlines. As noted earlier, Northwest and United exhibit the least level of customer satisfaction.

In this section, the data focusing on the main variables used in this research are described. Section 5.2 presents the results of the PLS-SEM following the guidelines in using PLS-SEM discussed in Section 4.3.3.

5.2 PLS-SEM Results

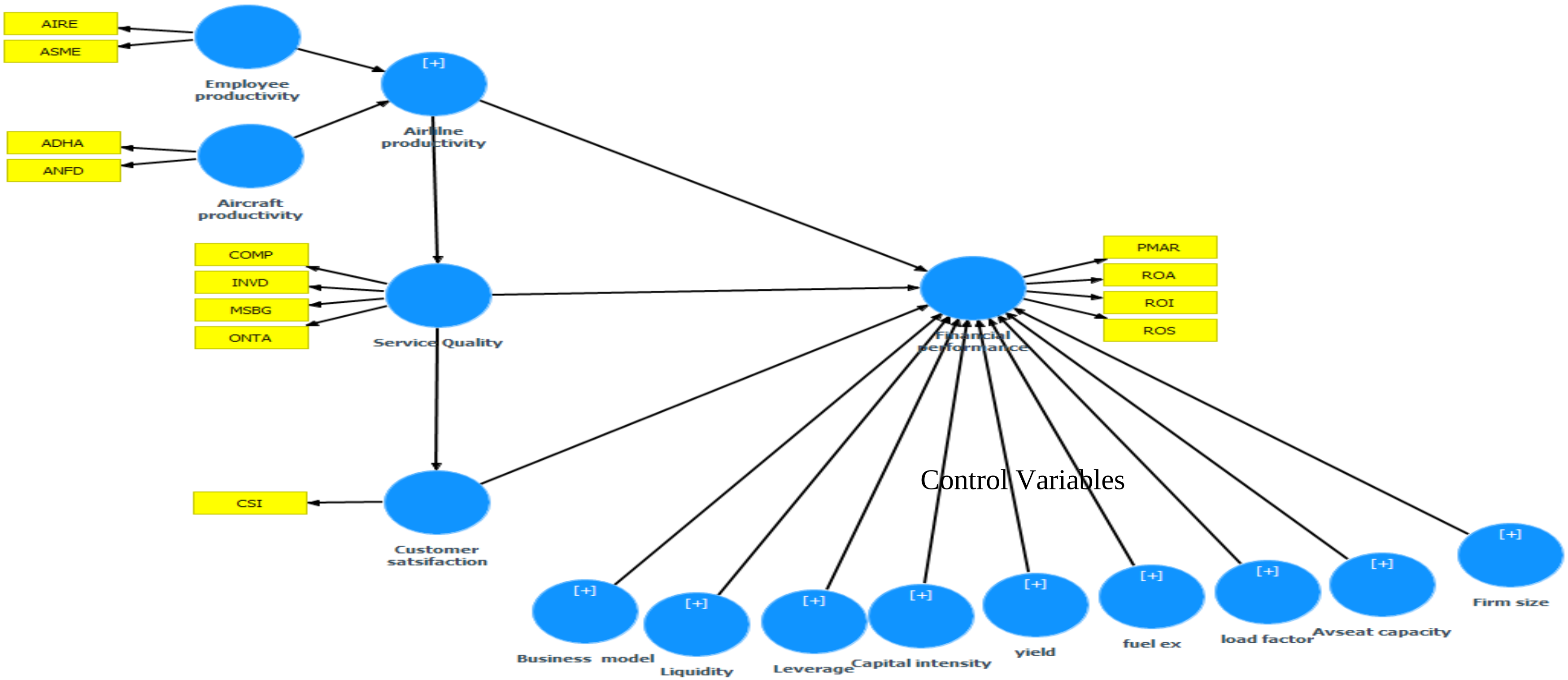
Specification of the model, evaluation of the measurement model, and finally assessment of the structural model, are the three required steps in the use of PLS-SEM. This section presents the results of PLS-SEM estimation. For clarity and consistency the results are presented in accordance with each of the three steps discussed in Section 4.3.3. Accordingly, **Section 5.2.1** presents the results of model specification, Section 5.2.2 presents the results of the assessment of the measurement model, and Section 5.2.3 presents the results of the assessment of the structural model.

5.2.1 Model Specification - Step 1

As noted earlier, the first step when using PLS-SEM is model specification, which itself involves two steps: specification of both the structural and the measurement model. The structural model shows the hypothesized relationship among the latent variables (constructs), while the measurement model shows the relationship between the latent variables and the indicators (measures). As discussed in Chapter Four, model specification is about the identification of the path relationship between the latent variables and the specification of the respective indicators of each latent variable (construct). The theoretical model is specified in Chapter Three, It is based on the Resource Based View (RBV) and Stakeholder Theory (ST), as well as on insights from the relevant literature. In this chapter, the theoretical model is empirically tested using the SmartPLS software.

SmartPLS software enables users to *visually display* the path models in order to demonstrate the hypothesized relationship among the latent variables. It also has a feature that allows users to repetitively explore various combinations of indicators for each latent variable. This research has four first order constructs, namely, *airline productivity*, *service quality*, *customer satisfaction*, and *financial performance*. *Airline productivity* is further broken into two second order constructs, *employee productivity* and *aircraft productivity*, to better capture two dimensions of the productivity of these airlines. Moreover, each latent variable used is measured using four indicators, with the exception of *customer satisfaction* which is measured using a single indicator. In addition, as discussed in Chapter Three, business model, liquidity, leverage, capital intensity, yield, fuel expense per available seat miles, load factor, average seat capacity, and firm size are included as control variables. Figure 23 shows the path model specified using the SmartPLS software.

Figure 23. Path Model Specified in SmartPLS



Notes: This figure shows the specified model used in this study. The figure demonstrates that the model has four latent variables, namely: airline productivity, service quality, customer satisfaction, and financial performance. Further, airline productivity has two formative second order constructs: employee productivity and aircraft productivity. Employee productivity is measured using aircraft per employee (AIRE) and available seat miles per employee (ASME). Aircraft productivity is measured using average daily block hours (ADBH) and average number of flight per day (ANDF). Service quality is measured using four indicators: number of complaints (COMP), number of involuntarily denied boardings (INVD), number of mishandled baggage reports (MSBG), and on time arrival (ONTA). Customer satisfaction is measured using the customer satisfaction index (CSI). Four indicators are specified to measure financial performance. These are: operating margin (OPMAR), return on assets (ROA), return on investment (ROI), and return on sales (ROS). The figure also shows that business model, liquidity, leverage, capital intensity, yield, fuel expense, load factor, average seat capacity and firm size are modeled as control variables.

Once the model is specified as discussed in Section 5.2.1 above, analytical analysis is conducted using the SmartPLS software. Outputs of outer loadings of the indicators, as well as the composite reliability and the average variance extracted (AVE) of each latent variable, are exported from SmartPLS. These results are used to assess the measurement model. Further, the SmartPLS software provides the path coefficients of the relationship between the latent variables and the coefficient of determination of the endogenous variables, and the Q^2 values are used to assess the predictive capability of the structural model. In this section, I discuss the assessment of the measurement model. Evaluation of the structural model is discussed in Section 5.2.2 below.

5.2.2 Assessment of the Measurement Model - Step 2

The second step in using PLS-SEM is the assessment of the efficacy (appropriateness) of the measurement model. The measurement model can be assessed by looking at whether the internal consistency reliability, the convergent validity, and the discriminant validity of the measurement constructs have been satisfied. These requirements are evaluated via the factor loadings, the AVE, the composite reliability, and the inter-correlation among the latent variables respectively (Hair et al., 2012a). The discussion of results relating to the assessment of the measurement model is organized according to the sequence of these requirements: internal consistency reliability, convergent validity, and discriminant validity.

5.2.2.1 Internal Consistency Reliability

As discussed earlier, an indicator is considered reliable when its outer loading is higher than 0.7, which suggests that at least 50% of its variance is explained by the related latent variable. Indicators with loadings within the range of 0.4 and 0.7 can be either removed, in order to improve the average variance extracted of a construct (Hair et al., 2012a), or retained, in order to ensure the content validity of a construct (Wong, 2013). Similarly, when the outer loading is below 0.4, the indicators are considered as unreliable to measure the construct and should be removed.

Almost all the indicators used in this research loaded well above 0.7, except for the two indicators of *service quality*, involuntarily denied boarding (-0.401) and mishandled baggage (0.598), and one of the indicators of *financial performance*, return on investment (0.502). Involuntarily denied boarding and return on investment are removed from the model as their loadings are lower than 0.7 and hence indicate low explanatory power (Hair et al., 2012b). Mishandled baggage (0.598), however, is retained to ensure content validity, even though its loading is slightly lower than the critical value of 0.7 (F. Hair Jr et al., 2014). The remainder of the indicators are retained as they have loadings higher than 0.7 at a significant level of $p < 0.001$. Table 10 presents the list of latent variables, indicators retained, and their respective outer loadings.

Table 10. Assessment of Measurement Model with all Indicators Measured at Year t (Indicator Loadings with all the indicators and with the retained indicators)

Latent Variables	**Second Order Constructs**	**Indicators**	**Indicator loadings (with all the indicators)**	**P value**	**Indicator loadings (with the retained indicators)**	**P value**
Airline productivity	Employee productivity	Available seat miles (ASM) per employee	0.807	p<0.001	0.800	p<0.001
		Number of aircraft per employee	0.908	p<0.001	0.913	p<0.001
	Aircraft productivity	Average daily block hours	0.748	p<0.001	0.732	p<0.001
		Number of departures per day per aircraft	0.881	p<0.001	0.892	p<0.001
Service quality		On time arrival	0.756	p<0.001	0.818	p<0.001
		Number of complaints	0.884	p<0.001	0.913	p<0.001
		Mishandled baggage	0.538	p<0.001	0.598	p<0.001
		Involuntarily denied boarding	-0.401		Removed	
Customer satisfaction		Customer satisfaction index	NA	NA	NA	NA
Financial performance		Operating margin	0.889	p<0.001	0.898	p<0.001
		Return on assets	0.690	p<0.001	0.702	p<0.001
		Return on sales	0.725	p<0.001	0.792	p<0.001
		Return on investment	0.502		Removed	

Notes: This table shows the loadings and p-values of the measurement model with all the indicators and with the indicators retained. In this model, all the indicators are measured at time *t*. Involuntarily denied boarding (-0.401) and Return on investment (0.502) are removed because of their lower loadings. *Customer satisfaction* is a single item construct, hence it is not applicable (NA) to report its loading and p value.

5.2.2.2 Composite Reliability

Furthermore, the reliability of each construct is assessed by looking at the composite reliabilities of both the first and second order constructs. As indicated in Table 11, the results show that the composite reliability of each construct is well above the minimum value of 0.7, ranging from 0.748 (Aircraft productivity) to 0.848 (employee productivity), thereby confirming the reliability of the constructs.

Table 11. Assessment of Measurement Model with all Indicators Measured at Year t - Internal Consistency Reliability

Latent Variable	Number of Items	Composite Reliability
Airline productivity	4	0.748
Employee productivity	2	0.848
Aircraft productivity	2	0.798
Customer satisfaction	1	NA
Service quality	3	0.826
Financial performance	3	0.842

Notes: This table presents the PLS-SEM values used to assess the measurement model. Specifically, it shows the composite reliability of the latent variables used in this study. As can be seen, the composite reliability of all latent variables is well above the minimum value of 0.7. Customer satisfaction is measured using one manifest variable, namely customer satisfaction index. Thus, it is single item construct with one indicator; it is not required to measure and report the composite reliability and convergent validity of a single item construct (Hair et al, 2012).

5.2.2.3 Convergent validity

Convergent validity of a construct is assessed by looking at the Average Variance Extracted (AVE). It is suggested that the minimum value of the AVE, of all the latent variables used in a study, should be at least 0.5 (Hair Jr et al., 2013). PLS-SEM estimation results show that the AVE of each latent variable used in this study is above the cut off value of 0.5, suggesting that the requirement of convergent validity has been met. The AVE of each latent variable used in this research is presented in Table 12.

Table 12 Assessment of Measurement Model with all Indicators Measured at Year t - Convergent Validity

Latent Variable	Number of Items	Convergent Validity (AVE >0.50)
Airline productivity [a]	4	0.628 [b]
Employee productivity	2	0.736
Aircraft productivity	2	0.666
Customer satisfaction [c]	1	NA
Service quality	3	0.620
Financial performance	3	0.642

Notes:
a. *Airline productivity* is operationalized as a multidimensional construct with *employee productivity* and *aircraft productivity* as second order formative constructs. Further, each second order construct has two indicators and hence there are four indicators of *airline productivity*. Accordingly, ASM per employee and aircraft per employee are the manifest variables for the measurement of employee productivity, while average daily block hours and number of departures per day are manifest variables of capacity utilization.
b. When using higher order modelling like this, AVE of the first order construct, *airline productivity*, in this case is manually computed. This is done by dividing the square of the correlation between *employee productivity* and *airline productivity,* and between *aircraft productivity* and *airline productivity,* by two, i.e., $(0.777^2 + 0.808^2)/2 = 0.628$.
c. *Customer satisfaction* is measured using one manifest variable, namely Customer Satisfaction Index (CSI). As this is single item construct with one indicator it is not a requirement to measure and report its composite reliability and convergent validity (Hair et al, 2012).

5.2.2.4 Discriminant Validity

Discriminant validity assesses whether a given latent variable is different from another latent variable in the model (Hair Jr et al., 2013), for instance, whether *aircraft productivity* is materially different from *employee productivity*. This is assessed via the AVE values of each latent variable. As shown in Table 13, the AVE values of each construct (latent variable) are higher than the squared value of the correlation between the constructs, thereby suggesting the requirement of discriminant validity is met. For example, the AVE of employee productivity (0.858) is higher than the correlation between employee productivity and aircraft productivity (0.263), employee productivity and service quality (-0.410), employee productivity and customer satisfaction (0.264), and employee productivity and financial performance (0.007), respectively. Similarly, the AVE of aircraft productivity (0.816) is higher than its correlation with service quality (-0.311), customer satisfaction (0.584), and financial performance (0.397).

Table 13. Assessment of Measurement Model with all Indicators Measured at Year t – Inter-correlation of Latent Variables (Discriminant validity)

Latent Variable	EP	AIRCP	SQ	CSAT	FP
Employee productivity (EP)	**0.858**				
Aircraft productivity (AIRCP)	0.263	**0.816**			
Service quality (SQ)	-0.410	-0.311	**0.787**		
Customer satisfaction CSAT)	0.264	0.584	-0.566	**NA**	
Financial performance (FP)	0.007	0.397	-0.112	0.454	**0.802**

Notes: This table presents the inter-correlation of the latent variables. Numbers in bold on the diagonal represent the square root of AVE value. *Customer satisfaction* is a single item construct that does not require reporting of the correlation value, hence NA is reported.

The second measure of discriminant validity is that the loadings of each indicator should be higher on the construct it measures (Chin, 1998) and this is shown by the results in the lower triangle. The results are presented in Table 14**.** The cross loading of each indicator is higher on the construct it measures than on any other construct. For example, as can be seen in Table 14**,** the highest cross loading of the employee productivity construct is the cross loadings of its indicators, i.e., available seat miles per employee (ASME_ 0.800) and Aircraft per employee (AIRE) at 0.913. These loadings are higher than the cross loadings of these two indicators on the rest of the constructs in the model. Similarly, the highest cross loadings of the aircraft productivity construct are the cross loadings of average number of flights per day (ANFD_0.892) and average daily block hours per day (ADBH at 0.732). The cross loadings of the service quality indicators, number of complaint (COMP at 0.913, mishandled baggage (MSBG at 0.598), and on time arrival (ONTA at 0.818) are the highest compared to the cross loadings of these indicators on the other constructs. The highest cross loadings of profit margin (PRMA at 0.898), return on assets (ROA at 0.702), and return on sales (ROS at 0.792) are the highest on financial performance from any other construct.

Table 14. Assessment of Measurement Model with all Indicators Measured at Year t-Indicator Cross Loadings (Discriminate validity)

	Employee Productivity	Aircraft Productivity	Service Quality	Customer Satisfaction	Financial Performance
ASME	**0.800**	0.103	-0.176	0.014	-0.203
AIRE	**0.913**	0.313	-0.477	0.375	0.148
ANFD	0.269	**0.892**	-0.412	0.632	0.497
ADHA	0.139	**0.732**	-0.026	0.261	0.075
COMP	-0.456	-0.373	**0.913**	-0.612	-0.196
MSBG	-0.160	-0.019	**0.598**	-0.208	0.032
ONTA	-0.223	-0.175	**0.818**	-0.349	0.034
CSI	0.264	0.584	-0.566	**NA**	0.454
PMAR	0.054	0.525	-0.186	0.490	**0.898**
ROA	-0.073	0.137	0.001	0.232	**0.702**
ROS	-0.013	0.152	-0.012	0.292	**0.792**

Note: This table presents the cross loadings of each indicator. The values in bold indicate the cross loadings of each indicator on the construct it measures. These values show that they are larger than the other cross loadings under each construct. Customer satisfaction is a single item construct; thus, measures of discriminant validity are not applicable.

In summary, the above results demonstrate that the measurement model meets the requirements of PLS-SEM with respect to internal consistency reliability, convergent validity, and discriminant validity. The next section will present the results of the assessment of the structural model.

5.2.3 Assessment of the Structural Model – Step 3

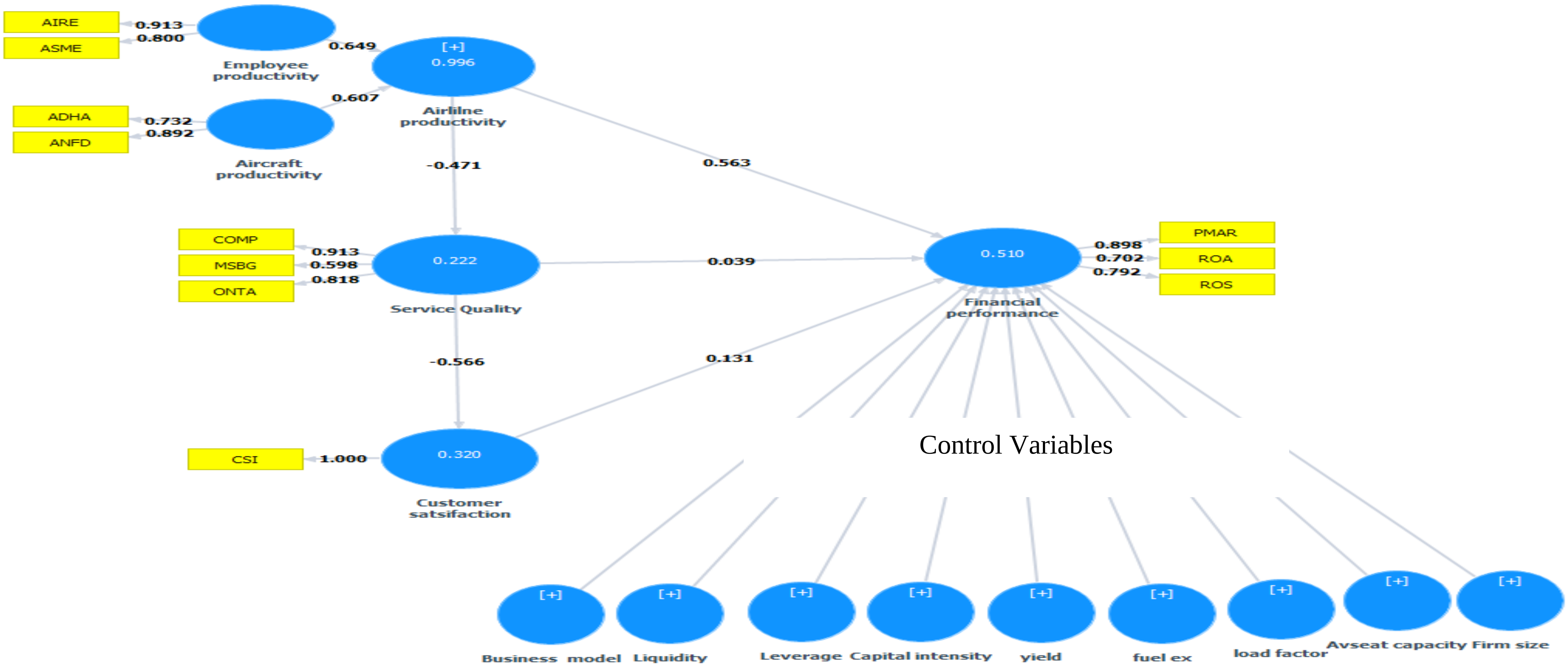
After establishing reliability and validity of the measurement variables, the structural model is assessed to ensure it is "fit" to predict the hypothesized relationship among the constructs. SmartPLS provides three results to evaluate whether the structural model is "fit": (1) the coefficient of determination (R^2), (2) the predictive relevance (Q^2), and (3) the size and significance of the path coefficients. To ensure clarity and consistency, the discussion of results are organized in line with the sequence of the requirements: coefficients of determination (R^2), the predictive relevance (Q^2), and the size and significance of the path coefficients.

5.2.3.1 Coefficient of Determination (R^2)

The main purpose of developing a structural model in PLS-SEM is to predict the relationship between latent variables. The most widely used means to assess the predictive ability of a structural model is the coefficient of determination (R^2) which represents the combined effect of the independent variable on the dependent variable. The value of R^2 ranges between 0 and 1; values closer to 1 suggest a stronger predictive capability of one, or a set, of the latent variable(s), the minimum acceptable value is 10% (Camisón and Ana Villar, 2010). In this research, airline productivity is the independent variable, while service quality, customer satisfaction, and financial performance are dependent variables. The R^2 is thus relevant for the three dependent variables. Figure 24 presents the SmartPLS output of the R^2. It shows that *financial performance* has the highest R^2 at 0.51, followed by *customer satisfaction* where R^2

= 0.32, and service quality where R^2 = 0.22. These results are above the minimum requirement of 0.1, thus the structural model fulfils the requirement of predictive power.

Figure 24. PLS-SEM Estimation Results of the Measurement and the Structural Model - with all constructs measured at the same time period (t).



Notes: This figure shows the PLS-SEM estimation results. As noted earlier, and as can be seen in the figure, service quality, customer satisfaction, and financial performance are the dependent variables. The figure reveals that financial performance has the highest value of coefficient of determination (R2= 0.51), followed by customer satisfaction (R^2 = 0.32), and service quality (R^2 = 0.22), surpassing the minimum requirement of 0.1. Overall, the figure shows that the model is capable of predicting the hypothesized path relationship among the latent variables. Further, the structural model shows that the path coefficient of the line that links airline productivity and financial performance is 0.563, while the path coefficient of the line that links airline productivity to service quality is -0.471. The path model also shows that the path coefficient of the line that links service quality with customer satisfaction is -0.566, while the link between service quality and financial performance shows a path coefficient of -0.039. The path that links customer satisfaction and the lagged financial performance shows a path coefficient of 0.131.

5.2.3.2 Predictive Relevance (Q^2)

Q^2 is used to assess the predictive relevance of a reflective structural model. SmartPLS uses the blindfolding procedure to determine the value of Q^2. In order to run the blindfolding procedure in SmartPLS, an omission distance has been set at six. The construct cross validated redundancy approach has been adopted because it determines the Q^2 based on the measurement and the structural model scores. The results show Q^2 values of 0.103 for *service quality*, 0.301 for *customer satisfaction*, and 0.125 for *financial performance*, which meet the general requirement for Q^2, i.e., it should be greater than 0 (**see** Table 15). The Q^2 values again confirm the model's predictive relevance. Table 15 shows the predictive relevance of three endogenous variables used in this research.

Table 15. Assessment of Structural Model with all Indicators Measured at Year t – Predictive Relevance (Q2)

Endogenous Latent Variable	SSO	SSE	Q2=1-SSE/SSO
Service quality	315.000	282.596	0.103
Customer satisfaction	105.000	73.343	0.301
Financial performance	315.000	273.574	0.125

Notes: This table presents the predictive relevance of the structural model (Q^2) with all constructs measured at the same time period (*t*). The column SSO shows the squared observations, while the column SSE shows the squared prediction errors. The predictive relevance (Q2) is the proportion of the observation excluding the prediction error, i.e. Q2 = 1- the squared prediction error divided by the squared observations. The table shows that the Q2 of service quality, customer satisfaction, and financial performance are 0.103, 0.301, and 0.125 respectively. These results suggest that the model is relevant to predict the relationship among the latent variables.

5.2.3.3 Size and Significance of Path Coefficients

One of the empirical contributions of this research is the operationalization of *airline productivity* as a multidimensional construct with a view towards the exploration of the contribution of key resources of airlines to their overall productivity. The results of the structural model presented in Figure 24 and Table 16, show that *employee productivity* contributes substantially in explaining and predicting (path weight = 0.65 $p < 0.001$) overall *airline productivity*. Furthermore, the results of this research show that *aircraft productivity* also plays a crucial role in enhancing *airline productivity* (path weight = 0.61; $p < 0.001$), in addition to *employee productivity*.

Table 16. Assessment of Structural Model with all Indicators Measured at Year t – Size and Significance of Path Coefficients (first order constructs)

PLS-SEM Path	Path Weight	P Values
Employee productivity --> Airline productivity	0.664	0.001
Aircraft productivity --> Airline productivity	0.578	0.001

Notes: This table presents the PLS analysis results for second order constructs, i.e., the path weight of employee productivity and aircraft productivity because these are second order formative latent variables of *airline productivity*.

Hypothesis 1. The link between airline productivity and financial performance

One of the objectives of this research is to investigate the combined effect of *employee productivity* and *aircraft productivity* on *financial performance*. To this end, the aim of the first hypothesis (H1) is to test the link between airline productivity and financial performance. The PLS analysis results seen in Figure 24 and Table 17 show that improvement in *airline productivity* has a positive and significant impact on the current period of *financial performance* (path coefficient = 0.563, $p < 0.001$).

Hypothesis 2. The link between airline productivity and service quality

In this research, it is argued that airline service productivity also has a positive impact on *service quality* (hypothesis 2) by reducing flight delays (improving on time arrival, reducing lost baggage), and thereby reducing customer complaints. The path coefficient of 0.47, $p < 0.001$ for the linkage between *airline productivity* and *service quality* supports this assertion, i.e., the success of airlines in their effort to enhance productivity also improves their service quality as a result of operational efficiency.

Hypothesis 3. The link between service quality and customer satisfaction

Following marketing theories, this research operationalizes *service quality* and *customer satisfaction* as two distinct constructs. Hypothesis 3 predicts *service quality* to have a strong impact on *customer satisfaction* because customers' opinions of the airlines represent their overall judgement based on their perception of the quality of the airline services. The path from *service quality* to current period *customer satisfaction* is negative and statistically significant (path coefficient = -0.566, $p < 0.001$). This result implies that lower levels of service quality have a significant negative impact on customer satisfaction.

Hypothesis 4. The link between service quality and financial performance

The structural model presented in Figure 24 and Table 17, shows a weak link between current period service quality, as measured by factors such as on time arrival, customer complaints resulting from flight cancellation, unfriendly employees, lost baggage etc., and current period financial performance (path coefficient 0.039). This result suggests financial performance does not immediately react to changes in service quality. Further analysis is carried out with varying time lags to examine if changes in service quality influence future periods of financial performance. The results of lag length analysis are presented in section 5.3.

Hypothesis 5. The link between customer satisfaction and financial performance

The path coefficient (0.131) between *customer satisfaction* and *financial performance* suggests a statistically insignificant relationship between the two constructs. One possible reason for this is that the relationship between these two constructs may not be contemporaneous. Therefore, additional analysis is conducted to understand the effect of changes in customer satisfaction on future financial performance. Results of the lagged effects are explored and presented in the next section of further analysis. **Table 17** shows the assessment of the Structural Model with all constructs measured at Year *t* – Path Coefficients.

Table 17. Assessment of Structural Model with all Constructs Measured at Year t – Path Coefficients

Hypothesis and Path	Path Coefficient	P Values	Hypothesis
H1: The higher the level of airline productivity the higher the level of financial performance	0.563	0.000***	Confirmed
H2: The higher the level of airline productivity the lower the problems of service quality	-0.471	0.000***	Confirmed
H3. The lower the level of service quality the lower the level of financial performance	-0.566	0.000***	Confirmed
H4: The lower the level of service quality the lower the level of customer satisfaction	0.039	0.631	Not Confirmed
H5: The higher the level of customer satisfaction the higher the level of financial performance	0.131	0.314	Not Confirmed

Notes: This table presents the path coefficients and the p values of the structural model with all constructs measured at the same time period (year t). The table shows that the path coefficients of the links between *customer satisfaction* and *financial performance*, and between *service quality* and *financial performance* are not significant. The table also shows that the results of the structural model confirm the first three hypotheses.

***denotes P < 0.001.

5.3 Time Lag Analysis

As discussed earlier, this study aims to investigate the impact of *airline productivity* on *service quality*, *customer satisfaction,* and *financial performance*. Furthermore, it aims to identify the lag length for changes in nonfinancial performance to be reflected in financial performance, using the data of US airlines. In Section 5.2 above, I present the results of the PLS-SEM estimation where all latent variables are measured over the same time period. The results show the existence of statistically significant links between *airline productivity* and *financial performance, airline productivity* and *service quality,* and *service quality* and *financial performance*. However, contrary to my predictions, the link between *service quality* and *financial performance,* and the link between *customer satisfaction* and *financial performance,* are not statistically significant. A possible explanation for such unexpected findings could be the lagged effect of changes in *service quality* and *customer satisfaction* on *financial performance*, i.e., improvement (or deterioration) of *service quality* and *customer satisfaction* does not have an immediate impact on *financial performance* (Banker and Mashruwala, 2007; Behn and Riley, 1999; Bernhardt et al., 2000; Ittner and Larcker, 1998a).

Airlines make substantial investment to improve employee capability and technology in order to improve operational efficiency and service quality. Such investment requires some time to show returns in the form of growth in turnover and operating profit. As a result, current period changes on *service quality* and *customer satisfaction* may not have a concurrent effect on *financial performance* (Banker and Mashruwala, 2007; Behn and Riley, 1999).

Therefore, to identify the length of time airline managers have to wait in order to observe the outcome of the strategic decisions made to enhance *airline productivity, service quality, and customer satisfaction*, I examine the hypotheses with all latent variables measured at the same time period, with one- or two-year time lags. This approach has been used extensively in prior literature that investigates the relationship between nonfinancial and financial performance measures. For instance, Banker and Mashruwala (2007) assess the lagged effect of customer satisfaction on the profitability of a hotel chain. Similarly Bernhardt et al. (2000) find a positive relationship between current customer satisfaction enhancement and an improvement in financial performance one or two years later.

Section 5.3.1 presents the PLS-SEM estimation results with financial *performance* lagged by one year. Section 5.3.2 presents the PLS-SEM estimation results where *customer satisfaction* is lagged by one year, while *financial performance* is lagged by two years.

5.3.1 One-Year Lagged Effect

It is widely acknowledged that nonfinancial performance measures are the leading indicators of future financial performance (Ittner and Larcker, 1998a; Kaplan and Norton, 1992). This suggests that current period changes in nonfinancial performance measures may not be fully reflected in current period financial performance. This is based on the conjecture that current period managerial decisions and actions require some time before they translate into financial outcomes (Wiersma, 2008). Nonfinancial performance measures, however, reflect the managerial actions because they "directly" capture the effects of such actions (Wiersma, 2008). For instance, when managers take action to improve *airline productivity*, on time arrivals (a nonfinancial performance measure) should increase immediately, as a direct reflection of the effect of this managerial action. However, the length of time for such an improvement to affect *financial performance* is ambiguous (Wiersma, 2008). Similarly, managerial actions to improve airline *service quality,* such as on time arrival, may be reflected in *customer satisfaction* concurrently, but the effect of such changes on *financial performance* may take time.

Based on the presumption that nonfinancial performance measures are leading indicators of future financial performance (Kaplan and Norton, 1992), I expect changes in the nonfinancial performance measures *airline productivity, service quality,* and *customer satisfaction* to be associated with future *financial performance*. To identify the time lag required for *financial performance* to react to changes in *airline productivity, service quality,* and *customer satisfaction*, a model adjusted for lagged effect is estimated and tested. Financial performance is firstly lagged by one year. Results of PLS-SEM estimation with financial performance lagged by one year, while the remainder of the latent variables are measured over the same time period, are discussed in Sections 5.3.1.1 and 5.3.1.2.

5.3.1.1 Assessment of the Measurement Model – Financial Performance Lagged By One Year

To ensure that the measurement model fulfils the quality requirements of validity and reliability with the lagged financial information, I assess it following the guidelines discussed in Section 5.2.2 above. As discussed in Chapter Four**,** Section 5.2.2, a measurement model is evaluated for internal consistency reliability, convergent validity, the AVE, and discriminant validity by using the composite reliability and the inter-correlation among the latent variables.

5.3.1.1.1 Internal Consistency Reliability - One-Year Lagged Financial Performance

Indicator loadings above 0.7 are considered as reliable measures. The second PLS-SEM estimation model with one-year lagged *financial performance* shows that 10 out of the 13 indicators loaded well above 0.7 (see Table 19 and Figure 25). However, involuntarily denied boarding (-0.333), return on investment (0.475), and mishandled baggage (0.556) loaded below 0.7. These results are consistent with the original model (without time lags) discussed in Section 5.2.2 above. Indicators with loadings between 0.4 and 0.7 are subject to removal and can only be retained for content validity purpose. Mishandled baggage is retained to enhance the content validity of the latent variable *service quality*, while involuntarily denied boarding and return on investment are removed. Table 18 presents the list of latent variables, indicators retained, and their respective loadings with the one-year lagged *financial performance*. Figure 25 shows the PLS-SEM estimation results of the measurement and the structural models.

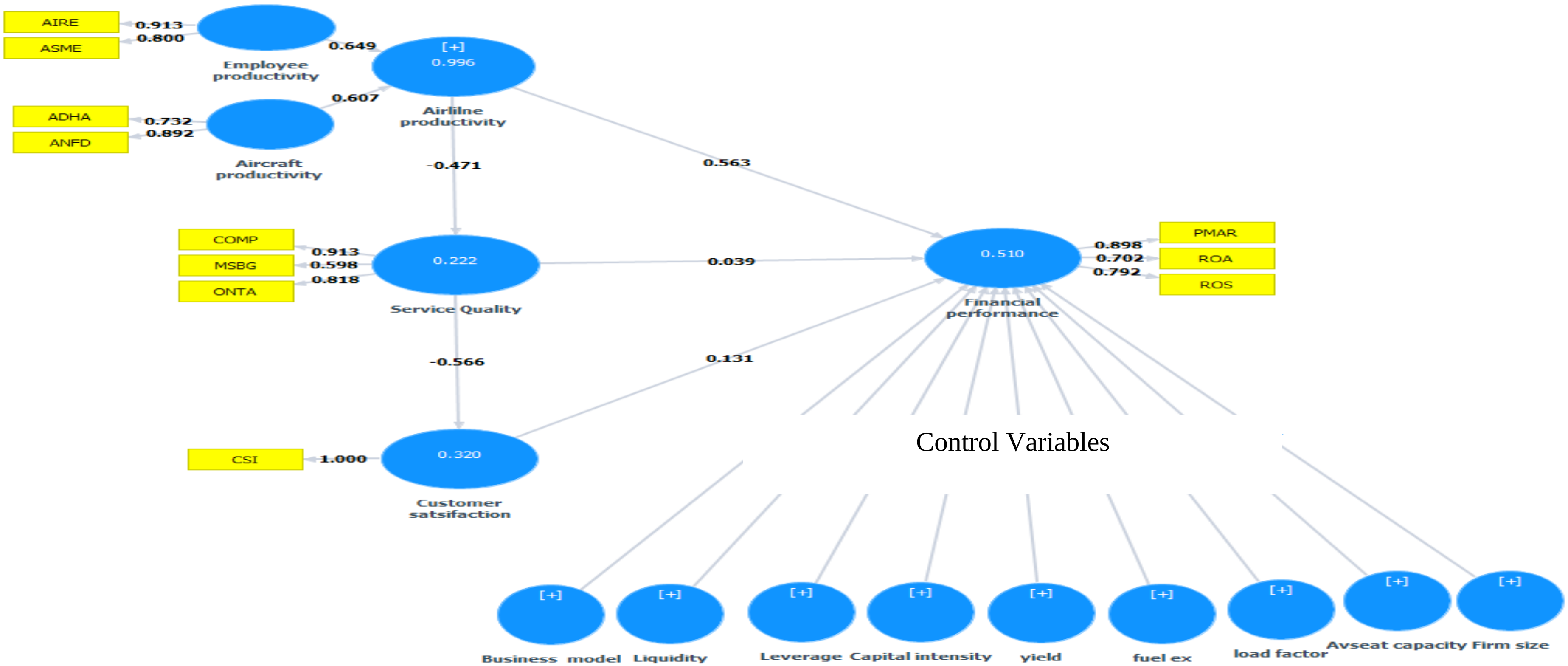
Table 18 Assessment of Measurement Model – with One-year Lagged Financial Performance (Indicator Loadings with All the Indicators and with the Retained Indicators)

Notes: This table presents the assessment of the measurement model that lags financial performance by one year. It shows the loadings and p-values of the measurement model with all the indicators and with the indicators retained for the measurement model with one-year lagged financial performance. In this model, airline productivity,

Latent Variables	Second Order Constructs	Indicators	Indicator Loadings (with all the indicators)	P Value	Indicator Loadings (with the retained indicators)	P Value
Airline productivity	Employee productivity	Available seat miles (ASM) per employee	0.800	p<0.001	0.796	p<0.001
		Number of aircraft per employee	0.908	p<0.001	0.911	p<0.001
	Aircraft productivity	Average daily block hours	0.750	p<0.001	0.740	p<0.001
		Number of departures per day per aircraft	0.884	p<0.001	0.891	p<0.001
Service quality		On time arrival	0.773	p<0.001	0.821	p<0.001
		Number of complaints	0.893	p<0.001	0.909	p<0.001
		Mishandled baggage	0.556	p<0.001	0.606	p<0.001
		Involuntarily denied boarding	-0.333		Removed	
Customer satisfaction		Customer satisfaction Index	NA	NA	NA	NA
Financial performance		Operating margin	0.890	p<0.001	0.896	p<0.001
		Return on assets	0.704	p<0.001	0.720	p<0.001
		Return on sales	0.747	p<0.001	0.776	p<0.001
		Return on investment	0.475		Removed	

service quality, and customer satisfaction are measured at the same time period - time t, while financial performance is measured at t+1. Involuntarily denied boarding (-0.333) and Return on investment (0.475) are removed because of their lower loadings. Customer satisfaction is a single item construct, and, hence, it is not applicable (NA) to report its loading and p value.

Figure 25. PLS-SEM Estimation Results of the Measurement and the Structural Model – One Year lagged Financial Performance



Notes: This figure shows the PLS-SEM estimation results. As noted earlier, and as can be seen in the figure, service quality, customer satisfaction, and financial performance are the dependent variables. The figure reveals that financial performance has the highest value of coefficient of determination (R2= 0.51), followed by customer satisfaction (R^2 = 0.32), and service quality (R^2 = 0.22), surpassing the minimum requirement of 0.1. Overall, the figure shows that the model is capable of predicting the hypothesized path relationship among the latent variables. Further, the structural model shows that the path coefficient of the line that links airline productivity and financial performance is 0.563, while the path coefficient of the line that links airline productivity to service quality is -0.471. The path model also shows that the path coefficient of the line that links service quality with customer satisfaction is -0.566, while the link between service quality and financial performance shows a path coefficient of -0.039. The path that links customer satisfaction and the lagged financial performance shows a path coefficient of 0.131.

The composite reliability of 0.7 and above also shows the reliability of latent variables. The results (presented in Table 19) show that each latent variable's composite reliability is above the minimum required value.

Table 19. Assessment of Measurement Model – with One-year Lagged Financial Performance - Measures of Internal Consistency

Latent Variable	Number of Items	Composite Reliability
Airline productivity	4	0.753
Employee productivity	2	0.844
Aircraft productivity	2	0.801
Customer satisfaction	1	Not applicable
Service quality	3	0.828
Financial performance	3	0.842

Notes: This table shows the composite reliability of the latent variables of the measurement model with one-year lagged financial performance. The rest of the latent variables: productivity, service quality, and customer satisfaction are measured at time t. *Customer satisfaction* is a single item construct, hence it is not applicable (NA) to report its loading and p value.

5.3.1.1.2 Convergent Validity - Model with One-Year Lagged Financial Performance

Convergent validity of a construct is assessed by looking at the AVE. The results of the PLS-SEM estimation with one-year lagged *financial performance* show that the AVE of each latent variable is above 0.5, which suggests the existence of convergent validity. The AVE of each latent variable is presented in Table 20.

Table 20 Assessment of Measurement Model – with One-year Lagged Financial Performance - Convergent Validity (AVE)

Latent Variable	Number of Items	Convergent Validity (AVE >0.50)
Airline productivity	4	0.639[a]
Employee productivity	2	0.732
Aircraft productivity	2	0.671
Customer satisfaction	1	NA [b]
Service quality	3	0.622
Financial performance	3	0.641

Notes: This table shows the convergent validity measured by the average variance extracted (AVE) of the latent variables of the measurement model with one-year lagged financial performance. The other latent variables: productivity, service quality, and customer satisfaction are measured at time *t*.

a. Two second order constructs are used to capture productivity, employee productivity and aircraft productivity. When using higher order modelling like this, AVE of the first order construct, in this case productivity, is manually computed. This is done by dividing the square of the correlation between employee productivity and airline productivity and aircraft productivity and airline productivity by two. i.e., $(0.802^2 + 0.794^2)/2 = 0.639$.

b. Customer satisfaction is a single item construct, hence it is not applicable (NA) to report its loading and p value.

5.3.1.1.3 Discriminant Validity - Model with One-Year Lagged Financial Performance

Discriminant validity shows whether each latent variable is distinctive from the other latent variables in the model. This is established if the AVE values of each latent variable are higher than the squared value of the correlation between the latent variables. Table 21 presents the inter-correlation among latent variables to assess the requirement of convergent validity. Results show that the measurement model with one-year lagged financial performance meets the requirement of discriminant validity as the AVE of each latent variable is higher than the squared correlation between the latent variables. For example, the AVE of employee productivity (0.856) is higher than the squared correlation between employee productivity and aircraft productivity (0.280), service quality (-0.382), customer satisfaction (0.230), and financial performance (0.134). Likewise, the AVE of aircraft productivity (0.819) is greater than the squared correlation of employee productivity with service quality (-0.322), customer satisfaction (0.528), and financial performance (0.415).

Table 21 Assessment of Measurement Model – with One-year Lagged Financial Performance – Discriminant Validity (Intercorrelation among Latent Variables)

Latent Variable	EP	AIRCP	SQ	CSAT	FP
Employee productivity (EP)	0.856				
Aircraft productivity (AIRCP)	0.280	0.819			
Service quality (SQ)	-0.382	-0.322	0.789		
Customer satisfaction (CSAT)	0.230	0.582	-0.598	NA	
Financial performance (FP)	0.134	0.415	-0.423	0.492	0.801

Notes: This table presents the inter-correlation of the latent variables. Numbers in bold on the diagonal represent the square root of AVE values. *Customer satisfaction* is a single item construct that does not require reporting of the correlation value, hence NA is reported.

In summary, the model with one-year lagged *financial performance* also meets the requirements of measurement reliability, convergent and discriminant validity. In the next section, the assessment of the structural model with one-year lagged *financial performance* is presented.

5.3.1.2 Assessment of the Structural Model – Model with one year lagged Financial Performance

In section 5.4.1.1, I assess and confirm that the measurement model with one-year lagged *financial performance* is valid and reliable. The next step is to ensure if the structural model is appropriate for testing the hypothesized relationship among the latent variables. This is done by looking at the coefficient of determination (R^2), the path coefficients, and the predictive relevance (Q^2). Each measurement metric is discussed in the following sections.

5.3.1.2.1 Coefficient of Determination (R2) - Model with One-Year Lagged Financial Performance

The coefficient of determination (R^2) shows the predictive capacity of the structural model. It represents the explanatory power of the independent variable on the dependent variable. Value of coefficient of determination (R^2) closer to 1 suggests strong predictive ability while values closer to zero suggest the opposite, with the minimum acceptable value of R^2 as 0.1, or 10%. The PLS-SEM estimation results of the structural model with one-year lagged financial performance show that the R^2 is 0.52 for *financial performance,* 0.35 for *customer satisfaction,* and 0.20 for *service quality* (please see **Table 23***).* All R^2 values are above 0.1; this suggests that the structural model with one-year lagged financial performance also meets the requirement of predictive power with respect to the metric of coefficient of determination.

5.3.1.2.2 Predictive Relevance Q2- Model with One-Year Lagged Financial Performance

As discussed in Section 5.2 on evaluation of the structural model, the predictive relevance is also assessed using Q^2. A positive value for Q^2 suggests that the structural model is relevant to predict the hypothesized relationship among the latent variables. SmartPLS generates Q^2 via a blindfolding procedure. Table 22 shows the Q^2 of the three endogenous variables used in this research following the construct cross validated redundancy approach with an omission distance of six. As shown in Table 22, the Q^2 value is 0.103 for *service quality,* 0.301 for *customer satisfaction,* and 0.125 for *financial performance*. These results suggest that the requirement of predictive relevance has been met with regard to the metric of Q^2. This confirms that the structural model with one-year lagged *financial performance* is relevant to predict the hypothesized relationship among the latent variables.

Table 22. Assessment of Measurement Model – with One-year Lagged Financial Performance - Predictive Relevance Q2 (Construct cross Validated Redundancy)

Endogenous Latent Variable	SSO	SSE	Q2=1-SSE/SSO
Service quality	294.000	265.473	0.097
Customer satisfaction	98.000	64.609	0.341
Financial performance	294.000	203.823	0.307

Notes: This table presents the predictive relevance of the structural model (Q^2) that lags financial performance by one year. The column SSO shows the squared observations while the column SSE shows the squared prediction errors. The predicative relevance (Q2) is the proportion of the observation excluding the prediction error, i.e., Q2 = 1- the squared prediction error divided by the squared observations. The table reveals the Q2 values of the three latent variables are greater than 0, suggesting that the lagged model meets the requirement of predictive relevance.

5.3.1.2.3 Size and Significance of Path Coefficients - Model with One-Year Lagged Financial Performance

Hypothesis 1. The link between airline productivity and lagged financial performance

When conducting further analysis, *airline productivity* is measured at time *t*, while financial performance is lagged by one year, i.e., at time *t-1,* in order to assess the effect of current period changes in *airline productivity* on future periods of *financial performance*. The PLS-SEM path analysis of the lagged model shows that current period *airline productivity* is positively linked to future period *financial performance* (path coefficient 0.614, $p < 0.001$). These results are consistent with the results for the first model discussed in section 5.3.3. Table 23 shows the path coefficients of the lagged model.

Hypothesis 2. The link between airline productivity and service quality

Based on the argument that improvements (or deterioration) in *airline productivity* will have a simultaneous effect on both *financial performance* and *service quality*, H2 predicts that improvements in airline productivity will reduce service quality problems, hence there should be a negative link between airline productivity and service quality. Consistent with my prediction, the PLS-SEM analysis result of the lagged model, presented in Table 23 and Figure 24, shows the existence of a negative and significant link between *airline productivity* and *service quality* (path coefficient -0.458, $p < 0.001$). This result is also consistent with the first model without the one-year lagged effect of *financial performance*.

Hypothesis 3. The link between service quality and customer satisfaction

As discussed in the literature review (Chapter Two), *service quality* and *customer satisfaction* have been operationalized as two separate and independent constructs. *Service quality* problems, such as flight delays, lost baggage, and involuntarily denied boarding, could have a negative impact on the customer's overall judgement of an airline's service quality and should lead to a lower level of customer satisfaction. Thus, Hypothesis 3 predicts a negative relationship between current period problems of *service quality* and current period *customer satisfaction*. As predicted, the PLS-SEM analysis results of the one-year lagged model (Table 23 and Figure 25) indicate that the link between *service quality* problems and *customer satisfaction* is negative and statistically significant (path coefficient -0.598, $p < 0.00$). This result is consistent with the PLS-SEM results of the first model without the lagged effect. Furthermore, the path coefficient of -0.598 suggests a strong link between *service quality* and *customer satisfaction.*

Hypothesis 4. The link between service quality and financial performance

Hypothesis 4 predicts that *service quality* problems should have a negative effect on *financial performance* as a result of nonconformance costs incurred by airlines. The path leading from service quality to the one-year lagged *financial performance* (Figure 25) is negative and significant (path coefficient -0.299, $p < 0.01$). There appears to be a one year delay before changes in *service quality* are reflected in *financial performance*. This result is not consistent with the PLS-SEM estimation results of the first model that measures both *service quality* and *financial performance* in the same time period (*t*). This suggests that airline *service quality* problems such as flight delays/cancellations, lost baggage, and involuntarily denied boarding have a negative impact on future *financial performance.*

Hypothesis 5. The link between customer satisfaction and financial performance

Hypothesis 5 predicts a positive relationship between *customer satisfaction* and *financial performance*. The PLS-SEM estimation result with one-year lagged *financial performance* does not support Hypothesis 5. Although the path coefficient is positive (0.151), it is not significant (see Table 23 and Figure 25). This is consistent with the first model which measures all latent variables at the same time period (*t*).

Table 23. Assessment of Measurement Model – with One-year Lagged Financial Performance - Path coefficients

Hypothesis and Path	Path Coefficient	P Values	Hypothesis
H1: The higher the level of airline productivity the level of financial performance	0.614	0.000***	Confirmed
H2: The higher the level of airline productivity the lower the problems of service quality	-0.458	0.000***	Confirmed
H3: The lower the level of service quality the lower the level of financial performance	-0.598	0.000***	Confirmed
H4. The lower the level of service quality the lower the level of customer satisfaction	-0.299	0.020**	Confirmed
H5: The higher the level of customer satisfaction the higher the level of financial performance	0.151	0.178	Not Confirmed

R2 – Service quality	0.20
R2 – Customer satisfaction	0.35
R2 – Financial performance	0.52

Notes: This table presents the PLS path coefficients and the p values under each hypothesis tested where *financial performance* has been lagged by one year, i.e., *financial performance* measured at year *t-1*. The table shows that the path coefficients of the first four hypotheses confirm the hypothesized relationship among the constructs at $p < 0.000$. Further, the table reveals that the path coefficient of the line that links customer satisfaction to financial performance is not statistically significant.

In summary, the results of the model with one-year lagged financial performance are consistent with the model without consideration of the lagged effect, and the only exception is the link between *service quality* and *financial performance* (Hypothesis 3). As presented above, the link between *service quality* and current period *financial performance* is statistically insignificant in the model that measures all the latent variables at the same time period (*t*). However, this relationship becomes statistically significant when lagging the *financial performance* by one year, and this suggests that *service quality* is a leading indicator of future *financial performance* in the US airline industry. The PLS-SEM estimation results of the relationship between *customer satisfaction* and *financial performance* remain inconclusive as they are contrary to my prediction and to prior literature.

In order to explore consistency in the above results about the relationship between *service quality* and *customer satisfaction*, and the relationship between *customer satisfaction* and *financial performance*, further analysis is carried out with a varied lagged effect of the temporal relationship among the latent variables. The results are presented in the following section.

5.3.2 Two-Year Lagged Effect

In section 5.3.1 I present the PLS-SEM estimation results of both the measurement model and the structural model with one-year lagged *financial performance* (*financial performance* measured at time *t-1* and all the other latent variables and their indicators measured at time *t*). This section presents the PLS-SEM estimation results measuring *airline productivity* and *service quality* at the same time period (*t*), *customer satisfaction* lagged by 1 year (*t-1*) and *financial performance* lagged by 2 years (*t-2*).

As discussed in 5.2.2 PLS-SEM provides results to assess the measurement model and the structural model. It has been noted earlier that the measurement model is assessed for internal consistency, convergent validity, and discriminant validity. Section 5.3.2.1 presents the results of the assessment of the measurement model with lagged effects for customer satisfaction and financial performance. To this end, the measurement model has been reassessed for reliability and validity in line with the detailed guidelines and criteria presented in Section 5.2.2

5.3.2.1 Assessment of the Measurement Model - Model with One-Year Lagged Customer Satisfaction and Two-Year Lagged Financial Performance

The measurement model needs to be reassessed to ensure that it remains fit to predict the hypothesized relationship among the latent variables with one-year lagged *customer satisfaction* and two-year lagged *financial performance*. As discussed in Section 5.2.2 above, the measurement model is assessed for internal consistency reliability using indicator loadings. The convergent validity of indicators is assessed by looking at the AVE, and the discriminant validity is examined using the composite reliability and the inter-correlation among the latent variables. Results are presented and discussed in the sub-sections below.

5.3.2.1.1 Internal Consistency Reliability - Model with One-Year Lagged Customer Satisfaction and Two-Year Lagged Financial Performance

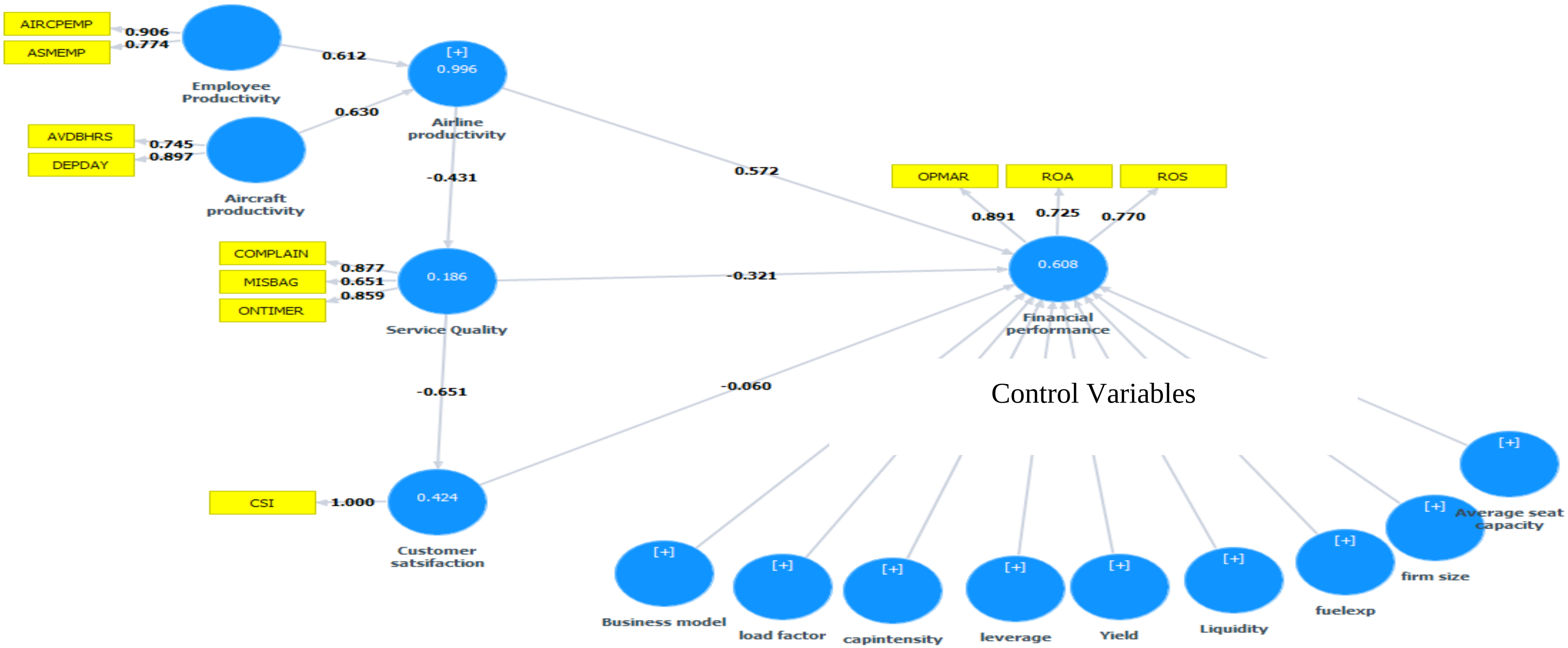
Indicator reliability is assessed by looking at the indicator loadings. Table 24 presents the list of latent variables, indicators retained and their respective loadings with one-year lagged customer satisfaction and two-year lagged financial performance. Figure 26 shows the PLS-SEM estimation results of the model that measures *airline productivity* and *service quality* at the same time period (*t*), *customer satisfaction* lagged by one year (*t-1*), and *financial performance* lagged by two years (*t-2*).

Table 24 Assessment of Measurement Model – with One-year Lagged Customer Satisfaction and Two-year Lagged Financial Performance (Indicator Loadings with All the Indicators and with the Retained Indicators)

Latent Variables	Second Order Constructs	Indicators	Indicator Loadings (with all the indicators)	P Value	Indicator Loadings (with the retained indicators)	P Value
Airline productivity	Employee productivity	Available seat miles (ASM) per employee	0.776	p<0.001	0.774	p<0.001
		Number of aircraft per employee	0.905	p<0.001	0.906	p<0.001
	Aircraft productivity	Average daily block hours	0.752	p<0.001	0.745	p<0.001
		Number of departures per day per aircraft	0.892	p<0.001	0.897	p<0.001
Service quality		On time arrival	0.804	p<0.001	0.877	p<0.001
		Number of complaints	0.865	p<0.001	0.909	p<0.001
		Mishandled baggage	0.595	p<0.001	0.651	p<0.001
		Involuntarily denied boarding	-0.351		Removed	
Customer satisfaction		Customer satisfaction Index	NA	NA	NA	NA
Financial performance		Operating margin	0.892	p<0.001	0.891	p<0.001
		Return on assets	0.713	p<0.001	0.725	p<0.001
		Return on sales	0.754	p<0.001	0.770	p<0.001
		Return on investment	0.398		Removed	

Notes: This table shows the loadings and p-values of the measurement model with all the indicators and with the indicators retained for the measurement model with one-year lagged *customer satisfaction* and two-year lagged *financial performance. Airline productivity* and *service quality* are measured at time *t*, while *customer satisfaction* is measured at time t-1, and *financial performance* is measured at time *t-2*. Involuntarily denied boarding (-0.351) and Return on investment (0.395) are removed because of their lower loadings. *Customer satisfaction* is a single item construct, hence it is not applicable (NA) to report its loading and p value.

Figure 26. PLS-SEM Estimation Results of the Measurement and the Structural Model - with One-year Lagged Customer Satisfaction and Two-year Lagged Financial Performance



Notes: This figure shows PLS-SEM estimation results of the measurement and the structural model with one-year lagged customer satisfaction and two-year lagged financial performance. The results of the measurement model show that all the indicators loaded above 0.7, with the exception mishandled baggage (MSBG). The figure also shows that the lagged model meets the requirement of predictive relevance as the R^2 of the dependent variables are: service quality R^2 = 0.10, customer satisfaction R^2 = 42, and financial performance R^2 = 61. Further, this figure depicts the path relationship among the latent variables. As can be seen, the path coefficient of the line that links airline productivity and the two-year lagged financial performance is 0.572, while the path coefficient of the link that links airline productivity to service quality is -0.431. The path model also shows that the path coefficient of the line that links service quality with one-year lagged customer satisfaction is -0.651, while the link between service quality and a two-year lagged financial performance shows a path coefficient of -0.321. The path that links customer satisfaction and the lagged financial performance shows a path coefficient of -0.060.

The PLS-SEM estimation results of the model that shows the lagged effect of customer satisfaction (*t-1*) and financial performance (*t-2*) shows that 10 indicators have loadings above 0.7, the minimum value required. However, it should be noted that involuntarily denied boarding (-0.351), return on investment (0.398), and mishandled baggage (0.595) loaded below 0.7. This result is consistent with the first model discussed in Section 5.2.2, and the second model in Section 5.3.1 above. Involuntarily denied boarding and mishandled baggage are removed due to their lower explanatory power, while mishandled baggage is retained to increase the content validity of *service quality*.

Furthermore, the composite reliability of the latent indicators is above 0.7 (see Table 25), this suggests that all the latent variables are reliable to measure the predicted relationship among the latent variables.

Table 25 Assessment of Measurement Model with One-year Lagged Customer Satisfaction and Two-year Lagged Financial Performance - Measures of Internal Consistency

Latent Variable	Number of Items	Composite Reliability
Airline productivity	4	0.752
Employee productivity	2	0.830
Aircraft productivity	2	0.808
Customer satisfaction	1	NA
Service quality	3	0.842
Financial Performance	3	0.840

Notes: This table shows the composite reliability of the latent variables of the measurement model with *customer satisfaction* lagged by one year (*t-1*) and *financial performance* lagged by 2 years (*t-2*). *Airline productivity* and *service quality* are measured at time *t*. The table shows consistency with the first model without the lagged effect, the model that lags financial performance by one year is also valid to measure the constructs. This is evidenced by the values of the composite reliability of the latent variables which is higher than the minimum value of 0.7.

5.3.2.1.2 Convergent Validity – Model with One-Year Lagged Customer Satisfaction and Two-Year Lagged Financial Performance

Table 26 shows the AVE of each latent variable used in the lagged model. The AVE reveals the amount of variance of an indicator explained by a given latent variable. The PLS-SEM estimation results, with *customer satisfaction* lagged by one year and *financial performance* lagged by two years, show that the latent variables explain more than 50% of the variance of their respective indicators, this suggests that the indicators meet the requirement of convergent validity. Table 26 also shows that the AVE values range between 0.710 (employee productivity) and 0.637 (financial performance), this suggests that the constructs are reliable.

Table 26. Assessment of Measurement Model with One-year Lagged Customer Satisfaction and Two-year Lagged Financial Performance - Measures of Convergent Validity (AVE)

Latent Variable	Number of Items	Convergent Validity (AVE >0.50)
Airline productivity	4	0.642
Employee productivity	2	0.710
Aircraft productivity	2	0.680
Customer satisfaction	1	NA
Service quality	3	0.644
Financial performance	3	0.637

Notes: This table shows the convergent validity of the latent variables**.** The AVE of *airline productivity* is determined by dividing the square of the correlation between employee productivity and airline productivity and aircraft productivity and airline productivity by two. i.e. (0.7952 +0.8082)/2= 0.639. The results show that the AVE values of all latent variables is above 0.5 thereby suggesting convergent validity.

5.3.2.1.3 Discriminant Validity - Model with One-Year Lagged Customer Satisfaction and Two-Year Lagged Financial Performance

One of the requirements for a measurement model to be reliable and valid is that each latent variable should be distinctively different from each of the others. This is assessed by evaluating the measurement model for discriminant validity. Discriminant validity is confirmed if the AVE value of each latent variable is higher than the squared value of correlation between the latent variables. The results of the PLS-SEM of the lagged model as presented in Table 27 show the AVE output from PLS-SEM for the model with one-year lagged *customer satisfaction* and two-year lagged *financial performance*.

The AVE values of employee productivity (0.843), aircraft productivity (0.825), service quality (0.802), and financial performance (0.798) are higher than the squared correlations of each construct with another construct in the model. These results suggest that the criterion for discriminant validity is met because the AVE values of each latent variable are higher than the squared correlation between the latent variables.

Table 27. Assessment of Measurement Model with One-year Lagged Customer Satisfaction and Two-year Lagged Financial Performance – Discriminant Validity (Inter-correlation among Latent Variables)

Latent Variable	EP	AIRCP	SQ	CSAT	FP
Employee productivity (EP)	0.843				
Aircraft productivity (AIRCP)	0.291	0.825			
Service quality (SQ)	-0.368	-0.300	0.802		
Customer satisfaction (CSAT)	0.320	0.558	-0.651	NA	
Financial performance (FP)	0.238	0.452	-0.467	0.471	0.798

Notes: This table presents the inter-correlation of the latent variables and the square root of AVE values. Numbers in bold on the diagonal represent the square root of AVE values. As can be seen in the table, the AVE values are higher than the Inter-correlation among the latent variables. These results suggest that the latent variables are distinct from each other.

In summary, the results taken together suggest that the measurement model with one-year lagged *customer satisfaction* and *financial performance* fulfils the requirements of indicator reliability consistency, convergent and discriminant validity. These results are consistent with the model where all latent variables are measured at the same time period (*t*), and with the model where *airline productivity, service quality,* and *customer satisfaction* are measured at the same time period (*t*) while *financial performance* is lagged by one year, and also the model, presented in this section, where *airline productivity* and *service quality* are measured at time *t*, while *customer satisfaction* and *financial performance* are lagged by one and two years respectively. The next section presents results of the assessment of the structural model with one-year lagged *customer satisfaction* and two-year lagged *financial performance*.

5.3.2.2 Assessment of the Structural Model - Model with One-Year Lagged Customer Satisfaction and Two-Year Lagged Financial Performance

After confirming the reliability and validity of the measurement model, the next step is to assess the appropriateness of the structural model to predict the hypothesized relationship among the latent variables. The structural model is examined using the R^2, the path coefficients, and the Q^2. The results of the structural model assessment are presented in the following sections. Sections 5.3.2.2.1 to 5.3.2.2.3 present the R^2, the Q^2, and the path coefficients of the structural model that lags customer satisfaction by one year and financial performance by two years.

5.3.2.2.1 Coefficient of Determination (R^2) - Model with One-Year Lagged Customer Satisfaction and Two-Year Lagged Financial Performance

The R^2 enables researchers to evaluate the predictive ability of the structural model. It shows the magnitude of the effect of the exogenous variable on the endogenous variable. As discussed above, R^2 ranges between 0 and 1. The PLS-SEM estimation results of the structural model that measures *airline productivity* and *service quality* at the same time period (*t*), while *customer satisfaction* measured at time *t-1*, and *financial performance* measured at time *t-2* show that *financial performance* has the highest R^2 at 0.61, followed by *customer satisfaction*, R^2 = 0.42, and *service quality*, R^2 = 0.19. These results suggest that the structural model with one-year lagged *customer satisfaction* and two-year lagged *financial performance* also meets the requirement of predictive power as the R^2 values are greater than 0.1 (please see Table 28).

Table 28. Assessment of Measurement Model with One-year Lagged Customer Satisfaction and Two-year Lagged Financial Performance - Path Coefficients

Hypothesis and Path	Path Coefficient	P Values	Hypothesis
H1: The higher the level of airline productivity the higher the level of financial performance	0.572	0.000***	Confirmed
H2: The higher the level of airline productivity the lower the problems of service quality	-0.431	0.000***	Confirmed
H3. The lower the level of service quality the lower the level of financial performance	-0.651	0.000***	Confirmed
H4: The lower the level of service quality the lower the level of customer satisfaction	-0.329	0.008**	Confirmed
H5: The higher the level of customer satisfaction the higher the level of financial performance	-0.060	0.689	Not Confirmed
R2 – Service Quality	0.19		
R2 – Customer Satisfaction	0.42		
R2 – Financial performance	0.61		

Notes: This table presents the PLS path coefficients, the *p* values, and *R2* for each hypothesis tested where customer satisfaction is lagged by one year, financial performance has been lagged by two years, i.e., financial performance at year *t-2*. The results in the table suggest that the path coefficients of the first four hypotheses are significant at $p < 0.001$, confirming the hypotheses. However, hypothesis 5 is not confirmed as the path coefficient is not statistically significant.

5.3.2.2.2 Predictive Relevance Q^2 - Model with One-Year Lagged Customer Satisfaction and Two-Year Lagged Financial Performance

In addition to assessing the R^2, Q^2 is also looked at for predictive relevance. This is performed using the blindfolding procedure of the SmartPLS software with an omission distance of six. Q^2 values greater than 0 suggest the predictive relevance of a structural model. The construct cross validated redundancy result of the PLS-SEM (see Table 29) shows that Q^2 values for *service quality, customer satisfaction, and financial performance* are 0.095, 0.427, and 0.329 respectively. These values are greater than 0 and thereby confirm the predictive relevance of the structural model.

Table 29. Assessment of Measurement Model with One-year Lagged Customer Satisfaction and Two-year Lagged Financial Performance - Predictive Relevance Q2 (Construct cross validated redundancy)

Endogenous Latent Variable	SSO	SSE	Q2=1-SSE/SSO
Service quality	273.000	246.972	0.097
Customer satisfaction	91.000	52.119	0.341
Financial performance	273.000	183.183	0.307

Notes: This table presents the predictive relevance of the structural model (Q^2) that lags customer satisfaction by one year and financial performance by two years. The column SSO shows the squared observations, while the column SSE shows the squared prediction errors. The table reveals the Q^2 values of the three latent variables as 0.097, 0.341, and 0.307, thereby suggesting that the lagged model meets the requirement of predictive relevance.

5.2.2.2.3 Size and Significance of Path Coefficients - Model with One-Year Lagged Customer Satisfaction and Two-Year Lagged Financial Performance

Hypothesis 1. The link between airline productivity and financial performance

Table 28 shows the path coefficients, *p* values, and the R^2 of the model with *airline productivity* and *service quality* measured at time *t*, while *customer satisfaction* is lagged by one year and *financial performance* is lagged by two years. The results of PLS-SEM estimation show a significant link between current period *airline productivity* and future period *financial performance* (path coefficient 0.572, $p < 0.001$). These results are consistent with the model that measures all the indicators in the same time period and with the model that lags *financial performance* by one year.

Hypothesis 2. The link between airline productivity and service quality

H2 predicts a negative relationship between airline productivity and problems of service quality. The path linking airline productivity and service quality is strong and significant (path coefficient -0.431, $p < 0.001$) providing support for Hypothesis 2. This suggests that strategic actions to improve airline productivity not only reduce cost and enhance profitability, but also improve airline service quality. Furthermore, the path coefficient of -0.43 implies that airline productivity is an important driver of airline service quality. This is consistent with the model where all indicators are measured at time *t*, the model with one-year lagged *financial performance,* and the model with one-year lagged *customer satisfaction* and two-year lagged *financial performance*.

Hypothesis 3. The link between service quality and customer satisfaction

In Hypothesis 3, a negative relationship is predicted between problems of *service quality* and *customer satisfaction*, i.e., higher occurrences of *service quality* problems are associated with lower levels of *customer satisfaction*. The PLS-SEM estimation result of the model that lags *customer satisfaction* by one year shows the existence of a strong and significant relationship between *service quality* and *customer satisfaction* (path coefficient at -0.651, $p < 0.001$). These results are consistent with the model where all indicators are measured at time *t* (path coefficient at -0.566, $p < 0.001$) and the model with one-year lagged *financial performance* (path coefficient at -0.698, $p < 0.001$). These results imply that *service quality* problems have a stronger long term effect on *customer satisfaction*.

Hypothesis 4. The link between service quality and financial performance

Failure to meet customer expectations is predicted to have a negative effect on *financial performance* as a result of the non-conformance costs incurred by the airlines. Based on this, Hypothesis 4 predicts a negative relationship between *service quality* problems and *financial performance*. The path linking *service quality* and the one-year lagged financial performance (Figure 26 and Table 28**)** indicates a strong negative relationship (path coefficient at -0.321, $p < 0.01$), which suggests that Hypothesis 4 cannot be rejected. The path coefficient is relatively higher than both the model without any lag effects and the model with one-year lagged *financial performance,* allowing the assumption that problems of *service quality* have a strong and negative impact on future period *financial performance*.

Hypothesis 5. The link between customer satisfaction and financial performance

In Hypothesis 5, a positive relationship is predicted between *customer satisfaction* and *financial performance* due to the repeated use by the customer of the same airline and favourable "word of mouth" expressed by satisfied customers. The path coefficient (Figure 26 and Table 28) of the line linking one-year lagged *customer satisfaction* and two-year lagged financial performance is statistically insignificant (path coefficient at -0.06). This result is very small and suggests that *financial performance* reacts to the changes in *customer satisfaction* after about one year, although the effect is not statistically significant. In summary, the results of the PLS-SEM models with airline productivity and customer satisfaction measured at the same time period, and customer satisfaction and financial performance lagged by one and two years respectively, are largely consistent with the second model that lags only financial performance by one year. In the second and third models, four of the five hypotheses are supported with relatively higher path coefficients and stronger statistical values.

5.4 Summary

Drawing on the RBV and ST, the main objective of this research is to investigate the relationship between airline productivity, *service quality*, *customer satisfaction,* and *financial performance*. Further, this research aims to identify the length of time for efforts to improve *airline productivity* and *customer satisfaction* to be reflected in *financial performance*. To this end, this research develops and empirically tests an integrative framework mapping the intertwined relationship between *airline productivity*, *service quality*, *customer satisfaction,* and *financial performance* using a longitudinal panel data of major US airlines over 15 years (1995-2009). This research has 105 observations with 2% missing value of each indicator.

The PLS-SEM has been used as the main analytical tool. It is preferred over multiple regression analysis because it is not constrained by data normality assumptions or sample size. Furthermore, PLS-SEM enables researchers to test the relationship between latent variables that are measured using multiple manifest variables. PLS-SEM is suitable for this research compared to CB-SEM as the latter requires a relatively larger sample size and a normally distributed sample, neither requirements are met by the sample used in this research. Moreover, PLS-SEM enables the assessment of the measurement model and the structural model simultaneously.

Three steps are suggested when using PLS-SEM: model specification, assessment of the measurement model, and assessment of the structural model. A model is specified by visually drawing the link among the latent variables along with their respective manifest variables (indicators). Model specification involves two stages: firstly, identification of the relationship among the latent variables based on an existing theory and the researcher's logic (known as inner model specification); and secondly, identification of the manifest variables (indicators) to measure each latent variable, also referred to as outer model specification. The inner model used in this research is specified by establishing a link between *airline productivity, service quality, customer satisfaction,* and *financial performance*. Furthermore, the outer model is specified by indicating four manifest variables (indicators) for each latent variable, with the exception of customer satisfaction which has only one indicator.

The measurement model has been tested to ensure that the measures are valid and reliable for the capture of the characteristics of the latent variables. This is done by evaluating the indicators' internal consistent reliability, convergent validity, and discriminant validity. Based on prior research into the links between nonfinancial and financial performance measures, I run additional tests on the original structural model incorporating two different time lag effects: one with *financial performance* lagged by one year; the other with *customer satisfaction* lagged by one year and *financial performance* lagged by two years.

Essentially three sets of tests have been performed on the dataset: the first is on the measurement model that measures all latent variables at time *t*; the second is on the measurement model which measures *airline productivity*, *service quality,* and *customer satisfaction* at time *t* while *financial performance* is measured at time *t-1*; and the third is on the measurement model that measures *airline productivity* and *service quality* at time *t*, *customer satisfaction* at time *t-1*, and *financial performance* at time *t-2.* Results from all three sets of tests confirm that the measurement model meets the requirements of internal consistency validity, convergent reliability, and discriminant reliability.

After confirming that the measurement models are valid and reliable, I also assess the structural model with three sets of tests. The structural model is evaluated for its ability to predict the hypothesized relationship among the latent variables. This is performed by looking at the R^2, Q^2, and the path coefficients. The results of the PLS-SEM estimation suggest that the structural model meets the requirements of predictive relevance as the coefficient of determination and the predictive relevance are above the minimum requirements of 0.1 and 0 respectively.

Results of the structural model that measures all latent variables at time *t* provide support to the first three hypotheses. However, the predicted relationship between *service quality* and *financial performance*, Hypothesis 4, and the relationship between *customer satisfaction* and *financial performance*, Hypothesis 5, is not confirmed due to low statistical significance.

Results of the structural model measuring *airline productivity*, *service quality*, and *customer satisfaction* at time *t*, while *financial performance* is measured at time *t-1,* lend support to the first four hypotheses. The path coefficient of the line that links *customer satisfaction* and *financial performance*, Hypothesis 5, is positive, but statistically insignificant.

Results of the structural model, measuring *airline productivity* and *service quality* at time *t* while *customer satisfaction* is measured at time *t-1*, and *financial performance* at time *t-2*, provide similar results to the results above for the model with one-year lagged *financial performance*. Contrary to my prediction, and to prior literature, the link between *customer satisfaction* and *financial performance* is not statistically significant.

Overall, evaluation of the structural model supports the hypothesis that *airline productivity* has a direct and strong impact on current and future *financial performance*. The findings also support the hypothesis that airlines' efforts to improve productivity have a significant impact on enhancing *service quality*. This finding is contrary to prior research that argues for a trade-off between *airline productivity* and *service quality*. Furthermore, consistent with my prediction, findings of this research also show that negative aspects of *service quality*, such as customer complaints and flight delays, have a strong negative effect on current and future *customer satisfaction*. These findings hold true in both the short-term (without time lags) and the long-term (with one-year and two-year time lags). However, changes in airline *service* *quality* are not reflected in current period *financial performance*. Further analysis shows that there is a significant negative link between current period problems of *service quality* and future period *financial performance*. However, the link between *customer satisfaction* and *financial performance* is weak both for current and future period *financial performance* due to its low statistical significance. This research makes both academic and practical contributions by extending similar studies into the US airline industry by Behn and Riley (1999), Liedtka (2002), and Tsikriktsis (2007). Chapter Six presents further discussion and conclusions of this research.

CHAPTER SIX: DISCUSSION AND CONCLUSION

The main objective of this research is to explore the links among *airline productivity*, *service quality*, *customer satisfaction,* and *financial performance* in the US airline industry. Drawing on the RBV, changes in *productivity of airline employees* and *aircrafts* are predicted to influence the airline's *financial performance*. Further, this dissertation argues that improvements in airline resource productivity should have a simultaneous impact on both *service quality* and *financial performance*. This is because initiatives to improve productivity, such as employee training, hiring competent employees, and acquiring better aircraft and equipment, will not only enhance employee productivity and aircraft utilization, but also improve on time arrival and baggage handling and the overall passenger experience. Furthermore, based on ST, this dissertation argues that strategic initiatives to improve airline resource productivity lead to superior *financial performance* when such initiatives are carefully planned and implemented to enhance *service quality* and *customer satisfaction*.

Chapter Three provides details of how the theoretical model is developed under the theoretical underpinning of RBV and ST, as well as following prior literature (reviewed in Chapter Two). Chapter Four discusses the measurement of variables and rationalizes the choice of methodological approach. As noted earlier, PLS-SEM has been used in this dissertation after comparing and contrasting it with alternative analytical tools. Chapter Five depicts the sample by providing descriptive statistics of the US airline industry and discusses the results on the evaluation of the measurement and structural models based the guidelines and criteria set out in the literature for using PLS-SEM. This chapter summarizes the findings and synthesizes the contribution of this research before concluding with suggestions for future research.

6.1 Lag Length Analysis

As discussed earlier, this research uses longitudinal panel data of seven major US airlines over a period of fifteen years (1995-2009). The use of longitudinal panel data creates an opportunity to test the theoretical model developed in Chapter Two using the SmartPLS software. As discussed in Chapters Three and Four, PLS-SEM enables researchers to assess both the measurement model and the structural model simultaneously. Assessment of the measurement model shows that the theoretical model, the measurement constructs (latent variables), and the indicators developed are reliable and valid. Further, assessment of the structural model has confirmed that the structural model is appropriate for the prediction of the hypothesized relationships among the latent variables.

Prior research suggests that incorporating time lag is crucial in the analysis of causal relationships among variables (Malina and Selto, 2001). This is important because changes in some variables may have immediate effect, while other variables may take several years to have a significant impact. For example, cost reduction will immediately affect financial performance, while changes in technological competence may take some time to translate into financial return. Therefore incorporating time lags helps to analyse the effect of delay in the reaction of the endogenous variable after changes in the exogenous variable. It also provides insights into the causal relationship among variables (Malina and Selto, 2001).

By allowing a time lag of one year when measuring *financial performance*, the results show that there is a one-year delay before current changes in service quality are reflected in *financial performance.* In contrast, changes in *airline productivity* are reflected in *financial performance* concurrently. Likewise, there is no delay before improvement/deterioration of *airline productivity* is reflected in *service quality*, and vice versa. *Employee productivity* improvement programs are immediately reflected in employee performance by enhancing coordination among the ground and cabin crew to ensure fast turnaround, which then leads to improvement in *service quality,* such as on time arrival. For this reason, there is no delay for changes in *airline productivity* to be reflected in airline *service quality*. Furthermore, airline customers immediately recognize the changes in airline *service quality*.

Another time lag considered in this research is between *customer satisfaction* and *financial performance*. This time lag was tested on the presumption that airline customers may not immediately react to *service quality* problems, but they may do over the course of time. A number of studies adopt a similar time lag between changes in *customer satisfaction* and *financial performance* (e.g., Banker and Mashruwala, 2007; Bernhardt et al., 2000; Sim et al., 2006). Subsequently *financial performance* is lagged by two years to establish a temporal relationship between *service quality, customer satisfaction,* and *financial performance.* However, contrary to my prediction, and to prior literature, there appears to be no relationship between *customer satisfaction* and *financial performance* when the model with *customer satisfaction* lagged by one year and *financial performance* lagged by two years is tested. This implies that changes in *customer satisfaction* do not have a statistically significant relationship with current and future period *financial performance* in the US airline industry.

The use of longitudinal panel data provides more robust results than those that can be obtained from simultaneous correlations (Malina and Selto, 2001). This is imperative, especially when the objective of the research is to explore causal relationship among variables. Thus, incorporating a time lag enables researchers to test the delay in reaction of a given lagging indicator after changes are made in a leading indicator (Malina and Selto, 2001). As noted in Chapter Five, Sections 5.3.1 and 5.3.2, including a time lag of one and two years into the PLS-SEM models has affected the results of the PLS-SEM estimation. Consequently, changes in *airline productivity* manifest instantaneously in *financial performance* and *service* *quality*. Likewise, changes in *service quality* are immediately reflected in *customer satisfaction*, whereas changes in *service quality* need a longer time to affect *financial performance*. *Financial performance* appears to react to the changes in *customer satisfaction* one year after, although this has not been empirically and statistically validated.

It appears that changes in nonfinancial measures require varying lengths of time to be reflected in *financial performance*. This suggests that investigating the relationship between a given nonfinancial performance measure in isolation, and its impact on *financial performance* may not provide a complete picture of a firm's performance (Kaplan and Norton, 1996b). Currently airlines are evaluated based on their operational and financial performance. Thus, managers need to know the effect of changes on operational activities, such as *aircraft productivity* or *employee productivity* on *service quality,* and the impact of such interaction on *financial performance*. Further, it is important for managers to know the length of time for changes in one aspect of operational performance to be reflected in another operational performance, and finally on *financial performance*. Such information provides a reliable basis for strategy formulation and implementation. For example, the impact on *financial performance* of an initiative which aims to improve *employee productivity* cannot be fully evaluated. This is because such an initiative may have an impact on *service quality* immediately, but take some time to feed into positive profit figures. The results of this study suggest that airline managers should assess the impact of strategic actions taken to improve productivity over a longer time span, rather than the traditional accounting period of twelve months.

6.2 Linkages among the Latent Variables

This research aims to investigate the links between *airline productivity, service quality, customer satisfaction,* and *financial performance*. Drawing on the RBV, it is argued that airline resources productivity has a positive impact on *financial performance*. Further, drawing on ST, it is argued that the impact of resource productivity on *financial performance* will be sustainable when management is competent to ensure productivity improvement initiatives are carefully formulated and implemented to achieve enhancement of *service quality* and *customer satisfaction*. Based on the combined view of the RBV and ST, this dissertation has developed and empirically tested an integrative framework mapping the integrative relationships between *airline productivity, service quality, customer satisfaction,* and *financial performance*.

As noted earlier, the partial least square (PLS) approach to PLS-SEM has been used in this study to explore the effect of *airline productivity* on *service quality* and *financial performance*, and the effect of *service quality* on *customer satisfaction* and *financial performance*. Findings suggest a positive and significant relationship between *airline productivity* and *financial performance*. Further, improvement in *airline productivity* has a strong effect on the reduction of *service quality* problems and this suggests compatibility of *productivity* and *service quality* in the US airline industry. Findings also show positive relationships between *service quality* and *customer satisfaction*. However, the relationship between *customer satisfaction* and *financial performance* is not statistically significant. The findings, taken together, support our theoretical argument that superior financial performance is determined by management's competence to improve resource productivity while satisfying customers with better quality products and services.

The following sections will discuss the key relationships between *airline productivity, service quality, customer satisfaction,* and *financial performance* separately.

6.3.1 Airline Productivity, Service Quality, and Financial Performance

The results of this study show that *airline productivity* has a strong positive effect on current and future periods of *financial performance*. Furthermore, the results show that *airline productivity* enhances *service quality* by reducing flight delays, loss of baggage, and customer complaints. These results are consistent across the models with varying time lags suggesting that improvement in *airline productivity* has both short-term and long-term effects on *financial performance*. The PLS-SEM results (see Figures 24, 25, and 26) suggest that airlines can improve *service quality* by improving productivity. These results also imply the compatibility of *airline productivity* and *service quality* in the US airline industry. However, this finding is contrary to the long standing argument which suggests there exists a trade-off relationship between *airline (service) productivity* and *service quality* (Anderson et al., 1997).

One of the possible reasons for such a conflicting result is that this dissertation focuses on the airline industry only, whereas Anderson et al. (1997) tested their hypotheses using data drawn from a number of different industries, including airlines, banking, retail, insurance, newspapers, furniture, and others. Although studies that cover multiple industries have important implications in enhancing the generalizability of the findings, they may not show the true picture of the relationship among the variables due to the confounding effect of industry characteristics on performance (Huselid, 1995; Porter, 1980).

Another reason for my findings regarding the relationship between *airline productivity* and *service quality* is, perhaps, related to the nature and classification of service businesses in general. As discussed earlier, the service literature classifies service businesses into four categories depending on the proportion of capital/labour used as input and based on the level of customization of services (Schmenner, 1986; 2004). Schmenner's (1986) classification suggests compatibility of service productivity and service quality in a service business that is relatively capital intensive and with a relatively low level of *service customization*. However, while prior studies discuss the link between productivity and quality in goods and services, this study takes the discussion a step further by considering differences in the nature of service businesses.

Findings of this research have important theoretical implications. The RBV argues that those distinctive resources which cannot be easily copied are the source of a firm's competitive advantage. Research often focuses on the identification of such resources and investigates their impact on *financial performance*. However, additional understanding is needed to assess the impact of a firm's capability to improve resource productivity on *service quality* and *customer satisfaction*. In this study, I find that whilst resource changes in *productivity* impact on *service quality* and *financial performance* concurrently, changes in *service quality* are reflected in future period's financial performance. These findings suggest that a firm's competitive advantage can best be assessed by combining the RBV and ST.

6.3.2 Service Quality, Customer Satisfaction, and Financial Performance

The ST suggests that firms' financial success is the result of management capability to manage and satisfy the varying interests of stakeholders (Choi and Wang, 2009; Donaldson and Preston, 1995b; Freeman, 1984). Airline customers are among the major stakeholders of airline companies. Drawing on the ST, this dissertation argues that a firm's ownership of *unique, rare, and inimitable resources,* as claimed by the RBV, leads to competitive advantage when the firm is able to satisfy its customers. Consequently, it is hypothesized that problems of *service quality* have negative effects on both *customer satisfaction* and *financial* *performance*. Further, a positive relationship is predicted between *customer satisfaction* and *financial performance*.

As noted earlier, in Section 5.2.3**,** the PLS-SEM estimation results presented in Figures 24, 25, and 26, and in Tables 10, 23, and 29, identify *service quality* problems, such as flight delays, lost baggage, and customer complaints due to the failure of the airlines to meet expectations of customers, has a direct and strong impact on *customer satisfaction*. This finding is consistent across the models, i.e., with and without the lagged effect, suggesting that *service quality* has contemporaneous and long-term effects on *customer satisfaction*. Today, in the US airline industry, the majority of airlines have begun to recognize *service quality* and *customer satisfaction* as critical factors in their aim to achieve and maintain a competitive position. As a result, airline *service quality* is at the centre of the agenda for many US airlines (Baker, 2013). To this end, airlines are making great efforts to improve *service quality* by recruiting competent employees (pilots, air stewardesses and stewards, maintenance engineers, etc.), and acquiring better technologies (aircraft, maintenance equipment, etc.). These findings are consistent with the implications of ST, i.e., negative aspects of *service quality* have an adverse effect on *customer satisfaction*. The findings are also consistent with prior studies, such as that of Steven et al. (2012) who find that flight delays, cancellations, and involuntarily denied boarding each have a negative impact on customer satisfaction.

The PLS-SEM estimation results (Figure 23, Table 10) also suggest that changes in airline *service quality* are not immediately reflected in *financial performance*. Instead, their impact on one-year lagged *financial performance* is prominent (Figure 25, Table 24). This reveals that there is one-year delay for *financial performance* to reflect changes in *service quality*. This result implies that airlines in the US are able to achieve higher *service quality* due to improvements in *productivity*, but the effect of *service quality* on *financial performance* is delayed by one year. In order to understand the effect of productivity and quality improvement programs on *financial performance*, airline mangers need to adopt a long term view of strategy development, implementation, and evaluation. This finding is consistent with the findings of prior research (e.g., Behn and Riley, 1999; Sim et al., 2006; Wiersma, 2008). For instance, Sim et al. (2006) find that *service quality* is an important factor to achieve competitive position, and thus customer complaints and flight delays have a strong negative effect on future periods of *financial performance*.

In addition, drawing on ST and prior studies, a positive relationship is predicted between *customer satisfaction* and *financial performance*. However, as indicated in the PLS-SEM estimation results presented in Section 5, Figures 24, 25, and 26, *customer satisfaction* does not seem to have a significant impact on *financial performance*. This finding is contrary to my prediction and to some empirical studies which suggest a positive relationship between *customer satisfaction* and *financial performance* (Behn and Riley, 1999; Chand, 2010; Ittner and Larcker, 1998a; Sun and Kim, 2013).

One possible explanation for this inconclusive finding is the competitive and legal environment of the US airline industry. As discussed earlier, the US airline industry is characterized by strict entry barriers due to the substantial amount of capital and safety requirements. Furthermore, due to various industrial and global factors, such as economic recession and rising fuel prices, the performance of US airlines has been declining over the past decade. As a result of such challenges, airlines in the US have been experiencing financial difficulties, with some even going into bankruptcy, while others have been forced to go through mergers and acquisitions for survival, which has left a limited number of major airlines operating in the market. Thus, with the reduced level of competition, *customer satisfaction* appears to have become less important and has no material effect on financial performance (Banker and Mashruwala, 2007). This is an obvious area for further research to empirically test the theoretical model developed in this research in a highly competitive industry.

Another possible explanation for the unpredicted finding regarding the link between *customer satisfaction* and *financial performance*, is the influence of switching costs (Lee and Feick, 2013). "Switching costs are costs that the customer incurs by changing providers that they would not incur if they stayed with their current provider" (Lee and Feick, 2013, p.3). In a business environment with few service providers, such as the current US airline industry, customers have limited choices and thus the switching cost is relatively high (Jones, 1996). Under such circumstances, dissatisfied customers will still continue to be "loyal" to the service provider, and thus customer satisfaction will not have a substantial impact on firms' financial performance. This situation becomes more apparent within the airline industry because of frequent flyer programs, which many scholars believe have limited the level of competition and increased the switching costs for airline customers (Carlsson and Lofgren, 2006). Future research that considers the role of switching costs may shed more light on the links between *airline productivity, service quality, customer satisfaction,* and *financial performance*.

6.3 Research Contribution

This research explores the links among nonfinancial performance measures and their effect on financial performance. Particularly, the main objective of this research is to investigate the links between *airline productivity, service quality, customer satisfaction,* and *financial performance*. To this end, a theoretical framework is developed based on the combined views of the RBV and ST. The theoretical framework is empirically tested using 15 years' data of seven major US Airlines. Data are analysed using the partial least square approach to structural equation modelling (PLS-SEM).

This research contributes to management accounting literature by combining the RBV and ST to explore the linkage between *airline productivity, service quality, customer satisfaction,* and *financial performance*. It also has practical implications for airline managers because it identifies the causal links among the performance measures. The theoretical and practical contributions of this research are summarized in the following sub sections. Section 6.3.1 summarizes the contribution of this research to the existing literature, and section 6.3.2 re-emphasizes the practical contribution.

6.3.1 Contribution to Existing Literature

Since the introduction of nonfinancial performance measures as part of the overall performance measurement system in the 1990s, considerable research has been undertaken to investigate the association between nonfinancial performance measures and financial performance. However, these studies have focused on examining the association between one or more nonfinancial measures and current or future periods of financial performance. While these studies have enriched the management accounting literature by providing evidence about the usefulness of nonfinancial measures to predict future performance and firm value, they are criticized for neglecting the links among the performance measures (Bryant et al., 2004; Ittner and Larcker, 2001). As a result, some accounting researchers (e.g., Behn and Riley, 1999; Bryant et al., 2004), and some operation management researchers (e.g., Calabrese, 2012; Tsikriktsis, 2007) have called for an integrative investigation of the links among these nonfinancial performance measures and their effect on financial performance.

More recently, Hoque (2014) suggests further research on the causal relationship among the various nonfinancial performance measures and financial perspectives of the balanced scorecard. However, the review of the literature shows that prior studies tend to focus on an investigation of the relationship between a particular nonfinancial performance measure in isolation, such as *customer satisfaction* or *service quality*, and its impact on *financial performance*.

Although several studies have investigated the relationship between productivity and financial performance (e.g., Huselid, 1995; Sim et al., 2006; Tsikriktsis, 2007), customer satisfaction and accounting performance, (e.g., Banker and Mashruwala, 2007; Ittner and Larcker, 1998a; Sun and Kim, 2013), and the relationship between quality and customer satisfaction (e.g., Sim et al., 2006; Smith and Wright, 2004), only a limited number of researchers attempt to explore the links among these various nonfinancial performance measures and their impact on financial performance in a comprehensive manner. This research is the first to develop an integrative theoretical framework based on the RBV and ST, and to empirically test the relationship between airline productivity, service quality, customer satisfaction, and financial performance, using longitudinal panel data drawn from major US airlines over 15 years.

The contributions of this research are three-fold.

1. The *first* contribution made is the application of the convergent views of the RBV and ST to obtain more insights about the temporal relationship between nonfinancial performance measures and *financial performance*. This research argues that resource productivity leads to superior financial success, as posited by the RBV, when the firm is able to satisfy its stakeholders, as suggested by ST. Thus, it is predicted that improvements in *airline productivity* positively influence both *service quality* and *financial performance*. Further, *service quality* is predicted to be an important antecedent to *customer satisfaction*. To this end, this study has developed, and empirically confirmed, an integrative theoretical framework based on the RBV and ST

to investigate the impact of *airline productivity* on *service quality, customer satisfaction,* and *financial performance*. To the best the author's knowledge, this study is the first attempt to develop and test an integrative framework in an empirical setting. As noted earlier, the PLS-SEM estimation results suggest that *airline productivity,* measured by employee productivity and aircraft productivity are important drivers of *financial performance* in the US airline industry. On the other hand, contrary to prior studies, the PLS-SEM path coefficients also show that improvement in *airline productivity* has a strong positive impact on *service quality* by reducing flight delays and cancellations, lost baggage, and passenger complaints. Therefore, these findings lend support to the theoretical arguments of the RBV which suggest management's capability to identify, organize and deploy its resources leads to enhanced *productivity* and *service quality* and ultimately to superior *financial performance* (Barney, 1991).

In addition, the PLS-SEM estimation results of the structural model support the conceptual argument in the service literature (Schmenner, 1986; 2004). That is, *productivity* and *service quality* are compatible in those service industries, such as airlines, that do not require customization of services and that involve a relatively low level of interaction with customers. Previous empirical studies tend to focus on the examination of such a relationship by classifying firms based on their product, i.e., goods or services. The findings of this study suggest that overlooking the nature of the service businesses may overshadow the true relationship among the variables. .

As presented above, the findings of this research also show that *service quality* problems, such as flight delays and mishandled baggage, have long term adverse effect on *customer satisfaction* and *financial performance*. This is consistent with ST which holds that firms may achieve and sustain competitive advantage through the management of the diverse interests of stakeholders (Donaldson and Preston, 1995b; Freeman, 1984). Taken together, these findings suggest that *airline productivity* and *service quality* are necessary conditions for the achievement and maintenance of a competitive position in the US airline industry. Therefore, management accounting researchers should employ an integrative view by combining the effect of resource *productivity* on *service quality* and their combined effect on *financial performance*.

2. The *second* contribution of this research is specifying the time required for a firm to observe the effect of efforts to improve *productivity* and *service quality* on *customer satisfaction* and *financial performance*. Prior studies aiming to investigate the relationship between nonfinancial and financial performance measures report varying time lags for the changes in nonfinancial performance measure to be reflected in the *financial performance* of firms. Methodological and measurement factors are identified as some of the possible reasons for such inconclusive results (Ittner and Larcker, 2008). This research has conducted an integrated investigation into the longitudinal associations between more than one nonfinancial performance measure and financial performance measures with multiple indicators using PLS-SEM. It does this over a period of 15 years (1995-2009) which provides an adequate basis for the temporal relationship among performance measures to be identified.

   Three varying time lags have been incorporated into the PLS-SEM model to identify the duration of the delay between changes in one nonfinancial measure on another nonfinancial or financial measure. Specifically, by testing the PLS-SEM model with: *(i)* all indicators measured at the same time period (*t*); (*ii*) lagging *financial performance* by one year (*t-1*); and (*iii*) lagging *customer satisfaction* by one year (*t-1*) and *financial performance* by two years (*t-2*), this research has established that there is a one year delay before *financial performance* reacts to changes in *service quality*.

Furthermore, the results suggest the importance of *airline productivity* as it shows both short- and long-term impacts on *financial performance* as both direct and indirect results of *service quality*. Results based on longitudinal panel data provide the opportunity to incorporate a time lag in the model to capture the effect of the independent variable on the dependent variable.

3. The *third* contribution of this study is its methodological rigor attributed to the measures and the analytical tool applied to explore the link between the nonfinancial and financial performance measures. This study develops an integrative framework that explores the links between multiple constructs with related manifest variables. This approach enhances our understanding of the simultaneous effect of more than one organizational factor on financial performance. To this end, this study uses PLS-SEM to help investigate the simultaneous effects of multiple variables (F. Hair Jr et al., 2014). The use of PLS-SEM is appropriate for this research because it enables the assessment of the cause and effect relationship among the multiple latent variables and their indicators. Notwithstanding the important benefits, and subsequent popularity, in other disciplines PLS-SEM is not widely applied in account research. (Lee et al., 2011). To address the complex issues in management accounting research, scholars recommend management accounting researchers to update their analytical skills (Chenhall, 2012). Consistent with such recommendations, this research contributes to management accounting literature by applying the PLS-SEM to predict the hypothesized relationship among the latent variables.

6.3.2 Contribution to Practice

The empirical findings of this research also have practical implications for airline managers and policy makers. The main practical contributions of are presented in this section.

The current business environment of the US airline industry is characterized by fierce competition and rapid technological change. As a result, airlines are under constant pressure to identify and sustain the source of their competitive advantage in order to survive in the market. This research (See Figures 24, 25, and 26) has explored the role of airline resource *productivity* in improving *service quality* and *financial performance*. Results suggest that it is crucial for airline managers to consider the factors that affect resource productivity as well as the effect of these factors on airline service quality.

The findings of this research also offer airline mangers insights into how to develop appropriate strategies to achieve competitive advantage. These findings can also help airline managers to assess their existing strategies. As the US airline industry strives to enhance its profitability, service quality is likely to become a more pressing issue for customers and policy makers. Under such an unpredictable business environment, it is crucial for airline managers to devise effective strategies to survive in the market. The results of this research suggest it is important for airlines to identify the key factors that affect *productivity, service quality,* and *financial performance* and to organize these factors in such a way as to make the airlines more effective when responding to the needs of their shareholders and other stakeholders, including customers.

This research provides additional insights into the links between efficiency in labor and aircraft utilization and service quality, and the subsequent effect on the bottom line performance. This knowledge could contribute to improvements in airlines performance due to better understanding of the interaction between resource productivity improvement initiatives and customers' requirements for high quality service, as well as their eventual impact on financial performance. The US airline industry is operating in one of the most developed economies in the world. The theoretical framework developed and tested using the US data in this research could be applied to airlines in other developed economies. The theoretical framework could also be used to conduct a benchmark study of airlines in developing economies, such as the airline industry in Ethiopia.

6.4 Limitations and Directions for Future Research

Despite the theoretical and practical contributions discussed above, this research also has limitations.

One limitation is that the dimensions of the *airline productivity* explored in this dissertation are not exhaustive. Future research should include measures to explore the effect of other resources, such as fuel efficiency (Liedtka, 2002; Tsikriktsis, 2007) on overall *airline productivity,* and the subsequent impact on *service quality* and *financial performance*. Furthermore, the RBV categorizes resources into tangible and intangible resources (Barney, 1991), which are generally classified into financial, technological, reputational, physical, and organizational resources (Grant, 1991). This research focuses on human and physical resources only. Consequently, further research that incorporates measures to explore the effect of other resources may shed more light on the impact of strategies to improve *productivity* on *service quality* and *financial performance*.

As noted earlier, ST broadly categorizes stakeholders as primary and secondary. Employees, capital suppliers, other resource suppliers, customers, and the community are considered primary stakeholders (Hillman and Keim, 2001). This research has investigated the effect of resource productivity improvement initiatives on *customer satisfaction,* customers being one of the primary stakeholders, and the subsequent effect on financial performance. Future research is therefore needed to explore the role of the other stakeholders not incorporated in this study with regard to the relationship between resource productivity, stakeholder satisfaction, and financial performance.

A further limitation of this study is that the sample size is limited to the seven airlines for which Customer Satisfaction Index (CSI) data are available for the sample period. The findings are also based on data collected from one country - the United States of America. It could be argued that these findings are therefore applicable to US airlines only. This limits the generalizability of the findings for airlines in other countries with different economic, social, and political environments. The sample for this study has been designed to cover only homogenous firms. This is important because the type of resources used, and the services provided, should be similar across the sample, so it is reasonable to put them in one homogenous sample. While this approach may limit the generalizability of the findings, it provides confidence that the results are not confounded by industry characteristics. In fact, the literature suggests that studies which focus on one industry provide an opportunity to obtain a thorough understanding of the factors and to better control the effect of industry related factors on the relationship among the variables (Amir and Lev, 1996; Behn and Riley, 1999).

Future research is therefore needed to replicate this study in other countries to explore if the findings hold in a different social and economic environment. It may enhance our understanding of the role of intervening variables in the link between performance measures. Another interesting venue for future research is a micro level study that investigates the research question for each airline. Such research would provide additional insights into the role of institutional factors in the link between performance measures.

Due to turbulent economic factors, mergers and acquisitions have been widely observed over the last decade in the US airline industry. Examples include the merger of US airways with

America West in 2005, Delta with Northwest in 2008, Continental with United in 2010, each having impacts on the performance of the acquiring carriers. Future research that conducts survival analysis of airlines would extend our understanding of the effect of mergers and acquisition on *productivity, service quality, customer satisfaction,* and *financial performance* in the airline industry.

Finally, this research is limited by the fact that it uses archival data. Archival data limit the "internal validity" of the study as they do not provide adequate bases to establish causal relationship among variables (Amy, 2008). To address this limitation, Shadish (2002) suggests that researchers need to identify and control all other alternative factors that affect the variables of interest. In this research, relevant control variables have been identified based on prior literature and have been integrated into the model to control for the effect of confounding variables and thereby to ensure the validity of the findings. Furthermore, the effect of time lags has been considered to explore the cause and effect relationship among the variables. Future research that combines archival data with survey or interview data provides the opportunity to enhance the validity of the links among productivity and service quality improvement strategies and their impact on financial performance.

Overall, this research is based on well-established theories. Moreover, relevant literature on performance measures in general, and on productivity, service quality, customer satisfaction, and the impact of each on financial performance, were reviewed to establish sufficient theoretical underpinning for the research. The data of this research have been analysed using a second generation statistical tool – the PLS-SEM. Alternative models have been developed and tested to enhance the robustness of the findings and to explore the causal link among the variables. Thus, this research contributes to the management accounting literature and to managerial practice, as justified above. Nonetheless, this dissertation has limitations that can be addressed in future research.

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Appendix: Profile of Sample Airlines

The sources of the profiles of the airlines are the websites of each airline.

American Airlines

American Airlines Inc. is the parent company of American Airlines and American Eagle which has a wide domestic and international network that makes the airline one of the major airlines in the US. It is one of the biggest airlines in terms of its numerous destinations, huge fleet size, and substantial revenue. *American Airlines* (AA) has a number of centers in the United States, the biggest of which is in Dallas.

AA started its operation in 1926 with a flight from *St Louis, Missouri* to *Chicago, Illinois* under the name All American Aviation. Its first commercial flight occurred in 1936 when, for the first time in US airline industry, a DC-3 came into service. The DC-3 is a passenger plane that has transformed the airline industry, allowing the diversification of its source of revenue by providing both airmail and passenger transportation services. AA was a pioneer in terms of building an airport and running its own lounge. Currently, AA's largest base is in New York City where it has its own terminal.

AA started flights to Europe after World War II under the name American Export Airlines. During the 1950s, this was the largest airline in the United States, and second largest in the world. AA was not only the first airline to introduce an electronic booking system, but was also the first to recruit a female pilot. It recorded another first when it introduced electronic ticketing in 1998.

In the 1980s, AA increased its destinations to European cities and Tokyo, Japan. During the 1980s, it was the second airline, after United, to fly to London, Heathrow. With a rise in the intensity of competition following the Airline Deregulation Act in 1978, in 1981 AA announced the *AAdvantage,* a customer loyalty program aimed at retaining existing customers and attracting new ones. In collaboration with other major airlines it initiated *Oneworld*, a global airline alliance. Throughout the 1980s, AA continued to expand its operations, connecting several cities in the US and across the world by launching a number of centers, including the Dallas/Fort Worth center, to cater to its services across Latin America.

In the 1990s, AA continued its growth both in the domestic market and internationally. It introduced advanced technologies to enhance customer service and modernize its services. For instance, AA introduced the *AAccess Ticketless Travel* and the *AAccess Boarding* in 1996.

The consequence of the September 11, 2001, terrorist attacks affected the airline hugely. The incidents demolished two of the airline's planes in addition to the tragic loss of the lives of 23 employees. Like the other US airlines, the September 11 terrorist attacks had a devastating effect on American Airlines. Subsequently, the airline condensed its centers, reduced plane seats to widen the space, and introduced standard services. In the meantime, it expanded its services by adding new routes to various cities in Asia. As a result, the airline registered a profit four years on from the September 11 attacks.

Likewise, the financial crisis of 2008 greatly affected the airline's operation. As a result, AA was forced to lay-off a substantial number of employees, abandon aircraft, and cut a number of flights. Furthermore, AA closed some of its facilities, including its overhaul base, maintenance stations, and repair facilities, which resulted in a reduction of its workforce.

During the 2010s, AA established a joint venture and partnership to secure antitrust immunity in Europe, to acquire arrival and departure slots, and to exchange traveler's loyalty miles in the regional operation. Furthermore, AA increased its number of destinations in Asia and the Pacific to include Shanghai, Seoul, and Hong Kong. This was the first nonstop flight to China from Dallas.

In 2013, AA and US Airlines merged to create the largest airline in the world. Currently, American Airlines Group represents the new company retaining its American Airlines name and brand. Today, AA operates in 10 airports with Dallas Fort Worth International Airport, Charlotte Douglas International Airport, and O'Hare International Airport being the largest centers in terms of number of flights per day.

Source: https://www.aa.com/intl/fr/aboutus/history.jsp

Continental Airlines

Continental Airlines, established in 1934 with a small aircraft that carried four passengers, is one of the major US airlines. Like the rest of the US airlines, Continental's main source of revenue was originally from mail transport, managed by the US Post Office.

During World War II, US airlines were involved in transporting military personnel to support the war and this provided the opportunity for Continental to earn more profit from non-mail services. Subsequently, Continental expanded its operation by connecting several cities in the US and acquiring new aircraft. The merger with Pioneer airlines in 1955 created further opportunity for Continental Airlines to fly to many cities in the United States.

In 1960, Continental Airlines raised its passengers miles by 300% compared to its status in 1956. This was a result of its expansion in domestic services and the start of its international flights and subsequent efficient use of its aircraft. Continental's expansion continued during the Vietnam War as it was heavily involved in transporting the US military. Consequently, it established Air Micronesia as its first subsidiary in 1968, and this remained operational until 2010. In 1970, Continental Airlines started using Boeing 747 aircraft for its domestic flights, in addition to DC-10, 727-200, and DC-9-10 aircraft. During the 1970s Continental continued to expand its operations flying long distance routes within the US.

Following the Airline Deregulation Act in 1978, Continental Airlines focused on expanding profitable routes. As a result, its performance steadily improved over the years. In 1981, the airline was acquired by Texas Air Corporation. Following this acquisition, Continental merged with Texas International in 1982 and thereby created another market opportunity with its routes expanding across America, Australia, and Asia. The merger with Texas International also expanded the number of aircraft leading to expansion of its existing hubs and routes.

Despite its expansion, Continental Airlines started to experience financial challenges during the early 1980s. Further, after acquisition by Texas Air Corporation, the new management of Continental had a strong views about cutting labor costs. After a lengthy legal process, Continental declared bankruptcy in 1983. Following its bankruptcy, Continental was reorganized with a reduced number of employees and it became very competitive and profitable with a record profit of $50 million in 1984.

In 1985, Continental Airlines carried out its first international service to Europe/London. Its expansion to Europe continued with its flight to Paris. Consequently, Continental Airlines reported improved performance evidencing its recovery from bankruptcy in 1986. Furthermore, People's Express, Frontier, and New York Air merged with Continental in 1987, again expanding Continental's local and international services and making it the third largest airline in the United States. Despite its expansion, Continental's service quality was declining, leading to increased customer complaints.

In 1987, Continental Airlines introduced a frequent flyer program called *OnePass.* However, the performance of Continental was volatile. Two months after its recovery from bankruptcy, Continental reported a $24 million loss. Consequently, it cancelled its services to nine routes in the US and to six international routes. It also laid off 2500 employees in 1994. During this time, Continental was ranked among the poor performers. However, these cost cutting decisions helped Continental to survive and maintain its competitive position.

From 1998, Continental Airlines re-launched its expansion program to international destinations including Ireland, Japan, Israel, Switzerland, and Zurich, using Boeing 777 aircraft which allowed it to provide long distance non-stop flights. It also signed cooperation agreements with *Northwest, America West, Avant, Cape Air and Transbrasil Airlines*. It continued expanding by introducing a non-stop service in 2000. It further expanded its services to Beijing (China) in 2005, and a daily non-stop flight to Mumbai (India). As a result, Continental's passenger traffic continued to grow, making it the fourth largest carrier in the US.

Continental Airlines started to revive from its worst performance to be one of the best carriers in the US. Its stock price improved from $2 to $50. It became one of the award winning airlines for customer satisfaction and was ranked as one of the best organizations to work for by the Fortune Magazine. In fact, it was named *the most admired Global Airline* for the years 2004, 2005, 2006, 2007, and 2008.

Following the economic recession in 2008, Continental Airlines reduced its work force by 3,000 and cut the salaries of the remaining staff. It also reduced its capacity by retiring over 60 aircraft. This led Continental to incur substantial costs due to retirement benefits paid to pilots. By the end of 2009, Continental had 41,300 employees, of which 4195 represented management, 4270 pilots, and 8740 flight attendants. Continental Airlines merged with United Airlines in 2011.

Source: http://continentalairlinesguide.com/history/

Delta Airlines

Delta Airlines started its operation as a private commercial aerial crop dusting company in 1924. Since then it has evolved to become one of the largest global airlines, transporting around 180 million passengers per year, using more than 800 aircraft, with 15,000 daily flights. Currently, Delta is headquartered in Atlanta, Georgia and flies to 330 destinations on all continents except Antarctica. Delta is the pioneer of the *SkyTeam* marketing alliance. In its many years of service, the company has not only acquired a number of airlines, but has also merged with other airlines.

The aerial crop dusting service was not limited to the US, rather it went further to Peru. In 1929, Delta Airlines started its first passenger service with a five person aircraft. Delta also launched mail services in the 1930s. Since 1934 it has retained its current name "Delta Airlines". Then, Delta began its first night service. In 1936, the airline started to serve meals to passengers.

With the introduction of the Douglas DC-2 and DC-3 aircraft, flight attendants started serving passengers with meals and drinks. In 1942, Delta assisted the military by providing training for pilots and technicians and transporting supplies. In 1946, Delta Airlines started its cargo service. Delta was able to run its operation without any fatal accidents to either passengers or crew and in 1945 and 1947, Delta was well recognized for this excellent safety record.

The 1950s were marked by a number of developments for Delta. In addition to a wide range of domestic destinations, Delta launched international flights to the Caribbean and Caracas. Furthermore, the airline introduced a customer recognition program. X-ray machines were used for the first time to inspect aircraft in addition to the customary visual checks carried out. In the same way, the airline started to use forklifts and conveyer belts for cargo as well as truck lifts to assist passengers. Delta was the first airline to use the Douglas DC-8 jet and to serve meals on its cheaper flights. Delta was also the first to enable passengers to travel to their destination using its own connecting flight.

The 1960s was the decade when Delta began to use computers and jets. The major milestones of the decade were the opening of the biggest indoor maintenance facility and the introduction of: the Convair 880 jet, nonstop flights from Atlanta to Los Angeles, flexible cabins for business class and economy, “instant” reservations, the fastest flight, the Douglas DC-9 service, and baggage allowance. Delta ceased its commercial agricultural operation at the end of the decade. The airline was once again recognized for its safety record.

During flight passengers were able to entertain themselves with audio music and with inflight magazines. Later, in 1975, passengers started to enjoy movies. The airline had high customer satisfaction and fewer complaints. In 1973 Delta bought Boeing 747 aircraft in addition to its existing Douglas DC planes. 1975 was marked with the commencement of Cargo services through Delta Air Express. Following the enactment of The Airline Deregulation Act in 1978, Delta started to fly to Europe.

Delta Airlines transported military supplies during Desert Storm in 1991. The airline had fewer customer complaints than any other airline for 17 successive years. Delta Airlines introduced the latest inflight technologies, such as live news, telephones, individual video monitors, and moving maps that show passengers the route being traveled. Frequent passengers were rewarded with free tickets or upgrades. In addition, passengers were served with seasonal menus. Delta Express commenced its operation as a low fare airline. In 1999, Delta was recognized as Global Airline of the Year and Best Managed Airline.

Throughout the 2000s, Delta faced a number of challenges. On the one hand, it became a member of SkyTeam, established delta.com, placed an order for 500 jets, launched self-service check-in machines, and carried the Olympic torch. On the other hand, following the

September 11 attacks, the airline reported a financial loss. It took measures to avoid further financial losses by cutting jobs, reducing salaries and other costs, and adjusting its flight schedule. Hence, it started selling food on selected flights. With the introduction of improved schedules, timely departure was better and more evenly distributed throughout the day. It purchased oil fields and so produces fuel for its aircraft. Those measures helped the airline to return to profitability in 2007.

Northwest Airlines merged with Delta in 2008 which created the opportunity to form the world's largest airline and which flies to all continents.

Source: http://money.cnn.com/quote/profile/profile.html?symb=DAL

Northwest Airlines

Northwest Airlines was established in 1926 in Detroit, with the main purpose of transporting airmail for the United States Post Office. Like the other airlines in the United States, Northwest expanded its operations after World War II by opening several centers in the US and in other countries. It ceased its operation in 2010 after its merger with Delta.

After one year of mail transportation, Northwest started its passenger transport service in 1927. It was quick to expand both its domestic and international operations. For instance, Northwest launched its first international flight to Winnipeg, Canada in 1928. Furthermore, in 1930, Northwest continued expanding its domestic routes by connecting several cities in the US.

In 1931, it started flights from New York to Tokyo, further expanding such service throughout World War II by transporting the US military. The experience of Northwest in this region enabled it to secure the routes that cover the North Pacific region.

Northwest Airlines continued to expand both domestically and internationally. In 1947, it launched its first international flight to Japan. It further expanded its route to Seoul via Tokyo and to China. In line with the growing demand for its services and to enhance the comfort of its customers, Northwest acquired Boeing 377 aircraft in 1949 for use on its routes from the US to Japan. In 1952, it added DC-6B aircraft to service its flights from Japan to the Philippines. In addition, Northwest continued adding more aircraft, such as the Boeing-720, the Boeing-707, and the Boeing 747, to its operations in the 1960s and early 1970s.

As a result of its several years of flights to Japan, Northwest Airlines developed into a strategic partner with Japan Air Lines. This is strengthened by the joint agreement between the United States and Japan that allows Northwest Airlines and Pan-American Airways to fly to Tokyo. Furthermore, the joint agreement allows these airlines to use Tokyo as a stopover hub for their flights from the United States to various countries in Asia.

Northwest Airlines is also known for being the first airline to introduce weather forecasting technology in 1957. In addition to using this technology in-house, Northwest also provided forecasting services to other airlines.

Following the Airline Deregulation Act in 1978, Northwest Airlines further expanded its operations by launching non-stop flights to Asian and European countries. Its capacity also grew substantially as a result of a merger with Republic Airlines in 1978. The merger created access to routes which allowed Northwest Airlines to improve its market share of 80%. In 1986, Northwest opened centers at Detroit and Memphis airports to add to its main center in Minneapolis.

During the period between 1990 and 2000, Northwest Airlines continued to improve its operations to boost customer comfort while managing its costs. This is evidenced by its introduction of self-service check-in kiosks in 1997 and internet check-in 2000. These improvements helped Northwest Airlines to enjoy growth and profitability throughout these years.

The terrorist attacks of September 11 substantially affected the performance of Northwest Airlines. It took several cost cutting initiatives, including employee reduction, and reduction in its capacity by the removal of old aircraft and replacement with new ones. It also eliminated some of its inflight services. In spite of these cost saving actions, the performance of Northwest continued to decline and ultimately led it to declare bankruptcy in 2005. In 2007, Northwest Airlines revived from bankruptcy after two years of bankruptcy protection.

Northwest Airlines was also heavily involved in cargo transport with a cargo aircraft (Boeing-747) flying from the US to different cities in Asia, Europe, and many others around the world.

In the 1980s, Northwest Airlines was the only American airline flying to Oslo, Copenhagen, Stockholm, and Glasgow. Northwest Airlines expanded its destinations to include Australia in 1991, and later to include Rome in 2000. It further added non-stop flights to Beijing and to Shanghai during 1996-2002.

In its bid for expansion and to increase its destinations, Northwest Airlines entered code sharing agreements with a number of airlines within the US, such as Alaska Airlines and American Eagle, and airlines from other countries including China Airlines, Kenya Airways, Korean Air, and Japan Airlines.

With the rise in competition and customer preferences, Northwest Airlines introduced the *"World Business Class"*, more commonly known as *business class* among other airlines, on its international flights. This was not provided by all aircraft due to differences in configuration. Thus, Northwest was using its Airbus-A330, Boeing-747, and Boeing 757 to provide the *"World Business Class".* Northwest was also providing a similar service to its domestic customers.

In 1981, Northwest Airlines introduced a loyalty program known as Northwest Orient Airlines Free Flight Plan, later renamed "*WorldPerks"*, designed to retain its regular passengers. Using *WorldPerks*, customers can accumulate points to allow them to upgrade their flights from economy class to first class, or to enjoy discounts when using Northwest's services.

Northwest was the sixth largest US airline before its consolidation with Delta. Northwest ceased operation in 2010 after its merger with Delta.

Source: http://www.deltamuseum.org/exhibits/delta-history/family-tree/northwest-airlines

Southwest Airlines

Southwest Airlines is the largest low cost airline that transports the highest number of passengers in the US. It was founded in 1967 under the name *"Air Southwest"*. Its name was changed four years later to its current name. Currently, Southwest's headquarters is in Dallas, Texas. *Southwest Airlines* flies to 98 destinations using 572 aircraft. Every day it operates 3,800 flights, using each aircraft at least 6 times a day.

Southwest Airlines started its operation by flying between eleven cities within Texas. Following the Airline Deregulation Act in 1978, the airline became an interstate carrier and started to fly to Tulsa, Oklahoma, Albuquerque, Kansas, Phoenix, and Las Vegas. In other words, *Southwest Airlines* began to fly to the north and west. Between 1983 and 1999, the airline added 18 more local destinations to both the north and the south of the US.

The financial performance of Southwest during its first two years of operation was weak. However, Southwest improved its financial performance in the subsequent years by expanding its operations and implementing cost saving strategies. Consequently, Southwest acquired *Muse Air* which was operational as its subsidiary until it was sold after two years. Likewise, in 1992 Southwest purchased *Morris Air* and extended its destinations. Similarly, Southwest acquired *AirTran Airways* in 2010 and the purchase was later approved by United States Department of Justice in 2011. The acquisition of *AirTran* afforded Southwest the opportunity to add more destinations and landing slots.

Southwest's mission is to "*Connect people to what's important in their lives through friendly, reliable, low cost air travel. It endeavors to achieve this mission with a view of becoming "the World's most Loved, Most Flown, and Most Profitable Airline"*, as set out in its vision statement. Southwest is well recognized for its management capability and considered by many as a model low cost airline. The success of the airline emanates from high productivity and low cost. Southwest uses one type of aircraft – the Boeing 737.

Source: https://www.southwest.com/html/about-southwest/

United Airlines

United Airlines Inc. is a major US passenger and cargo airline that connects 60 countries using 719 aircraft. It is a member of Star Alliance, a marketing and code sharing team. United is owned by *United Continental Holdings*.

Founded in 1926, United started operations after five years. In terms of the number of destinations concerned, it is the world's largest airline. It has 235 domestic and 138 international destinations, and 4564 daily departures, which make it one of the world's most comprehensive route networks. United has nine airline hubs (eight domestic and one international in Tokyo, Japan) as well as maintenance facilities. It has around 86,000 employees around the world. United Express, an independent carrier, serves domestic flights using 510 planes.

Due to the increased number of travelers in the 1940s and 1950s, United was generating high profits and growing fast at this time. In order to train aircraft pilots in a modern way, United purchased a flight simulator in 1954, making it the first airline to have such technology. In 1961 United Airlines and Capital Airlines merged. This arrangement allowed United to remain one of the largest US airlines. Subsequent to the Airline Deregulation Act in 1978, and the labor dispute and economic crisis in the 1970s, United suffered financial losses.

United Airlines was the first US airline to use Boeing 767 and Boeing 777 aircraft. It extended its destinations by acquiring new routes to Asia and Europe. However, in 1991-92 the airline once again faced financial losses because of competition and war in the Middle East. With a view to tackling the competition, United Airlines introduced a low cost carrier which operated until 2001. By introducing a special arrangement, employees of United owned 55% of the airline stock.

The September 11 terrorist attacks substantially damaged the performance of United Airlines by destroying two of its aircraft. Likewise, the high cost of fuel, economic crisis, and reduction in demand aggravated the situation. As a result, United suffered a huge financial loss. The management took several measures to improve the situation, for instance reducing the labor force, shutting down facilities (ticket offices and maintenance facilities), abandoning some routes, and reducing its number of flights. United again launched a low fare carrier, Ted, in 2003 which was closed again in 2008.

United evolved into the largest airline after merging with and acquiring a number of airlines in the US. Recently, in 2010, Continental Airlines merged with United Airlines. Currently, United is working under the "Fly the Friendly Skies" slogan. United Continental Airline's headquarters is located in Chicago, Illinois, US. United Airlines owns other facilities, such as international hotel chains and car rental services.

United flies to 60 countries across Africa, Latin America, Asia, Europe, and Oceania. It also has extensive local destinations connecting different cities in the United States. Its flights to Asia include such destinations as Japan (Tokyo), China (Beijing, Chengdu, Xian, Hong Kong, and Shanghai), and Singapore; it covers 27 cities in Europe, departing from Chicago and Newark; its Middle Eastern destinations include, Bahrain, Doha, Qatar, Dubai, and Tel Aviv. It also flies to Oceania, i.e., Australia (Melbourne and Sydney) and New Zealand (Auckland).

Source: https://www.united.com/web/en-US/content/company

US Airways

US Airways was once one of the largest airlines in the US, it was established in 1937 and ceased its operation in 2015 following its merger with American Airlines. US Airways was originally known as All American Aviation, until 1949 when it changed its name to All American Airways, then to Allegheny Airlines in 1953, to US Air in 1979, and finally to US Airways in 1997.

In response to the increasing demand for air travel services, US Airways grew its capacity by absorbing Lake Central Airlines and Mohawk Airlines in 1968 and 1972 respectively. US Airways was also the first to start a code sharing agreement with Henson airlines in 1975.

Following the Airline Deregulation Act of 1978, US airways expanded its operation by acquiring new aircraft with higher capacity and better comfort for passengers. It was heavily committed to using DC-9 aircraft until it added the Boeing-737 to its fleet in 1984. As deregulation freed airlines to enter into mergers and acquisitions, US Airways acquired *Pacific Southwest Airlines and* the *Piedmont Airline* in 1986 and 1987 respectively.

In the 1990s US Airways further expanded its operation by flying to Europe through bilateral agreements with European airlines. This created access to several centers in various cities in Europe. To cater for the route expansion, US Airways acquired several aircraft, including the Airbus-320 and the Airbus-330.

The closure of Washington National Airport subsequent to the September 11 terrorist attacks substantially affected the financial performance of US Airways. This is because the Washington National Airport was one of the biggest hubs for the airline. As a result, US Airways entered into bankruptcy in 2002. However, its performance was improved within one year due to the cost cutting actions taken by management and financial support provided by the government. Not long after its revival from bankruptcy, the airline again suffered from financial losses in 2003 and was forced to again declare bankruptcy in 2004. Following its financial challenges, it merged with American West Airlines in 2005 to form a new entity known as the *US Airways Group.*

The merger with American West boosted US Airways operation by creating access to the western US. Further, through its code sharing agreement with United Airlines, US Airways expanded its services to many cities in the United States. It also entered into code sharing agreements with American Airlines to provide its services in Asia, Australia, and the southern US.

US Airways uses a passenger loyalty program known as Dividend Miles - a frequent flyer program that was in use until the merger with American airlines. After the merger, the dividend miles were converted into the Advantage program – a frequent flyer program of American Airlines. US Airways ceased operation as a separate entity following its merger with American Airlines in 2013.

Source: http://www.airreview.com/USAirways/History.htm