Incremental Information Content of Financial and Non-Financial Performance Measures

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ABSTRACT

Previous research has yielded mixed results concerning the connections between financial and non-financial measures of performance; furthermore, the relative value of these measures has yet to be effectively investigated. This paper contributes to the discussion of non-financial metrics by investigating the predictive value of multiple non-financial performance measures as compared to financial performance measures. This analysis includes quarterly panel data gathered from 31 US airline companies during the period of 2003-2007, to test the hypothesis that non-financial measures are in fact leading indicators for lagged financial performance and therefore have greater incremental information content than that provided by financial measures.

The results of this study indicate that various non-financial performance measures can be leading indicators for lagged accounting numbers. Consequently, non-financial measures have an incremental information content advantage over conventional accounting numbers. Finally, the lag-search results suggest that the benefits in improving non-financial measures of performance would take place in the short-term. Thus, they can be included in managers' compensation plans to encourage enhanced performance.

Keywords: Non-financial performance measures, Incremental information content, Balanced Scorecard.

1. INTRODUCTION

Researchers suggest that performance measurement systems, developed as a means of supervising and sustaining organisational control, guarantee that firms aim at strategies that ensure accomplishment of both goals and objectives. Management accounting researchers define performance measures as key instruments in "performance measurement" systems that support management in predicting future fiscal performance in addition to helping to highlight possible changes in operations to maintain congruence with the intended strategy (Otley, 1999; Simons, 1999).

Academics and professionals agree on the significance of performance measure selection decisions for any organisation, since unwisely selected measures usually lead to serious risks that include unsuccessful implementation of an organisation's strategy, unsound

judgments and thus undesirable consequences. These hazards could be avoided by developing reliable measurement methodologies that encompass non-financial measures, characterized by value relevance and predictive value, to be used as reliable indicators of prospective shareholder value (Kaplan and Norton, 1992; 1996; Ittner and Larcker, 1998; Chambers 2003, Chu et al., 2011, and Tung et al., 2011).

It is argued that if a performance indicator gives incremental information about executives' decisions then it should be incorporated into managers' evaluation and therefore their remuneration (Holmstrom, 1979). However, Simons (1990, 135) states, "Managers have neither the time nor the capacity to process all the information available to them". For that reason, management accounting reports and particularly management control systems should embrace the most informative measures. Many accounting academics consider information content as a measure by which information can be filtered efficiently and effectively and thus limit potential information overload (Biddle et al. 1995).

The majority of incremental information content

studies address either stock with abnormal returns or stock prices on multiple financial measures, such as cash flow from operations, earnings, or EVA. There are also studies that suggest that incremental information content of performance is a fundamental criteria to choose which measures to report especially within the field of external reporting and financial accounting from the investors' point of view (Wilson (1986; 1987); Bernard and Stober (1989); Bowen et al. (1987); Jennings (1990); Ali (1994); Ali and Pope (1995); Biddle et al. (1995; 1997)). Biddle et al (1995) acknowledge the importance of relative and incremental information content tests at the company level whilst assessing different performance measures for management accounting purposes e.g. managerial control or managers' remuneration. Studies in the management accounting sphere focus on either one or two non-financial measures. These measures include service area population, the penetration of the firm into the service area (Amir and Lev, 1996) customer satisfaction (Ittner and Larcker, 1997), employee satisfaction and delivery punctuality (Wiersma, 2008).

The purpose of this study is to shed further light on the importance of non-financial information, specifically its utility in predicting changes in the financial performance of firms. This is realized through the examination of the incremental information content of multiple non-financial measures in line with the Balanced Scorecard categories compared to financial perspective measures to explain future financial performance measures, namely: operating revenues, operating expenses, and operating cash flows.

This study contributes to the existing literature as follows: firstly, we examined the expected associations that could exist between the current financial performance measures and lagged multiple non-financial measures while controlling for lagged financial performance. Secondly, we conduct a lag search to identify the required time lag between productivity and efficiency changes on one hand and the changes in future financial performance on the other.

2. Literature Review

Tung at el. (2011) conducted a study in order to examine the association between the use of multidimensional performance measures and four organizational factors with the effectiveness of performance measurement systems (PMSs). To this end the study utilized mail survey questionnaire from a random sample of 455 senior financial officers in Australian manufacturing organizations. The results revealed that the use of multidimensional performance measures is associated with two dimensions of the effectiveness of PMSs (performance and staff related outcomes). The results also revealed that organizational factors were associated with the effectiveness of PMSs. Specifically; top management support was found to be associated with the effectiveness of PMSs in respect to the performance related outcomes, and training was associated with the staff related outcomes.

Fullerton and Wempe (2009) examine how utilization of non-financial manufacturing performance (NFMP) measures impacts the lean manufacturing/financial performance relationship by using a structural equation model (SEM) is estimated using data provided by 121 US manufacturing executives. In addition to examining direct effects, the study examined whether NFMP measurement mediates or moderates the lean manufacturing/financial performance relationship. The results provide substantial evidence that utilization of NFMP measures mediates the relationship between lean manufacturing and financial performance.

Currently, companies are implementing new incentivising innovations in management accounting such as Activity Based Costing, Balanced Scorecard or Total Quality Management, which help to boost their efficiency and effectiveness. It is reasonable to suggest that users of published accounting reports anticipate productivity changes to be reflected in the financial figures as research suggests that non-financial measures such as productivity, efficiency, and operational measures are the leading indicators for lagged financial performance measures (Ittner and Larcker, 1998).

The general purpose of financial figures is to convey indicative information to different users: shareholders, creditors, potential investors, and analysts as well as internal users. These users' primary interest is in companies' performance and they use financial data in their decision-making in line with their motivations. However, the prominence of these financial numbers as measures of performance has actually declined due to various well-established inherent drawbacks (Otley 2003; Horngren, 2004; Parmenter, 2007).

Productivity and efficiency measurement is central to the evaluation of a company's performance the practice of which has become increasingly important in recent years. Various techniques are employed for different

measurement applications. With a well-defined and appropriate non-financial measure, apposite to the industry being examined, a great deal of information concerning the companies' performance can be obtained.

Neely and Bourne (2000, p.6) state that "…In the 1980s and early 1990s, the fundamental problem was that we were measuring the wrong things. Now the problem is that we are measuring too much", Simons (1990, 135) states, "Managers have neither the time nor the capacity to process all the information available to them". With this in mind, management accounting reports and particularly management control systems should include the most informative measures. As a result of multiple managerial responsibilities, top level management does not have the time to engage itself with information processing and so this is left to a limited lower group of the firm's formal management control framework (Simons, 1990).

Also Viaene and Willems (2007, 16) state, "In view of the massively available potentially interesting information floating around, highly efficient and effective filtering mechanisms are essential for supporting contemporary organisational management". An efficient and effective filter to limit information overload, suggested by many academics in the accounting literature is filtering by information content. Information is defined as a "change in expectations about the outcome of an event" Theil ((1967) in Beaver 1968) while Beaver's (1968) study concerning annual earnings announcement argues that an annual report is considered to have information content if it entails change in the investor's evaluation of the expected future returns or prices.

Malina and Selto (2004, p.452) define informative measures as "performance measures that differentiate managers facing similar and uncontrollable factors''. Put simply, information content evaluations seek to examine whether one measure (e.g. non-financial measure) provides information beyond that given by another or other measures (e.g. financial measures) while relative information content makes judgments related to which measure has greater information content (Biddle et al., 1995).

Few empirical studies have tackled the issue of information content in managerial accounting as most studies addressing information content have been undertaken to examine expected associations between stock prices or returns and varying financial measures for example; cash flows from operation, net sales, earnings,

EVA, and residual income (Biddle et al. 1995; 1997).

The growing body of management accounting literature argues that current non-financial measures are better forecasters of long-term financial performance than those current financial measures. They have the facility to give information not enclosed in contemporary accounting metrics i.e. they have "predictive value", and those measures reveal and gauge causal value creation by the organization's "value drivers". Therefore they help managers to focus on the long term effects of their actions. However, little empirical proof is available on the relationship between non-financial measures and financial performance (Ittner and Larcker, 1998; Banker et al., 2000).

These studies have also examined the link between the use of non-financial performance measures and future financial performance, reporting varying results. Schefczyk (1993) investigated the relationship between cost efficiency and profitability for 15 international airline companies, concluding that factors such as high operational efficiency, high passenger load factor, and high percentages of passenger revenue foretell high profitability. This is further supported by Anderson et al. (1994, 1997) who report that customer satisfaction in 77 Swedish companies is positively related to accounting rate of return for the same period but found negative relationships in service companies. Similarly, research by Ittner and Larcker (1998) report that customer satisfaction measures are the leading indicators of future growth in customer base, changes in business unit accounting performance and current market values consistent with Behin and Riley (1999). In the context of the airline sector, they argue that financial statement numbers are lacking information content due to considerable fixed costs associated with the acquisition and operation of their aircraft. Consequently, they affirm non-financial performance metrics could assist in avoiding such a deficit by signifying financial performance. However, Behin and Riley (1999) use one and two months of nonfinancial data from seven major airlines to predict the same quarter revenues, expenses, and operating income while we employ quarterly data from a larger sample to predict the following next four quarters financial performance seeking for incremental information content as we assume that it takes more than two months to reflect enhanced operational performance in the form of financial outcomes.

Additionally, Banker et al. (2000), find positive

associations between customer satisfaction measures and future accounting performance in 18 hotels. It should be mentioned that these results vary by industry and despite these positive relations; there are cases of negative or even absence of associations at all.

Managerial accounting is developing to include additional strategic approaches that highlight the detection, measurement, and managing of the key financial and non-financial drivers of strategic success and shareholders' value (Institute of Management Accountants, 1999). The most important explanation for the utilization of non-financial performance measures is that they are the leading indicators of financial performance, in other words they predict the direction of the financial outcomes and they provide information incremental to that in historical financial performance (Banker et al. 2000). However, there are mixed results as demonstrated by Ittner and Larcker (1998) who suggest that many firms did not find a significant association between customer satisfaction and accounting or market returns, in contrast Anderson et al. (1997) argue that customer satisfaction measures are positively related with current return on investment measure (ROI). Kaplan and Norton (1992) argue that current non-financial performance measures are better indicators for future financial performance compared to financial performance measures. Furthermore, Banker et al. (2000) document that measures of customer complaints and returning clients are leading indicators of financial measures such as profit and revenues in the hotels industry.

In the same way, Najar and Rajan (2001) examine the ability of non-financial performance information to forecast and predict future financial information. In particular they investigated the relationship between future sales (financial information) and product quality measures (namely defect rates and on-time delivery) for eleven plants belonging to an industrial Fortune 500 firm. It was observed that financial quality measures and non-financial quality measures include considerable information about future sales and consequently have the potential to predict sales one quarter in advance. In contrast, non-financial measures contain significant additional forward-looking information beyond financial quality measures suggesting an integrative relationship between financial and non-financial measures and the relative information content of the non-financial measures compared to the financial indicators. In support of this, Liedtka (2002) argues that non-financial

performance measures offer information not already provided by a comprehensive set of financial performance measures. This is consistent with Amir and Lev (1996) and Riley et al. (2003) who suggest that when both financial and non-financial performance measures are included in a model, the analysis indicates that non-financial measures show explanatory power incremental to that contained in accounting financial metrics. In the same vein, Ittner et al. (2003) argue that non-financial performance metrics are presumed to present superior information on strategic improvement and achievement. Consistent with these arguments, numerous accounting researchers provide evidence to demonstrate that non-financial measures can be considered to be leading indicators of lagging financial performance (e.g., Ittner and Larcker, 1997; Banker et al., 2000). In other words, non-financial measures can predict the direction of financial measures.

The majority of previous studies have examined linkages between the use of a single or several non-financial measures with financial outcomes represented by stock returns or prices. However, the serious difficulty faced by such studies is the availability of data. Therefore, most of the performance measurement studies depend on self-reported instruments of organizational performance rather than actual financial and non-financial performance.

There have been serious concerns about using stock returns and prices as a single financial measure for the purpose of managerial control and compensating managers. Specifically, Baiman (2006) argues that contracting theory provides general argument that stock based performance measurement may not be the most favourable for performance measurement and rewarding managers since markets aggregate publicly available financial information in a different way than that used by organisations for the above tasks.

Baiman (2006) adds three arguments contrary to the assertion that stock-based performance evaluation and compensation is always optimal. Firstly, stock prices are affected by many managers' actions and thus reflect many factors not essentially appropriate for appraising managers. Secondly, stock prices eliminate privately held information that possibly enhances executives' performance. Finally, earnings management literature provides evidence that management is capable of manipulating stock prices especially in the short term. Biddle et al. (1995) acknowledge that when examining

for incremental and relative information content in order to evaluate different performance measures for internal control purposes, it is useful to assess these specifications for dependent variables different to stock prices and returns.

A number of researchers report an increased organisational use of non-financial measures such as customer satisfaction, product quality, market share, lead time, on-time delivery, product returns and intellectual capital for performance measurement and rewarding managers in the last decade (Kaplan and Norton 1996; Ittner, Larcker and Rajan, 1997; Ittner and Larcker, 1998). Despite the substantial work that has already been undertaken by the accounting profession on performance measurement (Bititci et al., 1997) there is an obvious need to look at just how informative non-financial measures are compared with conventional financial performance metrics. For instance; Ittner and Larcker (1998, p. 226) state that "predictive validity is one of the key attributes of interest when selecting performance measures, from an accounting standpoint, a crucial test is whether a broad set of non-financial measures such as employee satisfaction, employee turnover, product cycle time, and supplier relations possess incremental ability to predict future financial performance, after controlling for the predictability of past financial performance". Furthermore, it is well documented in the current literature that high-quality relevant performance information will lead to informed decisions, better planning and superior managerial actions (Neely and Jarrar, 2004).

This study deals firstly with the importance of non-financial information concerning its utility in predicting changes in the financial performance of firms. And secondly with the examination of the incremental information content of multiple non-financial measures along with the Balanced Scorecard categories compared to financial perspective measures to explain future financial performance measures, namely operating revenues, operating expenses, operating cash flows. It is postulated that these productivity and efficiency changes could affect the financial figures; therefore, they could have incremental ability to explain changes in future financial performance.

With this in mind, this paper aims to provide preliminary answers to the following research questions:

-       Are non-financial measures superior to current financial performance measures in explaining future financial performance?

-       Do components unique to non-financial perspectives of performance help explain future financial performance to a greater extent than the information contained within the financial measures?

3. Research Method
3.1. Sample and Data Collection:

Mixing organisations across industries in this kind of study is considered problematic. For instance, the complications of constructing metrics that consider the same concept in different environments and the undesired noise in data might make the associations we are looking for indistinguishable. Therefore the research setting has been limited to the airline industry in the USA to avoid such problems and to capitalise on the availability of published data. Although this selection minimises the utility of the research results for making generalized conclusions, it is well documented in the literature that studies of non-financial measures usually cover one case study industry rather than a varied number of industries. For example, Amir and Lev (1996) argue that a study of non-financial information irrefutably concentrates on a given industry, given that such information is characteristically industry-specific (e.g., load factor in airlines, store capacity for retailers). In support of this, Kaplan and Norton (1996) argue that although firms have built up several new measurement systems, non-financial measures differ widely among industries in terms of their nature and type. In other words, each industry has distinctive business drivers that assist urge value formation. In contrast, Devinney et al. (2005) claim that the different measures do not need to be consistent because organisations are heterogeneous rather than homogeneous, even within the same industry, as different companies may stress and concentrate differently on alternative measures.

In order to achieve as representative a sample as possible, 31 airline companies in the United States were selected representing more than 85% market share and number of employees. This amplifies the assertion that this sample of companies would make inferences applicable at the industry level. Moreover, the homogeneity of the organizations under scrutiny provides a viable context for understanding the hypothesised associations between different perspectives of non-financial performance on the one hand and financial performance on the other. All data used in this study is

available and published either on the companies' websites, Department of Transportation website or Edgar webpage of the SEC website; hence this study makes use of actual financial and non-financial performance data rather than depending on self-declared instruments of organisational performance.

A panel data set of 19 quarters ranging from the first quarter of 2003 until the third quarter of 2007 from all 31 companies was collected and the observations mined from Bureau of Transportation Statistics databases/U.S Department of Transportation including number of employees, trainers' and instructors' expenses, on-flight expenditures, enplaned passengers, amounts of fuel issued, departures performed, airtime flown, available seat miles, revenue passengers' miles and many other non-financial measures. This was in addition to quarterly financial data comprising operating revenues, operating expenses and operating cash flows. Aggregation has already occurred for non-financial measures as they were disclosed on a monthly basis and accordingly a longitudinal method is employed in this study.

In order to evaluate the methodology employed, this study attempts to examine the extent to which non-

financial performance measures, in the period (t-i), are able to predict future accounting measures in the period (t), after controlling for accounting measures in (t-i) by identifying the linking of non-financial measures with three financial measures namely operating revenues, operating expenses and operating cash flow. Our dataset serves this purpose efficiently as it includes detailed information about three non-financial performance perspectives coupled with the financial perspectives and the Balanced Scorecard.

3.2. Measurement of Variables

Figure (1) contains a condensed description of variable measurement. Dependent variables have been normalized i.e. operating revenues, operating expenses, and operating cash flows by the size of the firm in total assets. Seasonality has been taken into account by defining the variables as the percentage change in the variables' value compared to the same quarter in year t-1. Figure (1) illustrates the suggested classification of the performance measures along with Balanced Scorecard notion (Kaplan and Norton, 1992; 1996).
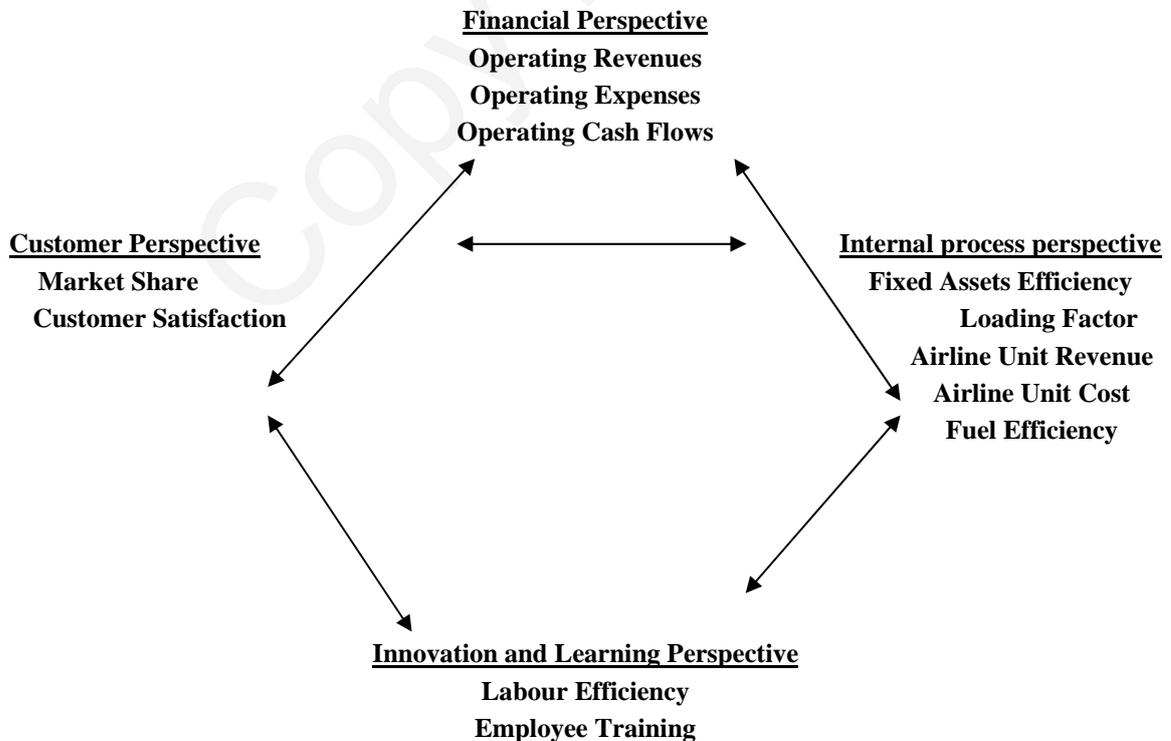

Figure (1)

Otley (1997) among others suggests that the founding of a balanced portfolio of performance measures and reporting instruments is a significant means of overseeing performance in tomorrow's companies. Also he considers the development of an information system that encompasses wide range measures including statistics on customer satisfaction, employee morale, and on-time delivery coupled with the financial aspects is the key strength of management accounting. He states "...The design of such an integrated performance report is important. We know that a picture is worth a thousand numbers" Otley (1997, p.2).

Also Dikolli and Sedatole (2007) acknowledge the importance of examining improvements in mediating variables to generate more comprehensive models of management and control that look at how different aspects of firms' performance are linked to their future financial performance. These suggested mediations could be utilised to test the generalisability of theoretical structures such as the Balanced Scorecard that relates current nonfinancial performance to future financial performance.

Moreover; Dikolli and Sedatole (2007, p. 82) state: "In general, the NFPM literature does not fully explore potential mediating effects suggested by theory. Consequently, we currently have a less than complete understanding of the process by which investments in nonfinancial performance ultimately provide financial benefits". Therefore; this paper is an attempt to contribute to the current discussion by considering multiple nonfinancial measures in conjunction with the nonfinancial dimensions of the Balanced Scorecard and hence we suggest the following nonfinancial measures to be leading indicators of the future financial performance in our research setting.

Innovation and Learning Perspective:

Human resources theorists have argued that employee training has a positive influence on their job satisfaction, enthusiasm at work, aptitude to do their jobs, and personal development through enhanced knowledge, improved self-confidence, self-efficiency, less need for control and general satisfaction, raising their motivation and decreasing the turnover of well qualified employees thus increasing the employees productivity and accordingly improve the employer's financial performance (Jones and Wright (1992); Huselid (1995)).

For instance, Johnson, Ryan, and Schmit (1994) reported that attitudes regarding training and development were considerably associated with customer satisfaction, consistent with Schlesinger and Zornitsky (1991) argued that satisfied employees are able to deliver higher level of outstanding service to customers and with Schneider and Bowen (1992) suggested that service quality can be improved by applying service climate that includes providing job training which leads to job satisfaction.

Furthermore, Molina and Ortega (2003) acknowledged that higher training can have a positive effect on firm performance through aspects such as employee satisfaction and customer loyalty. Finally, Norton and Kaplan (2004) also supported this argument as they recommended that investments in employees training have indirect cause-effect relationship with customer satisfaction by improving service quality as they state: "employee competencies in process improvement are foundational for improving operations" (Norton and Kaplan, 2004, p. 82)

As for the airline industry; labour is a very important element of their operations in the form of pilots, flight attendants, luggage handlers, customer service, call centre employees and others. According to the Air Transportation Association (ATA) labour is the number one cost for the airlines industry.

Internal Process Perspective:

The internal process perspective identifies key areas that are expected to have dramatic effect on organisation strategy by aligning organisation's tangible and intangible assets to create value by converting the potential value of its intangible assets to realised value in the form of customers' value and financial improvements as presented in the financial perspective in conventional financial terms (Kaplan and Norton, 2004).

This perspective comprises five performance measures to answer the question: what a company must excel in as suggested by Kaplan and Norton (1992, p.74):

- Fixed asset efficiency: For the purposes of this study fixed asset efficiency is the percentage change in airline (departures performed divided by fixed assets) in (quarter $_t$) compared to (quarter $_{t-4}$). The rationale of this ratio is measuring fixed asset utilisation while controlling for seasonality. We expect that improved assets utilisation by means of allowing more departures with the same fixed assets will allow more revenues to be generated with the same fixed assets and hence indirect link between improved operations and enhanced financial

performance exists. As a result we expect that higher asset utilisation would be linked with higher operating revenues as well as higher operating expenses.

- Fuel Efficiency: The airline industry is exceptionally sensitive to fuel costs. According to the Air Transportation Association (ATA), fuel is an airline's second biggest expense. Fuel forms a major fraction of an airline's total operating costs. Efficiency among different carriers can vary widely as Short haul airlines usually get poorer fuel efficiency since take-offs and landings consume high quantities of fuel. Therefore it is very important to consider the fuel efficiency as a nonfinancial measure of performance; for the purpose of this study fuel efficiency is the percentage change in airline (revenue aircraft miles flown / Aircraft fuel issued (gallons). A previous study by Liedtka (2002) used available seat miles per gallon of fuel, aircraft miles per gallon of fuel and departures per gallon of fuel as measures of fuel efficiency. However we assume that "revenue aircraft miles flown" is a better instrument to capture the fuel efficiency ratio since this ratio captures how many fuel gallons are consumed to generate revenues.

- Loading factor: The passenger load factor of an airline is a measure of how much of an airline's passenger haulage facility is used. According to the Bureau of Transportation Website it is "passenger miles flown as a percentage of seat-miles available". This is a measure of capacity utilisation. As airlines often have intense fixed costs and are capital intensive, consequently the efficiency of asset exploitation is significant. The airline business is very seasonal and therefore it is important to compare the passenger load factor with the same time of the year thus, for the purposes of this study, loading factor is the percentage change in airline's loading factor in (quarter $_t$) compared to (quarter $_{t-4)}$.

Also Analysts used to refer to loading factor in their reports for example; an analyst in Airline Industry Information Journal (June, 2008) states: "Frontier's revenue passenger miles increased by 2.5% compared with May 2007, while available seat miles decreased by 0.8%. This resulted in a mainline load factor for the month of 82.2%, up 2.6 percentage points from May last year"

- Measure of unit cost/ revenue in the airline industry: It is calculated by dividing all of an airline's operating expenses/revenue by the total number of available seat miles. Airline companies tend to report

their cost unit in their annual reports. Besides; airline unit revenue and airline unit have always been of great interest to financial analysts. We expect that the higher the unit of revenue and the lower the unit of cost would be associated with improved future financial performance.

Customer Perspective:

Kaplan and Norton (2004, p.7) states "success with targeted customers provides a principal component for improved financial performance" Balanced Scorecard framework suggests that customer perspective must incorporate indicators of customer success such as customer satisfaction, customer retention, and market share as well as how the company intends to deliver value to its targeted customers (Kaplan and Norton, 1992; 1996) . Customer satisfaction could be defined as a state of mind that results from the customer's assessment of expectations proceeding to a purchase with impressions after utilising the service of the purchased service or goods (Oliver 1993; Oliver 1996).

A large number of studies in the marketing as well as the management literature proposed that there is a robust theoretical support for an empirical investigation of the associations between customer satisfaction, market share and companies' financial performance i.e. profitability (Nelson et al.(1992); Heskett et al. (1990, 1994)). However, few empirical studies have been conducted to address these theoretical associations (Griffin and Hauster (1993); Anderson and Sullivan (1993); Anderson et al (1994); Ittner and Larcker (1998))

Anderson et al. (2004) suggested that the foremost rationale that underlies the theoretical association between customer satisfaction and the long-term financial performance is that customers are the main resource of the entire future positive cash flows, besides that customer satisfaction signifies the steadiness of the firm's customer relationships and subsequently the timing, level, and constancy of cash flows.

In short, the literature has shown a common belief in such a positive association between customer satisfaction, market share and economic consequences.

Kaplan and Norton (2004) suggest that value creation is indirect process; improvements in the non-financial perspectives of the organisational performance improve financial results i.e. enhanced revenues, decreases costs, and higher profits through series of cause-effect relationships. For instance, employee training could

improve internal process quality. Such improvements are expected to enhance customer satisfaction and loyalty which in turn boost the market share, finally; developments in customer perspective indicators lead to better sales, reduced costs and consequently higher profits in the future.

Financial perspective:

Superiority in operations performed in the above perspectives is expected to have indirect ties with the financial measures in the financial perspective of our suggested dash board through enhanced revenues' growth, reductions in the cost of operations in the future and improvements in future cash flows which have direct link to the company's overall financial performance. Therefore, presumably growth in operating revenues, operating expenses; operating cash flows are appropriate measure to capture such improvements.

Accordingly, this study investigates whether non-financial metrics are the leading indicators of three financial outcomes, namely, operating revenues, operating expenses, and operating cash flows, and therefore have incremental information content beyond the current accounting numbers. The test was repeated with a lag of one quarter; two quarters, three quarters and four quarters to explore any significant associations between these lagged non-financial measures and the current financial performance.

The intention of these tests is to investigate the timing when these effects have taken place as well as the persistence of these improvements over the four tested lags to enhance our understanding regarding the amount of information about future performance that can be obtained from nonfinancial performance measures as recommended by Dikolli and Sedatole (2007).

A neutral position has been taken as the literature provided mixed results about this issue. For instance; Amir and Lev (1996), Kaplan and Norton (1996), Ittner and Larcker (1998), and Liedtka (2002) acknowledge that non-financial metrics are the leading indicators for financial measures and that non-financial measures have incremental information content beyond that supplied by financial measures, while Behn and Riley (1999) and Wiersma (2008) present contradictory results. Therefore, three basic models were examined for the lagged model study:

Model 1:

(Operating revenues) $_t = \alpha + \beta_1$ (revenue unit $_{t-i}$) + β_2 (training $_{t-i}$) + β_3 (fixed assets efficiency $_{t-i}$) + β_4 (fuel efficiency $_{t-i}$) + β_5 (loading factor $_{t-i}$) + β_6 (customer satisfaction $_{t-i}$) + β_7 (market share $_{t-i}$) + β_8 (labour efficiency $_{t-i}$) + β_9 (operating revenue $_{t-i}$) + ϵ_t

Model 2:

(Operating expenses) $_t = \alpha + \beta_1$ (cost unit $_{t-i}$) + β_2 (training $_{t-i}$) + β_3 (fixed assets efficiency $_{t-i}$) + β_4 (fuel efficiency $_{t-i}$) + β_5 (loading factor $_{t-i}$) + β_6 (customer satisfaction $_{t-i}$) + β_7 (market share $_{t-i}$) + β_8 (labour efficiency $_{t-i}$) + β_9 (operating expenses $_{t-i}$) + ϵ_t

Model 3:

(Operating cash flows) $_t = \alpha + \beta_1$ (training $_{t-i}$) + β_2 (fixed assets efficiency $_{t-i}$) + β_3 (fuel efficiency $_{t-i}$) + β_4 (loading factor $_{t-i}$) + β_5 (customer satisfaction $_{t-i}$) + β_6 (market share $_{t-i}$) + β_7 (labour efficiency $_{t-i}$) + β_8 (operating cash flows $_{t-i}$) + ϵ_t

Where (i) could be 1 quarter, 2 quarters, 3 quarters or 4 quarters lag, these four lags were examined because there was no support in the literature about the time lag between the non-financial indicators and financial outcomes. However, only three quarters lag results are reported in this paper.

This research utilised Generalized Least Squares regression (GLS) which corrects the standard errors for panel heteroskedasticity and autocorrelation. GLS regression converts the model to account for a first-order autoregressive (AR1) process. The standard errors computed from a variance covariance matrix that corrects for heteroskedasticity and correlation in the residuals across panels (companies). The results are unbiased coefficients and consistent panel-corrected standard errors (PCSE's) (Beck and Katz, 1995), we used this type of regression to correct for heteroskedasticity and autocorrelation.

3.3. Results and Analysis

Table 2 illustrates descriptive statistics about the studied companies for the fourth quarter 2006 signifying that our sample's firms tend to be large companies, the variables descriptive statistics are presented in table 3, while the independent variables correlation matrix is illustrated in table 4.

We tested for collinearity by calculating Variance Inflation Factors (VIF) for all models and VIF values for all models were less than 10 as suggested by Gujarati (2003) hence multicollineraity does not appear to be a problem in our models.

The correlation matrix demonstrates logical

correlations between the variables. For instance, significant positive correlations between employee training on one hand, and market share and fixed assets efficiency on the other, also significant positive

correlation has taken place between loading factor at one end and fixed assets efficiency and labour efficiency on the other.

Table 1. Descriptive Statistics for the whole sample

Descriptive Statistics	N	Minimum	Maximum	Mean	Std. Deviation
Total assets (millions)	31	17	25850	4762	7578
Available seat miles (millions)	31	627	126411	23344	34586
Number of employees	31	570	72969	12697	17641

Tests of incremental and relative information content were carried out for 1 quarter, 2 quarters, 3 quarters and one year lag. However, this paper only reports 3 quarters lag results since they are best served to the purpose of this study even though other lags tests have given similar results. Table 5 shows the results of three quarters lag regressions for different dependent variables.

Three tests were conducted to explore the explanatory power of multiple non-financial measures in explaining changes in different dependent financial performance measures namely operating revenue, operating expenses, operating cash flows. Financial performance is accounted for by including it in the model as a lagged variable $_{t-i}$, as is seasonality by defining the variables as the difference between the variable at quarter $_t$ and the variable at quarter t-4 divided by variable at quarter $_{t-4}$ the result of this equation would be the percentage change in the variable compared to the same quarter in the previous year. Finally, size was controlled for by scaling dependent variables along the lines of a firm's total assets.

Biddle et al. (1995) among others argue that a performance measure would have an incremental information content in explaining the financial performance if the coefficient of this variable is significantly different to zero. The test of incremental information content was carried out for 1 quarter, 2 quarters, 3 quarters and one year lag. Table 5 shows the results of three quarters lag regressions for different dependent variables, this study investigates the explanatory power of a number of non-financial measures at quarter (t-3) to explain current quarter financial performance.

Operating revenue regression results show that revenue unit$_{t-3}$ (p < .10), fixed assets efficiency$_{t-3}$ (p <

.01), loading factor$_{t-3}$ (p < .05), market share$_{t-3}$ (p < .05), and labour efficiency$_{t-3}$ (p < .05) have positive and significant associations with current operating revenue at quarter $_{(t)}$. This implies that enhancements in these non-financial measures will be mirrored in improved financial performance figures after three quarters. Consequently, this result suggests that these non-financial measures have incremental and relative information content beyond that provided by the lagged financial measure (operating revenues $_{t-3}$), which did not exhibit a significant association with the current operating revenue.

The above results are consistent with Heskett et al (1994, p. 165) as they state; "Profit and growth are stimulated primarily by customer loyalty. Loyalty is a direct result of customer satisfaction. Satisfaction is largely influenced by the value of services provided to customers. Value is created by satisfied, loyal, and productive employees. Employee satisfaction, in turn, results primarily from high-quality support services and polices that enable employees to deliver results to customers".

Operating expenses regression results reveal similar findings observing that airline cost unit $_{(t-3)}$ has a positive and significant relationship with current operating expenses at 1% level. This means that increases in airline cost unit will be reflected in higher operating expenses in 3 quarters lag between the leading measure (airline cost unit) and the lagging measure (operating expenses).

Customer satisfaction $_{(t-3)}$ is found to have a negative and significant association at 1% level with current operating expenses $_{(t);}$ this confirms findings from marketing literature that established a link between customer satisfactions and enhanced economic returns (Anderson et al 1994) and verifies the service profit chain proposition that higher customer satisfaction is related to

higher customer loyalty and therefore higher profitability (Heskett et al., 1994). This result is consistent with other marketing work. For instance, Hallowell (1996) showed that customer satisfaction, loyalty, and profitability are linked to each other. However, Hallowell (1996) did not examine for causality between customer satisfaction and profitability, while this study demonstrates the causality relationship between enhanced customer satisfaction and less operating expenses, and accordingly improved profitability.

Moreover, lagged market share as a non-financial measure reveals negative and significant relationship at 1% level with current operating expenses. This result involves four implications: firstly, the market share non-financial measure is helpful in predicting and explaining future financial performance. Secondly, market share has incremental information content over that provided by the lagged financial measure. Thirdly, it provides support to the efficiency theory suggested by Demsetz (1973) that firms with higher market share have cost efficiencies and hence superior profits. Fourthly, it offers support to market power theory proposed by Schroeter (1988) that organisations with higher market share apply market power to put prices rather than take prices and acquire inputs at lesser rates, thus they generate better financial outcomes.

Finally, the lagged financial measure (operating expenses $_{t-3}$) did not prove to have explanatory power to predict current operating expenses at quarter (t). In fact, taken together, the results of operating expenses model provide evidence that non-financial measures have incremental and relative information content beyond that provided by the three quarters lag financial measure to explain current quarter operating expenses. In other words, these measures have higher predictive value to anticipate future financial performance.

The operating cash flows test shows that the changes in fuel efficiency and fixed asset efficiency measures have significant relationships with operating cash flows at 1% level demonstrating incremental information content of these lagged measures in explaining the current measure of operating cash flows. Furthermore, changes in market share as a non-financial measure was found to have positive and significant association with current operating cash flows at 5% representing that companies with ability to acquire higher market share i.e. more revenue passenger miles, have higher ability to generate higher and positive operating cash flows in three quarters

time. This is consistent with the Kaplan and Norton (2000) case study concerning Mobil North American Marketing and Refining as they demonstrated that when this company expanded its market share, it succeeded to increase its operating cash flows by $1 billion per year. In addition, the lagged financial measure (cash flows$_{t-3}$) did not show significant association with the current operating cash flows.

Altogether, the results of three quarters lag-operating cash flows model reveal that numerous non-financial measures of performance have higher explanatory power to explain and predict current operating cash flows behaviour compared to the lagged operating cash flows themselves, signifying relative and incremental information content ahead of that provided by the lagged financial measures.

These results show clearly the cause-effect relationship between improvements in non-financial perspectives and enhanced future financial performance consistent with the strategy maps idea of Norton and Kaplan (2000, p. 170) as they stated "strategy maps show the cause and effect links by which specific improvements create desired outcomes- for example, how faster process cycle times and enhanced employee capabilities will increase retention of customers and thus increase a company's revenues".

3.4. Discussion of Limitations and Conclusion

Taken together, the above results are consistent with the existing literature in many ways. They demonstrate that some non-financial measures could be the leading indicators of financial performance in addition to their having incremental information content beyond that provided by financial performance measures (Amir and Lev, 1996; Ittner and Larcker, 1998; Najar and Rajan, 2001; Liedtka, 2002).

More importantly, the results are consistent with the lag research conducted by previous studies and indicate that consequences of improvement in non-financial measures, would take place in the short term, specifically in one year's time and therefore non-financial measures could be included in managers' compensation plans to promote better performance, as demonstrated by Ittner and Larcker (1998), Najar and Rajan (2001) and Wiersma (2008). This is consistent with the informativeness principle that managers' compensation plans will comprise non-financial measures if they furnish information beyond that provided by traditional financial

accounting measures (Widener, 2006) and also consistent with Gjerde and Hughes (2007, p. 12) who state that "…employees should see the link between achieving the key lead measures and their compensation".

Ittner and Larcker (2001) argue that managers' perceived non-financial and financial measures are essential in appraising performance but they cast doubts on the quality of non-financial measures; hence less importance is weighted on these measures as they are considered to be less reliable. Nevertheless, managers are not required to depend on short-term non-financial metrics exclusively but expect to employ these measures to reach development on multidimensional organisational performance as well as mitigating the noise in financial measures (Kaplan and Norton, 1996). This is consistent with the literature e.g. Shank (1996) illustrates the need of strategic cost management to inter-link financial and non-financial information to enable a comprehensive and balanced assessment of the key strategic issues. Such action would specifically affect stock prices as documented by Said et al., (2005) highlighting the retention of non-financial measures, and arguing that the firms that maintain the utilization of non-financial measures have sustained continual growth in stock price returns.

The lack of significant association between some of these measures with regard to future operating expenses and operating revenues does not necessarily mean that they do not hold incremental information content or that improvements in these perspectives are not crucial. However, it would appear that investments in human capital and customer relations need more than one year to reveal an improved financial performance. For example, Ittner et al. (1997) argues that non-financial measures have incremental information and make the longer time horizon the centre of attention, Widener (2005, p.202) states that "It is well accepted that non-financial measures provide better information regarding long-term health", consequently; companies strive to find the right key performance indicators, by understanding the cause-effect relationships that link these measures together to ensure better performance. While working to guarantee that

tracking multiple performance measures, does not sidetrack the employee's effort from the main goals of an organisation (i.e. increased income, enhanced positive cash flow, better revenues) to only chasing those measures (Gjerde and Hughes, 2007).

Some limitations are noted in the present study. First, the non-financial measurement methodology used in this study is based on generic measures that are not necessarily used in practice as the generic measures consist with the study objectives which aimed to examine the associations between the current financial performance measures and lagged multiple non-financial measures and identify the required time lag between productivity and efficiency changes on one hand and the changes in future financial performance on the other.

Accordingly, Devinney et al. (2005) claimed that different measures do not need to be consistent because organisations are heterogeneous rather than homogeneous, even within the same industry, as different companies may stress and concentrate differently on alternative measures most of the studies utilised. Our sample included firms that may or may not use Balanced Scorecard, and hence these measures are not linked to firms' strategy as required by Kaplan and Norton (1996; 2001). However, Kaplan and Norton (1996) also argued that all Balanced Scorecards use generic measures (i.e. measures that appear in most organisations' scorecards (Kaplan and Norton 1996, p. 43)) that have a propensity to be outcome measures mirroring similar goals, structures and strategies among companies in the same industry or even across different industries . Caution is necessary before generalising the results to other industries, as the sample was restricted to the airline industry. Finally, some of the performance measures are measured depending on proxies rather than the real measures due to a lack of available, functional data. Despite the above limitations, this study, together with those previous investigations discussed in the literature review section presents an evaluation of the incremental information content of financial and non-financial measures of performance.

Table 2. The independent variables measurement

Variable	Measurement (proxy)
Operating Revenues	Total Operating Revenues / Total Assets
Operating Expenses	Total Operating Expenses / Total Assets
Operating Cash Flows	Total Operating cash flows / Total Assets
Employee Training	Personnel expenses + trainers and instructors expenses / full time equivalent employees.
Employee Productivity	Revenue aircraft hours /full time equivalent employees*
Loading Factor	Revenue passengers miles / available passengers miles Revenue ton miles / available ton miles for cargo airlines.
Customer Satisfaction	In-flight expenditures / enplaned passengers**
Market Share	Revenue passengers miles / Total revenue passengers miles
Full Time Equivalent Employees	Consistent with the literature; this study considered every two part time employees as one full time employee.
Fuel Efficiency	Revenue aircraft miles flown / Aircraft fuel issued (gallons).
Assets efficiency	airline's departures performed divided by fixed assets
Ton Mile	One ton (2,000 pounds) transported one statue mile***
Seat Mile	The aircraft miles flown in each inter-airport segment multiplied by the number of seats available on that segment for revenue passenger use. ***
Available Seat miles (capacity)	The aircraft miles flown in each inter-airport segment multiplied by the number of seats available on that segment for revenue passenger use. ***
Airline Unit Revenue	passenger revenue per available seat mile
Airline Unit cost	Operating expenses/ Available seat miles

* This measure was used by Fielding et al. (1978) as he employed revenue vehicle hours per employee as an efficiency measure of labour productivity.

** Customer satisfaction: most of companies don't disclose their customer satisfaction surveys results, and if they did, then there is a high probability that these results are biased, previous literature in the airlines industry used different proxies like on-time arrival, mishandled luggage and number of complaints (Behn and Riley (1999); Lidetka (2002)). However, on one hand we should differentiate between factors influenced by airports managing companies or extraneous causes (e.g. the weather) and on the other hand these proxies are available only for few companies (the largest 10 companies since other companies are not required to disclose these data to the regulator) which would reduce the sample size. Consequently, this study introduces a proxy for customer satisfaction for airline companies as we used in-flight expenditures per passenger as a proxy for customer satisfaction, therefore customer satisfaction was measured as: in-flight expenditures / enplaned passengers.

Table 3. The variables descriptive statistics

Descriptive statistics (n = 434)

Stats	Rev unit	Cost unit	Employee training	Assets efficiency	Fuel efficiency	Loading factor	Customer satisfaction	Market share	Labour efficiency
Mean	0.061474	0.074027	0.106719	0.008082	0.023628	0.022864	0.074429	0.010162	0.039024
SE	0.152298	0.202478	0.532139	0.698591	0.266969	0.180389	0.471772	0.177347	0.183138
Min	-0.39235	-0.74637	-5.89192	-0.97203	-0.74258	-0.6284	-1	-0.68534	-0.4793
Max	1.221393	1.45269	4.42983	9.849072	2.927064	1.289796	4.207971	0.782918	1.257718
Median	0.044779	0.046192	0.056121	-0.03961	0.003004	0.010853	0.00415	0.004052	0.031455

Revenue unit is the percentage change in airline revenue unit in (quarter $_t$) compared to (quarter $_{t-4}$).

Cost unit is the percentage change in airline cost unit in (quarter $_t$) compared to (quarter $_{t-4}$).

Employee training is the percentage change in training expenditure per full time equivalent employee in (quarter $_t$) compared to (quarter $_{t-4}$).

Assets efficiency is the percentage change in airline (departures performed divided by fixed assets) in (quarter $_t$) compared to (quarter $_{t-4}$).

Fuel efficiency is the percentage change in airline (revenue miles flown) per gallon of fuel issued in (quarter $_t$) compared to (quarter $_{t-4}$).

Loading factor is the percentage change in airline's loading factor in (quarter $_t$) compared to (quarter $_{t-4}$), loading factor usually measured as revenue ton miles divided by available ton miles.

Customer satisfaction is the percentage change in in-flight expenditures per passenger in (quarter $_t$) compared to (quarter $_{t-4}$).

Market share is the percentage change in market share in (quarter $_t$) compared to (quarter $_{t-4}$); for the purpose of this study market share is defined as revenue passengers miles / Total revenue passengers miles.

Labour efficiency: is the percentage change in labour efficiency in (quarter $_t$) compared to (quarter $_{t-4}$); labour efficiency was measured as revenue aircraft hours /full time equivalent employees.

Table 4. The independent variables correlation matrix

	Revenue unit	Cost unit	Employee training	Assets efficiency	Fuel efficiency	Loading factor	Customer satisfaction	Market share	Labour efficiency
Revenue Unit	1								
Cost unit	0.6665*	1							
Employee training	0.0891	0.0511	1						
Assets efficiency	0.1359*	0.1654*	0.3623*	1					
Fuel efficiency	-0.1081*	-0.0605	0.039	0.1556*	1				
Loading factor	0.0646	0.0002	0.1192*	0.2841*	0.0652	1			
Customer satisfaction	0.0383	0.0581	0.0267	0.0504	-0.0047	-0.1114*	1		
Market share	-0.2954*	-0.2977*	0.1574*	0.0967*	0.0766	0.2223*	-0.1644*	1	
Labour efficiency	-0.1630*	-0.1134*	0.3939*	0.4596*	0.1022*	0.1633*	-0.058	0.6132*	1

Table 5 Three quarters lag regressions for different dependent variables.

3 Quarters lag model, I	Independent variable	Operating revenue $_t$	Operating expenses t	Operating cash flows $_t$
	Coefficient	Revenue unit $_{t-3}$ 0.227164*	Cost unit $_{t-3}$ 1.110885 ***	Fuel efficiency$_{t-3}$ -1.92434***
	Z Value	2.42	19.58	-2.03
	SE	0.093857	0.056748	0.947139
Employee Training $_{t-3}$	Coefficient	0.556	-0.03993	0.567893
	Z Value	-0.28	-1.07	0.39
	SE	0.031111	0.037315	1.452249
f. assets efficiency $_{t-3}$	Coefficient	0.983***	-0.01094	-2.8119***
	Z Value	-3.44	-0.54	-2.88
	SE	0.044568	0.020281	0.976172
Loading factor $_{t-3}$	Coefficient	0.689**	-0.00613	-0.58789
	Z Value	2.04	-0.19	-0.23
	SE	0.138854	0.032458	2.502217
Cust. satisfaction $_{t-3}$	Coefficient	0.426	-0.04386***	-0.08248
	Z Value	-0.2	-3.83	-0.09
	SE	0.011747	0.011452	0.944023
Market share $_{t-3}$	Coefficient	0.141**	0.316693***	8.642597**
	Z Value	-2.42	3.9	2.12
	SE	0.208959	0.081297	4.079543
Labour efficiency $_{t-3}$	Coefficient	0.026**	0.110246	3.136794
	Z Value	3.3	1.3	0.5
	SE	0.18628	0.085108	6.224718
Lagged variable $_{t-3}$	Coefficient	Op. revenues $_{t-3}$ 0.036	Operating expenses$_{t-3}$ 0.077993	Op. cash flows$_{t-3}$ -0.01485
	Z Value	2.2	1.35	-0.17
	SE	0.094443	0.057797	0.087997
_cons	Coefficient	0.419	-0.03437***	4.605588*
	Z Value	0.72	-2.91	1.67
	SE	0.03191	0.011813	2.750541
N		372	372	372
Wald chi2		24.85***	50.75***	58.79***

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المحتوى المعلوماتي الإضافي لمقاييس الأداء المالية وغير المالية

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ملخص

أسفرت نتائج البحوث السابقة عن نتائج متباينة بشأن العلاقات بين مقاييس الأداء المالية وغير المالية. وعلاوة على ذلك، فأن الأهمية النسبية لهذه المقاييس لم يتم التحقق منها بعد بشكل فعال. وهذه الورقة أسهمت في مناقشة مصفوفات المقاييس غير المالية من خلال بحث القيمة التنبؤية لعدد من المقاييس غير المالية ومقارنتها مع مقاييس الأداء المالية. وهذا التحليل يتضمن بيانات ربعية متعددة الأبعاد تم جمعها من 31 شركة أمريكية عاملة في مجال الطيران خلال الفترة 2003–2007، لأختبار فرضية أن المقاييس غير المالية في الحقيقة مؤشرات رائدة للأداء المالي ولذلك تمتلك محتوى معلوماتياً إضافياً أكثر من الذي يتم تزويده من خلال المقاييس المالية.

تشير نتائج هذه الدراسة إلى أن مقاييس الأداء المالي يمكن أن تكون مؤشرات ريادية(قيادية) للأرقام المحاسبية النهائية. وبالتالي، المقاييس غير المالية تمتلك ميزة محتوى معلوماتي إضافي أكثر من الأرقام المحاسبية التقليدية. وأخيراً، تقترح نتائج البحث النهائية أن فوائد تحسين المقاييس غير المالية للأداء سوف تتحقق في المدى القصير، ولذلك، من الممكن تضمين تلك المقاييس في خطط تعويض المديرين لتشجيعهم في تعزيز الإداء.

الكلمات الدالة: مقاييس الأداء غير المالية، محتوى المعلومات الإضافية، بطاقة الأداء المتوازن.