

The Relationship between Balanced Scorecard Characteristics and Innovation: Evidence from Egypt

Fahim Abo-Alazm Mohamed

Department of Accounting, Suez Institute for Management Information Systems in Egypt

Fahim_721@yahoo.com

Abstract: This study attempts to investigate the relationship between characteristics of Balanced Scorecard (BSC) and innovation. To this end, BSC literature is reviewed and then three basic characteristics are extracted: diversity of performance measures, balanced use of performance measures, and strategic linkage of performance measures. Based on the premises of the relationships between each characteristic of BSC and innovation, three hypotheses are formulated. The hypotheses are empirically investigated by data collected from most active one hundred companies listed in Egyptian Stock Exchange. Findings indicate that diversity of performance measures is not sufficient in itself to stimulate innovation, unless both financial and nonfinancial measures are used in a balanced manner, and causally linked to the firm's strategy. This is consistent with BSC philosophy. The results also indicate that Egyptian companies still give priority to financial metrics over nonfinancial metrics. This weakens the ability of these companies to innovate. The study also reveals that financial metrics are not associated with innovation unlike nonfinancial metrics.

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1. Introduction

Contemporary business environment is characterized by fierce competition and increasing level of risk due to globalization, rapid technological development, and changing needs of customers. Organizations have inevitably become constantly searching for sustainable competitive advantages to ensure their success and continuity in the market (Mohamed *et al.*, 2010; Mat *et al.*, 2010). Most organizations have recently realized the difficulty of adopting cost leadership strategy due to the increasing rise in the price of production factors. They turned to adopt product differentiation strategy to achieve and sustain competitive advantages over other firms in the industry, by producing products with more valued features such as product quality, product flexibility or reliable delivery (Spencer *et al.*, 2009; Chenhall *et al.*, 2011). Modern organizations have realized that the way to achieve competitive advantages hard to imitate is the continuous innovation of new goods and services that add substantial value to the customers (Abushaiba & Zainuddin 2012). Innovation is defined as new ideas that are economically applicable (Chenhall *et al.*, 2011; Jarrar & Smith 2011; Matic & Jukic 2012; Rubera & Ahmet 2012). New ideas come from mental abilities that talented people have (Salim & Sulaiman, 2011; Valmmohammadi, 2012). Accordingly, human resources management is the base to make organization viable and well suited for innovation. Management control systems play an active role in making the behavior and action of human resources support the innovation strategy adopted by organizations (Chenhall *et al.*, 2011).

Performance measurement systems are the heart of management control systems applied in an organization (Mohamed *et al.*, 2010). Most contemporary studies consider BSC the most famous among strategic performance measurement systems so far (Bryant *et al.*, 2004; Othman, 2006; White, 2008; Aranda & Arellano, 2010a; Zuriekat *et al.*, 2011; Buhovac & Groff, 2012;). Reviewing the above mentioned studies would conclude that BSC has supremacy over traditional performance measurement systems in three characteristics: Firstly, diversity of performance measures to include both financial and nonfinancial metrics. Secondly, balanced combination of financial and nonfinancial performance measures which are distributed through four hierarchical perspectives of organizational performance: learning and growth, internal business processes, customer, and financial. Thirdly, Performance measures are causally linked to the organization's strategy both within and between these four hierarchical perspectives of performance.

Several management accounting studies provided an evidence on the relationship of strategic performance measurement systems (BSC) with achieving and sustaining competitive advantages (Mohamed *et al.*, 2010), the degree of managers' commitment to organizational strategic goals (Webb, 2004), and managers' job satisfaction (Burney & Swanson, 2010; Zuriekat *et al.*, 2010). Other studies provided an evidence of the relationship of BSC with employee understanding of organization's strategy (Aranda & Arellano, 2010b), generating consensus on strategy among managers (Aranda & Arellano,

2010a), and improving organizational performance (Burney & Widener, 2007; White, 2008; Spencer *et al.*, 2009; Abushaiba & Zainuddin, 2012). To the best of our knowledge, there may be no study- at least in Egypt- which addressed the relationship between BSC and innovation. So, the main objective of this study is to answer the following two questions: is there a relationship between BSC characteristics and innovation? Do BSC characteristics have an effect on innovation?

A deductive approach is followed to achieve research objective by formulating three hypotheses based on the premises of the relationship between each characteristics of BSC and innovation. The hypotheses are investigated by data collected from most active one hundred companies listed in Egyptian Stock Exchange. A questionnaire designed for this purpose includes the operational measures of study constructs. This study contributes to the literature in two ways. First, it describes the effect of each characteristic of BSC on innovation, the point that may not be addressed earlier -at least- in Egypt. Second, this study draws attention of Egyptian companies to the vital role of BSC in making companies ripe for innovation, and to the importance of disseminating innovation culture among its employees.

The results reveal that the diversity of performance measures does not positively affect innovation, while there is a significant positive impact of other two characteristics of BSC: balanced use of performance measures and strategic linkage of performance measures. Findings also indicate that diversity of performance measures is not sufficient in itself to stimulate innovation, unless both financial and nonfinancial measures are used in a balanced manner and are causally linked to the firm's strategy. This is consistent with BSC philosophy. The results also indicate that Egyptian companies still give priority to financial metrics over nonfinancial metrics. This weakens the ability of these companies to innovate. The study also reveals that the financial metrics are not associated with innovation unlike nonfinancial metrics. This is consistent with the findings of previous studies (Hoque 2004; Spencer *et al.*, 2009; Salim & Sulaiman, 2011; Matic & Jukic, 2012)

The remainder of this paper is organized as follows. Section Two discusses the theoretical background and hypotheses. Section Three describes the research method. Section Four presents the results of statistical analysis, followed by discussion of results in Section Five, and finally the last section provides the conclusions and possible areas for future research.

2. Background and Hypotheses

Innovation

In today's business environment, there is a need for innovation because of the fierce competition resulting from the globalization of economy, the pace of technological development, and the rapid change of customer needs (Chenhall, 2005; Mat *et al.*, 2010; Chenhall *et al.*, 2011). The main way in which organizations can sustain and achieve the competitive advantage is to develop innovative activities and introduce innovations in their business (Matic & Jukic, 2012). Innovation is defined as new ideas that would lead to radical or slight changes on products and/or on the organizational structures and management methods, which ultimately lead to gain sustainable competitive advantages over other firms in the industry (Chenhall *et al.*, 2011; Salim & Sulaiman, 2011; Rubera & Kirca, 2012). By innovation, organizations can assure a stream of differentiated products that offer unique attributes that are valued by customers (Chenhall *et al.*, 2011). Innovative organizations are those which demonstrate innovative behavior consistently over time. The ability of an organization to innovate is the characteristics of the organization which allow creating new ideas and translate them into reality (Hult *et al.*, 2004; Matic & Jukic 2012). This leads to adding value to the organization and supports its existence and continuity in the long run. Innovation is divided into technical innovation and administrative innovation. Technical innovations pertain to developing goods, services, and production process technology, while administrative innovations pertain to developing organizational structure and administrative process (Matic & Jukic 2012; Valmmohammadi, 2012).

Balanced Scorecard

Strategic performance measurement systems are a set of financial and nonfinancial metrics covering various perspectives of performance, which in total provide a way to translating the organization's strategy into a coherent set of performance measures (Chenhall, 2005). The greater the diversity of performance measures, the more the need to classify them across the different aspects of performance. Also the greater the scope and diversity of performance measures, the more difficult the integration of the different dimensions of performance. This increases the need for a framework to make integration among those differentiated perspectives (Aranda & Arellano, 2010a). Many researchers (Ittner *et al.*, 2003; Bryant *et al.*, 2004; Chenhall, 2005; Othman, 2006; Aranda & Arellano, 2010a) studied different frameworks for the integration of performance measures such as Performance Pyramids and Hierarchies, BSC,

Intangible Asset Scorecard, Economic Value-based Management, and Business Modeling. They found that the framework of BSC well accepted and widely widespread among academics and practitioners in comparison to other frameworks.

BSC developed in the early nineties of the twentieth century as an innovative framework for measuring strategic performance of organizations (Kaplan & Norton, 1992; Kaplan & Norton, 1996). Over time, the framework of BSC has been developed to become a performance management tool also. BSC helps organizations to clearly define the vision and strategy, and translate them into action, and provide management with a comprehensive view of business. Also, BSC provides management with feedback information about internal strategic processes and external outcomes in order to continuously improve strategic performance. The information provided by the BSC allows the possibility of emergence of new ideas to deal with the internal and external opportunities and threats. These ideas are an adequate basis for formulating the innovation strategy to gain competitive advantages (Abushaiba & Zainuddin, 2012). So, BSC is deemed as a management system which helps and stimulates executing radical improvements in key strategic areas, not just a tool for measuring performance (Jimenez-Zarco *et al.*, 2006). Jarrar and Smith(2011) claimed that BSC supports drivers of innovation and promotes innovation culture in the organization.

BSC depends on a combination of financial and nonfinancial metrics in a framework to realize the balance in achieving both short-term financial goals and long-term strategic objectives. This framework ties performance measures in a form of causal relationships covering drivers of value creation through four hierarchical perspectives of performance: learning and growth, internal business processes, customer, and financial (Bryant *et al.*, 2004; Othman, 2006; Buhovac & Groff, 2012).

Based on the review of BSC literature (Kaplan & Norton, 1992; Kaplan & Noorton, 1996; Kaplan & Norton, 2001; Bryant *et al.*, 2004; Othman, 2006; Burney & Swanson, 2010; Buhovac & Groff, 2012; Abushaiba & Zainuddin, 2012) we can conclude three main characteristics of BSC: diversity of performance measures, balanced use of performance measures, and strategic linkage of performance measures. In the following section, we demonstrate the premises of hypothesized relationships between each characteristic of BSC and innovation.

Diversity of Performance Measures and Innovation

Performance measurement systems are information systems designed to provide performance information which encourages individuals' actions to be consistent with organization objectives (Burney &

Widener, 2007). Traditional Performance measurement systems depend on financial accounting measures such as profit, liquidation, and efficient indicators that are calculated based on historical data of financial statements. These measures provide accounting information about past financial performance (Mat *et al.*, 2010). So, organization management tends to emphasize the derivers of value creation in the short run. Managers basically depend on well-managed tangible assets such as storage and operation efficiency, maximize production, identify cost accurately, and define and correct deviations from budgeted targets (Kaplan & Norton, 2001). Accordingly, financial performance measures encourage maintaining the current operation environment, keep people away from thinking outside the context of operations, and do not make a breakthrough in the status quo.

Financial metrics establish for a single loop learning (the process that keeps the current situation of organization intact). It limits itself in detecting and correcting errors within rules of the system employed. This level of learning leads to developing some initial relationships between behavior and outputs, and it is often oriented to short term objectives (Fiol & Lyles, 1998; Salim & Sulaiman, 2011). However, nonfinancial metrics establish for a double loop learning or creative learning which concentrates on using feedback of past actions to make radical changes challenge the current status in organization (Fiol & Lyles, 1998; Salim & Sulaiman, 2011).

Many studies have found that financial metrics do not encourage innovation (Houque, 2004; Spencer *et al.*, 2009), although we believe that the financial metrics can provide the motivation to push organization to innovate. For example, if the financial metrics indicate lower product revenues, it could prompt the administrator to search for new products with competitive advantages to maintain a level of revenue, increase revenue, or search for other reasons that may be behind the decline in revenue. This may lead to new ideas which cause administrative or/and technical changes. Some studies (Lillis, & Veen-Dirks, 2008; Spencer *et al.*, 2009) have found that financial measures are needed to judge the economic benefits of innovation and prevent wasting the resources of organization when management attempt to apply fictional innovations without value. Simons (2000) argues that financial metrics may impede innovation if they are used diagnostically (regulatory). While financial metrics may support innovation that is necessary for a strategy of product differentiation if they are used interactively (look for opportunities and learning).

Most researchers (Kaplan & Norton, 2001; Mat *et al.*, 2010; Mohamed *et al.*, 2010; Matic & Juckic,

2012) strongly criticized financial metrics as lag indicators which concern past performance and focus on the processes of value creation in the short term. Those researchers claimed that the information provided by financial metrics are not suitable for building effective competitive strategies that suit the contemporary business environment characterized by high competitiveness and quick pace of change in technology and customer preferences. Also, performance measurement systems based on financial measures fail to allocate organization resources to initiative programs and to link operation programs to the strategic priorities in the long term such as innovation (Buhovac & Groff, 2012). These criticisms led to developing new performance measurement systems so as to add non-financial metrics to cover the strategic dimensions of performance about which financial metrics failed to provide performance information.

The objective of using non-financial measures is to provide information about the processes of value creation in the long term, which rely mainly on investment in the creation and management of intangible assets such as customer satisfaction and loyalty, employee satisfaction and their commitment to the organization objectives, building human skills and capabilities, research and development, flexibility and quality of products, product leadership, brand image, and market share (Kaplan & Norton, 2001; Jimenez-Zarco *et al.*, 2006; Wyatt, 2008; Spencer *et al.*, 2009; Burney & Swanson, 2010).

Nonfinancial performance measures encourage all employees in the organization -whether they are superiors or subordinates- on the creative strategic thinking in order to maximize the value of intangible assets. For example, providing new ideas to maximize customer satisfaction may lead to making a simple or radical change in product design or production methods as follow: a salesman who management enters in his performance evaluation a non-financial measure, such as " how many times the same client buys the company's product" will always think how to make customers increase times of buying the company's products because this indicator sheds light on his performance that in turn affect the level of his income. This indicator may encourage a salesman to provide new ideas about, for example, packaging, product design, or time of response. Some of these ideas may be applicable, which in turn increase customer satisfaction and loyalty. So, we conclude that non-financial performance measures encourage each member in the organization to innovate. Some studies (Said *et al.*, 2003; Jarrar & Smith, 2011) found that non-financial measures are positively associated with innovation. Based on the above

argument, the first hypothesis can be formulated as follows:

H1: There is a positive relationship between the diversity in using performance measures and innovation.

Balanced Use of Performance Measures and Innovation

Many studies (Kaplan & Norton, 2001; Mat *et al.*, 2010; Mohamed *et al.*, 2010; Jarrar & Smith, 2011) reported that the use of financial performance measures alone is not enough to measure the performance of organizations that work in a highly competitive environment. These studies indicate that the use of non-financial metrics is not a substitute for the use of financial metrics; therefore strategic performance measurement systems include non-financial metrics in addition to financial metrics. But the new characteristic the BSC offers is the balanced combination of both types of measures. Financial metrics are used to measure financial performance in the short term, while non-financial metrics are used in measurement of strategic performance and value creation processes in the long term. Thus, performance data gathered from both types of measures send a message to decision makers in the organization states that the focus should be on financial performance in the short term which is achieved by the management of tangible assets, and at the same time, not neglecting the financial performance in the long term which is achieved by the management of intangible assets. This balanced use of performance measures encourages managers to promote the strategic balanced thinking which creates innovative ideas that establish strategic decisions and build strategies to maximize financial performance in the short and long term.

Also, the new characteristic the BSC offers is that the organization performance is divided into four perspectives: learning and growth, internal business processes, customer, and financial. Financial and nonfinancial measures cover these four aspects in a balanced manner without focusing on a perspective at the expense of others (Jimenez-Zarco *et al.*, 2006). Thus performance data, whether financial or non-financial, provide decision makers with a comprehensive view about the organization's operations (critical success factors) which help them determining areas that need to be developed, proposing innovative ideas about how to develop, set strategic plans, and allocate resources for implementing the ideas on the ground (Chenhall *et al.*, 2011; Abushaiba & Zainuddin, 2012). For example, performance data obtained from the perspective of learning and growth lead to new ideas about human skills needed for achieving the product differentiation strategy. Performance data related to

the internal processes perspective result in new ideas for development of these operations to ensure product excellence. Performance data related to the customer perspective lead to new ideas about the ways that maximize customer satisfaction and increase their loyalty. All above examples may be converted into improvements in the current and future financial performance.

Performance measures related to both customer perspective and learning and growth perspective provide information about the environmental conditions associated with the movement of outside business, technological development, and competitive conditions. Whereas performance measures related to both internal processes perspective and financial perspective provide internal information to decision makers. BSC creates balance between the information from outside organization and the information from inside organization. This balanced combination of internal and external information makes human resources in the organization strategically think and offer new innovative ideas which represent the foundation for the development of the organization's strategy to adapt with external and internal variables (Bustinza *et al.*, 2010). Salim and Sulaiman(2011) claimed that innovation is the natural response to internal and external variables. This adaptation process needs technical and/or administrative innovation. For example, performance data related to the customer perspective, which indicates that the customers desire to buy goods from any branch with a possibility of replacement or refund in any other branch, will make organization innovate ideas for development of sales information system and develop programs to train individuals on the new sales system.

These three dimensions of the balance, not equality - that characterize the BSC - provide balanced and comprehensive information about all dimensions of performance. This information leads to the balanced thinking that creates new ideas. These new ideas lead to making strategic decisions for areas which need to be developed, and allocating resources to strategic priorities to achieve the required development. Accordingly, the second hypothesis can be formulated as follows:

H2: There is a positive relationship between the balanced use of performance measures and innovation.

Strategic Linkage of Performance Measures and Innovation

BSC differentiates from other strategic performance measurement systems in that it connects performance measures to the organization's strategy in the form of causal relationships between performance measures in the same perspective and performance measures in other perspectives above it

in the hierarchy that culminate in the achievement of financial objectives. Causal relationships start from the perspective of learning and growth, and then the internal processes perspective, and the customer perspective, and finally the financial perspective in order to translate the organization's strategy into action. Thus, measures of a perspective are drivers for performance in other perspectives above it. For example, outcome measures of the learning and growth perspective become drivers of the outcomes of each of the three perspectives above it in the hierarchy (Kaplan & Norton, 2001; Bryant *et al.*, 2004; Othman, 2006; Aranda & Arellano, 2010a). These relationships reveal series of value creation drivers in the organization. For example, the skills acquired by individuals from learning and training are the cause of the development of internal processes. In turn, development of internal processes leads to increase customer satisfaction and increase loyalty to the organization's products. Customer satisfaction and loyalty are translated into more sales, revenues, and profits.

These causal relationships are not random, but are designed within the context of the organization's strategy, and determine how to translate strategy into real results. So, the organization's strategy should provide an answer to questions such as: what skills that should be the focus of performance measures in the perspective of learning and growth, which will lead to the improvements needed in the internal processes. What improvements should be the focus of performance measures in the perspective of internal processes that lead to increasing the customer satisfaction. What dimensions of customer satisfaction which are the focus of the customer measures that improve the financial results. What targeted financial results that should be the focus of financial metrics to achieve the organization's strategy. Thus, performance metrics in all perspectives of performance encourage all individuals in the organization to strategically think and act in line with the organization's strategy. If contemporary organizations adopt the product differentiation strategy that mainly relies on innovation (Chenhall *et al.*, 2011), the translation of this strategy into real results needs causally selection of performance measures that urges labor force in the organization to think innovatively and produce new ideas which lead - when translated into reality - to achieving competitive advantages. Othman (2006) claimed that the failure to formalize the causal model makes the organization design performance measures that are not linked to the organization's strategy. The result is a set of fragmented metrics with a little impact on the value creation processes. The information collected through these fragmented metrics may not have

strategic impact. Braam & Nijssen(2004) stated that the absence of causal model is similar to a person who drives in the area that is not known to him without a map. The final destination of the trip may be clear to him, but he has no knowledge of how to reach this destination.

Many studies have found that the causal relationships lead to clarity, avoidance of conflict, and providing functional information that is suitable for decision-making (Burney & Widener, 2007). Employees perceive job satisfaction (Burney & Swanson, 2010), justice in the evaluation, and getting compensated bonuses because of the clear causal relationships between performance measures and results (Lau & Moser, 2008; Tayler, 2010). Other studies have found that the causal relationships lead to better understanding of the organization's strategy (Aranda & Arellano, 2010b), strengthening the commitment to the organization's objectives (Webb, 2004), achieving consensus among managers of middle management on the organization's strategy, and establishing cooperation and coordination among the units of organization (Aranda & Arellano, 2010a). So, all labor force work together in one direction towards the achievement of the organization's strategy. Previous evidences provide a proof that the causal relationships of the BSC establish for healthy organizational environment. This environment orients individuals towards creative thinking which leads to new ideas that would be translated into continuous improvements in processes, products, and

administrative structures. Then, the organization becomes innovative, offering new products to the market which in turn achieves competitive advantages that are difficult to be imitated by competitors. Based on the above argument, the third hypothesis can be formulated as follows:

H3: There is a positive relationship between the strategic linkage of performance measures and innovation.

3. Data and Methodology

Variable Measures

Based on the proposed hypotheses, there are four key variables: the diversity of performance measures (DIVERS), the balanced use of performance measures (BALNCE), the strategic linkage of performance measures (STLINK), and innovation (INNOVT). Figure (1) shows a list of statements that were used to measure the variables of the study. DIVERS was measured using fifteen statements, seven of them answer whether a performance measurement system in the company includes financial measures (FINANC), and the remaining eight statements answer whether performance measurement system in the company includes non-financial measures (NONFIN). Three statements were used to measure BALNCE; six statements were used to measure STLINK; and four statements were used to measure INNOVT. Respondents were asked to express their perceptions on a five-point Likert Scale for each statement.

Figure 1: List of study variables

1- Diversity of performance measures (DIVERS):

The respondent was asked to determine the extent to which each of the following performance measures is used in his organization (very strong = 5: very weak = 1).

1-1 - Financial metrics (FINANC):

- Return on investment (FINANC1)
- Sales revenue (FINANC2)
- Operating profit (FINANC3)
- Budget deviations (FINANC4)
- Department / Branch profit (FINANC5)
- Product profitability (FINANC6)
- Customer profitability (FINANC7)

1-2 - Non-financial metrics (NONFIN):

- Customer satisfaction (NONFIN1)
- Employee satisfaction (NONFIN2)
- Responsiveness (NONFIN3)
- Market share (NONFIN4)
- Training and development of individual skills (NONFIN5)
- Teamwork and spirit (NONFIN6)
- Spoiled and defective rates (NONFIN7)
- Efficiency and effectiveness (NONFIN8)

2- Balanced use of performance measures (BALNCE):

The respondent was asked to determine the extent to which he agrees on each of the following statements (5= strongly agree to 1 = strongly disagree)

- Performance measurement systems applied in your organization give greater attention to the financial results and less attention to the non-financial results (BALNCE1).
- Performance measurement systems applied in your organization provide more information about the internal operations and less information about the external environment, such as competitors, technological development and customers (BALNCE2).
- Performance measurement system applied in your organization give greater attention to measurement of intangible assets and less attention to the measurement of intangible assets (BALNCE3).

Figure 1 (Continued)

<p>- Strategic linkage of performance measures (STLINK): The respondent was asked to determine the extent to which he agrees on each of the following statements (5= strongly agree to 1 = strongly disagree)</p> <p>- A large part of the employee's income relates to his performance (STLINK1).</p> <p>- The work done by the employee is affected by learning and training programs offered by the organization (STLINK2).</p> <p>- The work skills acquired by individuals from learning and training programs are related with improvements in processes (STLINK3).</p> <p>- Customer satisfaction on products of the company is mainly due to the development of internal processes (STLINK4).</p> <p>- Employee share in annual profit is affected by the satisfaction of the customer for the company's products (STLINK5).</p> <p>- Day-to-day actions and decisions of individuals are made in line with the organization's strategy (STLINK6).</p>
<p>- Innovation (INNOVT): The respondent was asked to determine the extent to which he agrees on each of the following statements (5= strongly agree to 1 = strongly disagree)</p> <p>- Performance measurement systems encourage individuals to think about the development of organizational performance (INNOVT1).</p> <p>- Performance measurement systems encourage individuals to discuss their colleagues for developing the performance of teamwork (INNOVT2).</p> <p>- Performance measurement systems encourage individuals to provide new ideas to their superiors (INNOVT3).</p> <p>- Performance measurement systems help the company to translate new ideas into reality (INNOVT4).</p>

Sample Selection

The sample for this study consists of the companies involved in the calculation of the price index EGX 100, which includes the 100 active companies listed in the Egyptian Stock Exchange. These companies cover all sectors of the Egyptian economy. According to stock exchange indices, these companies are successful and leading the Egyptian economy. In addition, they probably apply advanced performance measurement systems that encourage innovation to maintain their competitive edge. Basic data of these companies was obtained from the online services company Egypt for Information Dissemination (EGID). Table 1 shows the distribution of companies according to sectors of the Egyptian economy.

Table 1: Distribution of the sampled companies according to sectors of the Egyptian economy

Sector	N	Sector	N
Financial Services	14	Communications	4
Construction and Materials	10	Banks	3
Health care and Medicines	4	Tourism and Entertainment	5
Chemicals	6	Basic Resources	3
Food and Drinks	13	Information Technology	1
Household and Personal Products	5	Gas and Oil	2
Services and Industrial Products and cars	9	Media	1
Real Estate	19	Distributors and Wholesale	1
Total	80	Total	20

Data Collection

A questionnaire was designed to include a list of all statements that measure the four basic variables of the study. Respondents were asked to rank these statements based on a five-point Likert Scale (see Figure 1). Respondents were restricted in CFOs because they are more aware of the performance measurement systems and the performance measures used in their companies, and they have the ability to understand the concepts and terms included in the questionnaire. To ensure the clarity of statements and their relationship to the basic variables, questionnaire contents were discussed by some academic peers and pre-tested by five companies under study. Then,

appropriate adjustments were made on the questionnaire contents based on received comments. At the beginning of October 2012, the questionnaires were sent electronically via e-mail. Each respondent was telephoned to enhance opportunities to respond. Twenty one correct responses were replied by October 2012. For more responses, the researcher visited companies located in the Greater Cairo (Cairo, Giza, and Qaliubiya) where the main centers of most targeted companies exist. It was possible to obtain the additional 57 correct responses. Then, the total number of correct returns equaled 78 lists.

4. Results

Factor Analysis

Exploratory factor analysis was performed for statements of each basic variable. Results revealed that the statements of DIVERS loaded on two factors. The items of financial metrics were loaded on one of them, while the items of non-financial metrics were loaded on the second factor. The items of two factors together explained 65.2% of the total data variance. Reliability analysis indicated a Cronbach's alpha value of 88.5% for DIVERS items. For BALNCE items, Likert scores were reversed when analyzing data so that 1 equals strongly agree and 5 equals strongly disagree and so on. This action is necessary so that the higher score indicates more balance in the use of performance measures. The factor analysis revealed the statements of BALNCE loaded on only one factor and explained 75.9% of the total variance in the data. Reliability analysis indicated a Cronbach's alpha value of 84.2% for BALNCE items. Also, STLINK items were found to load on only one factor and explained 76% of the total variance in the

data and Cronbach's alpha was 93.7%. Lastly, factor analysis conducted for the statements of INNOVT indicated the existence of only one factor and explained 81.6% of the total data variance. The Cronbach's alpha recorded 92.5% for INNOVT items. Previous studies indicated that the Cronbach's alpha coefficient should be above 70% (Mohamed *et al.*, 2010; Mat *et al.*, 2010; Jarrar & Smith, 2011). In this study all constructs show that the Cronbach's alpha is above 80%. This means that the constructs have a good internal consistency and more reliability.

Descriptive Statistics

Table 2 presents descriptive statistics for the financial and non-financial measures. It is noted that the leading Egyptian companies still depend primarily on financial metrics. The non-financial measures, which got a relatively advanced rank, belong to the traditional measures: NONFIN 7 and NONFIN 8. Lesser-used inductors for measuring and evaluating performance in the Egyptian companies are NONFIN 4 and NONFIN 6. This may not encourage leading Egyptian companies to innovate.

Table 2: Descriptive statistics of financial and nonfinancial measures

	N	Minimum	Maximum	Mean	Std. Deviation
FINANC 1	78	2.00	5.00	4.2949	.70451
FINANC 2	78	2.00	5.00	4.1538	.72213
FINANC 3	78	2.00	5.00	4.0769	.90839
NONFIN 7	78	1.00	5.00	4.0641	1.04868
NONFIN 8	78	1.00	5.00	4.0513	1.00515
FINANC 5	78	2.00	5.00	4.0513	.70060
FINANC 4	78	3.00	5.00	4.0256	.62365
FINANC 7	78	2.00	5.00	4.0128	.74718
FINANC 6	78	2.00	5.00	3.9744	.73810
NONFIN 5	78	1.00	5.00	3.9615	1.23206
NONFIN 1	78	1.00	5.00	3.9231	.95031
NONFIN 2	78	2.00	5.00	3.8974	.84653
NONFIN 3	78	1.00	5.00	3.5769	1.25377
NONFIN 6	78	1.00	5.00	3.5769	1.18999
NONFIN 4	78	1.00	5.00	3.3333	1.14718
Valid N (listwise)	78				

In order to perform the following statistical analyses, a composite score for each variable was calculated. Table 3 presents descriptive statistics of the key variables of the study. It is noted that means values were greater than 3. This may indicate that most of the leading Egyptian companies adopt some form of BSC. It is also noted that, according to the rank of mean values, DIVERS is ranked first and then followed by BALNCE, STLINK, and INNOVT respectively. This indicates that some leading Egyptian companies adopt diversity in using

performance measures, but may not be interested in the balance in using performance measures or may not be concerned with the strategic linkage among them. This view is supported by the small values of standard deviation shown in table 3.

Correlations Analysis

Pearson correlation coefficients and associated levels of statistical significance are presented for pairs of variables in table 4. As it can be seen in the table, there is a weak positive significant association between DIVERS and INNOVT ($r = 0.32$, $p < 0.01$).

This may not be enough to support the validity of the first hypothesis. There is also a moderate positive significant relationship between BALNCE and INNOVT ($r = 0.59, p < 0.01$). This may support the validity of the second hypothesis. Finally the table

reveals the presence of a strong positive significant correlation between STLINK and INNOVT ($r = 0.86, p < 0.01$). This indicates the validity of the third hypothesis.

Table 3: Descriptive statistics of all key variables

	N	Range	Minimum	Maximum	Mean	Std. Deviation
DIVERS	78	2.00	2.70	4.70	3.9385	.57620
BALNCE	78	3.70	1.30	5.00	3.6679	1.10059
STLINK	78	3.40	1.30	4.70	3.1974	1.17074
INNOVT	78	3.50	1.30	4.80	3.1436	1.27285
Valid N (listwise)	78					

Table 4: Spearman correlation matrix

Variables	DIVERS	BALNCE	RESHIP
DIVERS	1.00		
BALNCE	.527**	1.00	
STLINK	.255*	.527**	1.00
INNOVT	.321**	.593**	.861**

** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).

Regression Analysis

According to the hypotheses of this study, the dependent variable is INNOVT and the independent variables are DIVERS, BALNCE and STLINK. Then, regression equation can be formulated as follows:

$$\text{INNOVT} = a_0 + a_1 \text{DIVERS} + a_2 \text{BALNCE} + a_3 \text{STLINK} + e$$

Table 5 shows the results of regression analysis. As it can be shown in the table, The F. Test value is significant (Sig. = .00). This indicates that there is an effect of the independent variables on the dependent variable. The results also show the independent variables explain 92.6% of variance of the dependent

variable (Adj. $r^2 = 0.92$). But, which of the independent variables affect the dependent variable? The level of significance for T. Test offers the answer. The results shown in table 5 indicate that the T. Test is significant for BALANCE and STLINK (Sig. = .00). In addition to the coefficient of these two variables indicate that there is a positive impact on innovation. Consequently, the second and third hypotheses are accepted. While the results indicate that DIVERS have no significant effect on innovation (Sig. = .27), this is consistent with the results of the correlation analysis that revealed a weak correlation between DIVERS and INNOVT. Accordingly, the first hypothesis is rejected.

Table 5: Regression analysis results

Predictors (Constant)	Coefficients (B)	T. Test	Sig.
Constant	-.290	-1.014	.314
DIVERS	-.105	-1.102	.274
BALNCE	.226	4.180	.000
STLINK	.943	23.699	.000

Adj. $R^2 = 0.926$; Std. Error = .34724; F. Test = 320.220; Sig. = 0.00; Dependent Variable: INNOVT

Additional Analysis

Previous analyses can be performed again with dividing DIVERS into its two factors: FINANC and NONFIN. Table 6 shows the lack of correlation between financial metrics and innovation, while there is a positive significant correlation between non-financial metrics and innovation ($r = 0.42, p < 0.01$).

The findings are in line with the results of previous studies (Hoque 2004; Spencer *et al.*, 2009; Salim & Sulaiman, 2011; Matic & Jukic, 2012). The indications in Table7 show the financial metrics or non-financial metrics alone do not have a positive effect on innovation. These results are consistent with the literature review presented earlier.

Table 6: Spearman correlation matrix

Variables	FINANC	NONFIN	BALNCE	RESHIP
FINANC	1.000			
NONFIN	.129	1.000		
BALNCE	.142	.652**	1.000	
RESHIP	.008	.361**	.527**	1.00
INNOVT	.024	.424**	.593**	.861**

** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).

Table 7: Regression analysis results

Predictors (Constant)	Coefficients (B)	T. Test	Sig.
Constant	-.261	-.810	.421
FINANC	-.066	-.902	.370
NONFIN	.033	-.434	.666
BALNCE	.215	3.431	.001
RESHIP	.941	23.130	.000

Adj. R² = 0.925; Std. Error = .34965; F. Test = 236.858; Sig. = 0.00; Dependent Variable: INNOVT

5. Discussion

Results of the statistical analysis indicated that the leading Egyptian companies use both financial and non-financial metrics, which means that they often apply the diversity in using performance measures. This is regarded as one of the important characteristics of strategic measurement systems. Ranking the use of performance measures according to variable means revealed that the leading Egyptian companies still give priority to financial metrics over nonfinancial metrics. This may not urge innovation, which depends mainly on the non-financial metrics. As shown in table 3, high means of variables indicate that most of the leading Egyptian companies may apply performance measurement systems. This is compatible with the philosophy of the BSC.

The correlation analysis revealed a weak correlation between the diversity in using performance measures and innovation, while it was found above average correlation between the balanced use of performance measures and innovation. It was also found that there is a strong correlation between the strategic linkage of performance measures and innovation. These results indicate that the strategic linkage of performance measures is the decisive factor in determining the degree of support performance measurement system to innovation.

The regression analysis showed that the diversity in using performance measures does not affect innovation, while the balanced use of these measures and linking them causally to the company's strategy play the key role in making a positive impact on innovation. This clearly indicates that the use of a variety of performance measures does not in itself lead to innovation unless there is a balance in using these measures and linking them causally to the

company's strategy. This finding is consistent with the philosophical framework of BSC.

Additional analysis found no relationship between financial measures and innovation, while it found a relationship between non-financial measures and innovation. This finding is compatible with the argument of previous research (Frigo, 2002; Hoque, 2004; Spencer *et al.*, 2009) that claimed that financial measures are lagging indicators which relate to past performance, unlike nonfinancial measures which are viewed as leading indicators drive performance in the future.

The findings also indicate that the use of a variety of financial and nonfinancial measures is not sufficient itself to propose innovative ideas because they might be a scattered set of performance measures conflicting with each other. Thus, the balance in using performance measures and causally link them to organization's strategy are both the base to make a positive impact on innovation. So, we finally conclude that a positive association is found between the characteristics of BSC and innovation. This result is consistent with the findings of previous studies that claimed that BSC has a positive effect on innovation (Jarrar & Smith, 2011).

6. Conclusion

The purpose of this study was to empirically investigate the relationship between the BSC characteristics and innovation. To achieve this goal, BSC literature was reviewed and three properties were extracted. These properties are the diversity in using performance measures, the balanced use of performance measures, and the strategic linkage of performance measures. The study offered premises to the relationship between each characteristic of BSC and innovation that pave the way for formulating the three hypotheses of study which presuppose the

existence of a positive relationship between each property of BSC and innovation. Study hypotheses were tested using data collected from the most active one hundred companies listed on the Egyptian Stock Exchange. The study revealed that the diversity in using performance measures does not positively affect innovation, while it found a significant positive impact for both balanced use and strategic linkage on innovation. These results indicate that the diversity in using performance measures is not sufficient in itself to stimulate innovation unless both financial and non-financial measures are used in a balanced manner, and causally linked to the company's strategy. This is consistent with the philosophy of the BSC. The results also revealed that Egyptian companies still give priority to financial metrics over nonfinancial metrics. This weakens the ability of these companies to innovate. The findings also indicate that the financial metrics are not associated with innovation, unlike non-financial metrics. These results are in line with the findings of previous studies. But the results should be taken with caution because of the small sample size. A greater sample size would have provided more confidence in the results of the analysis. Therefore, this study recommends conducting another research in the future using a larger sample of Egyptian companies and collecting real data about the number of technical and administrative innovations applied by these companies during the period of three or five years. Another opportunity for future research is to divide companies into innovative companies and non-innovative companies and investigate their correlation with the kind of performance measurement systems applied in them.

Corresponding author

Fahim A. Mohamed

Accounting Department, Suez Institute in Egypt

Fahim_721@yahoo.com

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