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## The Implication of the Application of the 3<sup>rd</sup> Generation Balance Scorecard in Education Sector; Evidence from DEA

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### Abstract

This study aims to develop performance evaluation measurements of the Private Higher Education Sector (PHES), based on the application of the third Generation Balanced Scorecard (3rd GBSC). It describes the process of developing Student Loyalty (SL). Also, it considers the improvement of the 3rd GBSC dimensions of Key Performance Indicators (KPIs), through examining the optimal stage of respectively increasing student satisfaction, loyalty, and profitability. This study explains how to apply the 3rd GBSC with a sufficient number of performance measurement indicators (PMIs) of education quality and set appropriate benchmarks for them. In addition, this study pursues a case study of the application of the 3rd GBSC at Canadian International College (CIC). This study investigates SL is a continuing concern within improving KPIs, and financial performance in the PHES. Therefore, this paper investigates student satisfaction with the CIC's engineering faculty. Further, its findings reveal that the application of the 3rd GBSC has a significant association with the improvement of the KPIs related to Education Quality (EQ). Also, this application increases expectations of profitability based on expectancy theory. It presents a practical example to assess EQ KPIs efficiency through the Data Envelopment Analysis model (DEA). In Egyptian PHES there has been no previous study to examine the effect of applying 3rd GBSC in accordance with assessing an efficiency and benchmarking of EQ.

**Key words:** 3rd Generation of Balance Scorecard, Expectancy theory, Activities perspective; Outcomes perspective; Data Envelopment Analysis, Profitability.

## Introduction

This paper represents an opportunity to improve KPIs of institutional education quality in general and financial performance in particular, through applying 3<sup>rd</sup> GBSC in the PHES based on improving Performance Measurements (PM) of EQ, which leads to increase respectively SL and profitability. In addition, this current study examines the significance of applying the 3<sup>rd</sup> GBSC in the PHES consistently with the DEA, which influences the different efficiencies of quality factors in institutional education quality compared with its benchmarks. In addition, this study is the first contribution of its kind to Egyptian HPES. This paper uses quantitative and qualitative research methods of CIC (Canadian International College (CIC) is one of institutions in Egypt's HPES and it established in 2012).

We motivated to examine that model in the context of the CIC, because it is a new campus and its managers ought to have been made aware of the benefits of applying 3<sup>rd</sup> GBSC in creating the establishment of a strong infrastructure. Also, we have access to the CIC's data. This research seeks to address the following questions:

- i. i.Q1. Is the application of the 3rd GBSC developing the CIC's KPIs?
- ii. ii.Q2. To what extent do the results of applying the 3rd GBSC differ from the CIC's current performance measurement of EQ?
- iii. iii.Q3. Will the application of the 3rd GBSC with the DEA and benchmarking develop the quality of the CIC's education process?
- iv. iv.Q4. Will the application of the 3rd GBSC improve the prediction of the CIC's profitability according to expectancy theory?

This paper makes several contributions to research on BSC. Firstly, although prior research focused on the application of the original generation of BSC in the HES, our paper presents an incremental contribution of examining the application of the 3<sup>rd</sup> GBSC. Secondly, this paper suggests that the application of the 3<sup>rd</sup> GBSC consistently with the DEA to reveal a significant association between this suggested model and the improvement of EQ KPIs.

Finally, Hoque, (2014) argues that the expectation of applying BSC in different sectors in accordance with the expectancy theory is a gap in the prior research; therefore, we consider this as an important gap in the literature. We aim to fill this gap. In addition, this paper measures the KPIs' weighted values in motivating managers to respond by reporting their expectations of HPES profitability.

### **Overview of the 3<sup>rd</sup> Generation of Balance Scorecard (3<sup>rd</sup> GBSC).**

This generation describes how organizational assets can be converted into performance outcomes. Consistent with the development strategy maps, Kaplan and Norton, (2004) revealed how intangible assets could determine the performance of critical internal processes. An extension of the development of BSC conducted by Lawrie & Cobbold (2002) the 3rd GBSC model based on a refined design of the 2nd GBSC and included new features. This generation revealed by Hammes (2010), shows the BSC that has become a core management system and a valuable tool to:

- i. Driving strategy execution.
- ii. Clarifying strategy.
- iii. Designing operational strategy.
- iv. Identifying and aligning strategic initiatives.
- v. Linking resources with strategy.
- vi. Aligning the organization with strategy.

The origin of current developments stem from issues concerning the selection of strategic objectives and target setting. Consistent with the 3rd GBSC definition provided by Hammes (2010) the replacement of the four perspectives by an outcome perspective which grouped the financial and customer perspectives together, and an activity perspective which combined internal business processes with learning and growth.

### **Destination Statement for KPIs.**

Hammes,(2010) defined the Destination Statement (DS) is as statement included details of all entity activities and outcomes, in accordance with the cause and effect relationship in order to reap the optimal results of KPIs. Beside this, Barney,et al, (2004) claims, this is an effective method for ensuring that the organisational plan is well constructed. It is further argued that the DS is a specific

description of short-term development plan which aim to assist target setting. Furthermore, Andersen, Lawrie, (2004) reveal that the 3rd GBSC is the first BSC to have included DS. There has been emerged the applications of this new approach. Lawrie, and Cobbold, (2002) argued that the DS is completed to the 3rd GBSC to re-designing and developing the original BSC.

### **A Strategic Linkage Model for KPIs with Activities and Outcomes Perspectives**

Consistent with the 3<sup>rd</sup> GBSC implementations, Lawrie and Cobbold, (2004) indicate that the 3rd GBSC is a simplification of a 2nd Generation Balanced Scorecard strategic linkage model (SLM) – with a single ‘outcome’ perspective replacing the Financial and Customer perspectives, and a single ‘activity’ perspective replacing the Learning and Growth and Internal Business Process perspectives. SLM seems that this is undertaken to justify the hypotheses inherent in the strategy and to prevent non-related objectives from creeping into the model. For instance, Hammes, (2010) points out that the SLM is enhanced by objectives and selecting PMIs to monitor these objectives, and due to this, has a positive impact on the 3<sup>rd</sup> GBSC success.

### **Literature Review on BSC in the Higher Education Sector**

There is a massive amount of literature on the use of BSC in many sectors. The reviewed literature shows that numerous studies have been carried out to examine the effectiveness of BSC in the HES. Consistent with the influences of BSC implementation on improving KPIs in the HES, Ismail & Al-Thaoiehie’s (2015) find the proposed BSC based empirically on a sample of target groups selected from public and private universities. They aim to explore and enhance their understanding of performance measures used by Saudi Arabia’s Universities as a strategic management system. Their study, however, lacked to measure the impact of improving KPIs on the education quality system in Saudi Arabia’s Universities, and then the KPIs should be different from one university to another. In addition, consistent with the application of BSC in universities, there is a need to revise and update such KPIs on a timely basis in order to consider changes in surrounding environments which affect the educational system.

Sudirman, (2012) aims to demonstrate how the BSC could be applied in Hasanuddin University. He finds the BSC is a performance management system which could be used appropriately to

improve a higher education institution's accountability through translating its vision, mission and strategy into a series of performance indicators which should drive change towards better improvement. However, his study finds, the universities still need to visualize precisely the strategy map, and commitment of applying BSC to improve HEI's accountability. Consequently, his study has a particular focus on the application of BSC to resolve problems that have been encountered when managing the institution.

Beside to this, Wu, Lin, and Chang, (2011) aim to develop, by utilizing Multiple Criteria Decision Making (MCDM), a set of appropriate performance evaluation indices based mainly on BSC for extension to universities' education centers. With regard to the performance of the education system, they find that the universities need to prioritize improvements of KPIs after performing of the education system. The authors reveal the relationship between the application of BSC and setting clear PM, although, this could not decouple finance from human resource management; these are useful avenues when examining the potential reaction of schools and research entities to planning the certification process. Further, BSC is a useful tool but it requires a careful determination of the elements of the four perspectives. It should state how the measurement is going to be done on a continuous basis whilst, at the same time, establish the recommended KPIs through applying BSC in the HES.

In the same vein with the identification of successful KPIs to achieve the strategic goals Siakas, Prighou and Draganidis, (2005) investigate the critical success factors of KPIs for achieving the strategic goals with regard to the Customer (student) Perspective of the BSC methodology for the Informatics Department. This is done in order to achieve a competitive advantage and excellence at Greece's Thessaloniki Technological Educational Institute. Their findings are that the BSC aligns goals, and strategies and that measurement of performance were suitable for their case. Their paper designs the KPIs for the Customer Perspective (student satisfaction). But their study omitted to consider the development of KPIs for other BSC perspectives, in measuring the impact of the customer perspective development on competitive advantage and the excellence model in HES.

In an extensive field study of BSC implementation to ensure performance reporting practices in the universities Sordo, Orelli, Padovani, and Gardini, (2012) examine whether the BSC as a

strategic tool can be used by the universities administration and other stakeholders to capture the multidimensional aspects of universities' performance. They find that the BSC of universities, as a proposed model can provide the following;

- i. A strategic vision in order to systematize the information that Rectors and academic bodies will have to use;
- ii. Creating both a guide and a strategic reporting system;
- iii. An external communication of the strategic objectives achieved in the context of an increased competition between universities;
- iv. A tool which, if used by more universities, would allow for a benchmark analysis. However, the authors noted, that their study lacked to focus on suitable BSC generation for applying to Italian universities and didn't reveal why they selected to use BSC reporting for Rector, academic bodies and stakeholders.

In addition, Aljardali, et al., (2012) aim to suggest a model that creates a framework for the overall organisational performance (OP) in Lebanese PHEIs for adapting BSC and putting OP in action. Their model perspectives have been built on university's Dean Authority (DA), Information System (IS) and Human Resources (HR). They find the university's dean could begin the process of implementing BSC, but their study reveals failure scenarios of the model in IS and HR perspectives. Although, this study lacked to combine the four perspectives of BSC in action. Where it fails to apply model to IS and HR in Lebanese universities, this could be a point of future research.

Further, Chen, Yang, and Shiau, (2006) examine how BSC could be used as a strategic management tool to evaluate performance. They find the senior supervisors should support both BSC and other management systems so that the outcome is both promising and successful, by emphasizing missions and visions, schools can learn from business and pay more attention to educational costs and benefits when implementing a performance management system. However, the authors reveal that when the financial perspective was placed above in BSC, they do not measure the impact of that perspective on the educational quality system and competitive advantage. Several studies have examined the influences of BSC implementation on performance management system in a business college and the integration between BSC and other management

systems in the HES.

For example, Papenhausen, and Einstein, (2006) find that the BSC has been enabled a wide variety of measures to be aligned with its unique mission and strategy. The authors discuss, also, the identification of KPIs through the application of BSC. Although, their study lacked to measure the impact of that model on the quality education system and the competitive advantage. Also, through understanding the concept of the BSC as being well suited to HEI; their study recommended that formal reporting structures would be replaced with strategic themes and priorities which would enable both consistent messages and sets of priorities throughout each college in HEI. On the other hand, they also, suggest placing the customer perspective as the top priority in the application of BSC.

Beard, (2010) also focuses on the measures which administrators have chosen for the BSCs in educational institutions whose successes were recognized in the HES. He finds that the integration between a management system and BSC ought to be considered when applying in the HES. But his study lacked the identification and using KPIs consistent with the institution's mission, and the relation between BSC implementation and setting PM is unclear. Additionally, Lee, Lo, Leung, and On Ko, (2000) highlight the integration between (Strength, Weakness, Opportunity and Threatens) SWOT analysis and BSC in Vocational Education (VE), and the use of Quality Function Deployment (QFD) methodology of developing an education strategy to achieve excellence performance. They find that the proposed model is effective and useful in strategic planning of VE. But their study lacked to measure the outcomes of that integration model and its impact on education efficiency in the HES.

Regarding the application of BSC in the HES, Negash, (2008) attempt to develop a goal congruent BSC for a professional academic unit. On the one hand, this study has shown that financial decentralization reduced the tensions between teaching and research, and, on the other hand, it has shown an importance of BSC between academic units and central administration. He finds that the application of BSC resulted in the improvement of South African universities' ratings in credible international ranking systems. However, his study cannot decouple finance from human resource management or examine the potential reaction of schools and research entities. The BSC is a useful

tool but it requires a careful determination of the elements of the four perspectives. It should state how the measurement is going to be done. Furthermore, Farid, Nejati, and Mirfakhredini, (2008) illustrate the application of BSC as a powerful measurement and assessment system in the universities. They have proposed a guide of BSC implementation in an Iranian context. But their study omitted to provide a practical application of BSC in an Iranian context.

In the possible application of BSC in Romanian universities, Silvia, (2008) finds the first overview is not yet developed. Her study has revealed a new avenue of applying BSC in the Romanian universities; this could be a future area of the research. In a similar vein, Umashankar, and Dutta, (2007) aim to look at the BSC concept and discuss in what way this should be applied at the HEI in the Indian context. They find that the BSC offered an institution opportunity to formulate a cascade of measures to translate the mission of knowledge creation, sharing and utilising these into a comprehensive, coherent, communicable framework for external stakeholders. However, their study has revealed when the BSC applied in Indian institutions, these institutions are confronted with many barriers that are difficult to overcome. Although, many barriers originate from the institution's organizational members themselves by way of resistance to change, such as; fear of accountability and its derivative pressure, lack of commitment, and fear of failure.

Consistent with the development and evaluation the incidence of Total Quality management (TQM) and BSC implementation in public universities. Lawrence, and Sharma, (2002) find the application of BSC with TQM creates greater efficiency and promotes effectiveness in the universities. Their study, however, omitted to explain the convenient link between TQM and BSC, which is interested in the private business and the HES.

In a recent study to investigate the impact of integration between the 3<sup>rd</sup> GBSC with Student Loyalty Model (SLM) in the HES, Farag, Elkady and Hussainey., (2015) aim to improve PM in the HES based on the application of 3<sup>rd</sup> GBSC and SLM. They find that the application of the suggested model has a significant association with the improvement of KPIs. However, their study lacked to investigate a benchmarking concept in order to reveal the plus and minus point of whole courses at different faculties, and also, investigates the influences of the 3<sup>rd</sup> GBSC with SLM implementation on improving the HES's EQ. Their study could be directed towards forming a

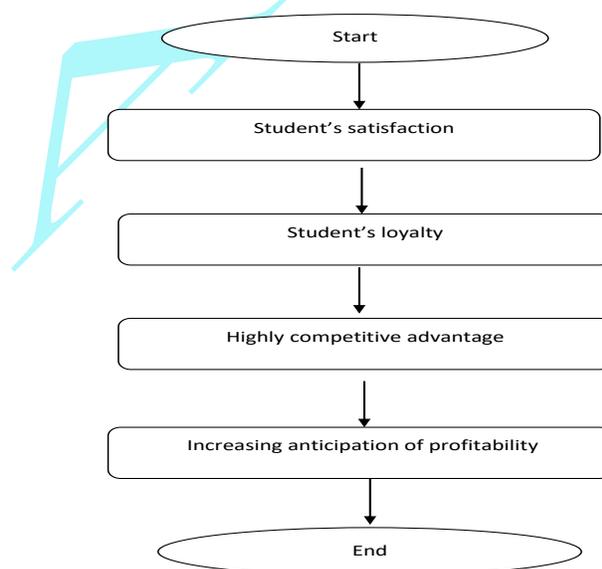
comprehensive strategy map to developing EQ and improving financial performance in the HES.

Overall, almost all of these studies highlight the need to apply the original generation BSC in the HES; however, the recent study considers the 3rd GBSC and its limited potential impact on the profitability. Therefore, we define this study as an incremental contribution to reveal the impact of applying the 3<sup>rd</sup> GBSC on whole courses of different faculties in the HES, to improve EQ in general and financial performance in particular. We believe that the application of the 3rd GBSC is more compatible in the HES compared with other generations.

### Student Loyalty the outcomes of student satisfaction

Regarding the customer loyalty in relation to higher education environment Mohamad, et al., (2009) define that the behavioural loyalty as the students' willingness to remain at the university to complete their existing undergraduate programs, and their intention to continue the graduate programs at the same university again in the future. Meanwhile, the attitudinal loyalty is defined as the student's willingness to provide positive words of mouth, and recommendation concerning their university to their families, friends, employers and organizations, whenever there are opportunities. Therefore, we conclude that the students' loyalty happened through verification of their satisfaction. Its consideration is to a certain the relationship between satisfaction and loyalty.

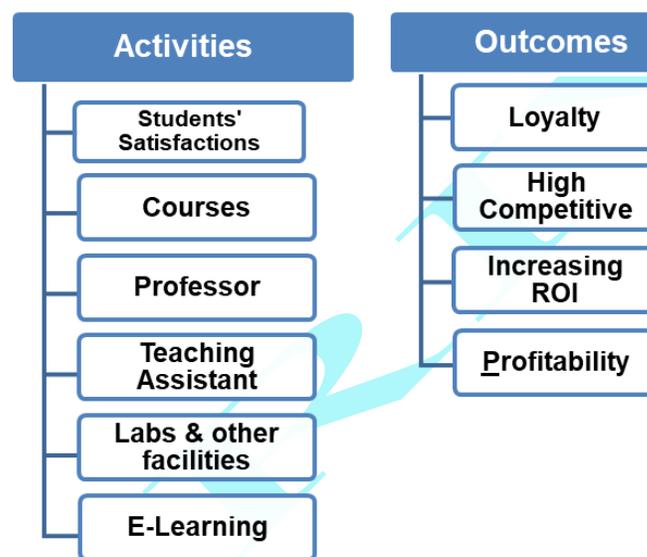
**Figure 1: Recording criterion of increasing profitability through respectively, increasing Student satisfaction and Student loyalty**



### Applying Student loyalty through 3<sup>rd</sup> GBSC

Neely, et al., (2003) argue that in order to achieve practical and organizational alignment activities, and outcomes must be practical insights that should enable action. Thus, this study builds on improving EQ KPIs based on the cause and effect association between student satisfaction (SS) and student loyalty (SL). Farag, et al. (2015) suggest a division of this cause and effect association into two 3<sup>rd</sup> GBSC perspectives (activities and outcomes).

Figure 2: The strategic linkage model in Destination Statement of 3<sup>rd</sup> GBSC



### The proposed model and measurement tool

#### The SHILP model

Farag, et al., (2015) have designed this model based on the strategic linkage model in a DS of the 3<sup>rd</sup> GBSC among Satisfaction, Highly competitive, Loyalty and Profitability. In addition, the model is built on a liner programming concept in order to achieve the optimal solution for the proposed evaluation. As shown in appendix B. This study is conducted an empirical analysis by taking the optimal outcomes of the five categories in student satisfaction form (SSF). We focus on optimal outcomes which are reflected in maximizing profit. Consequent, this model builds the relationship between optimal outcomes and maximizing profit, and consistently with expectancy theory. Thus, the performance report is derived from (SHILP) software for calculating an optimal

outcome of the financial accounting course. The following construction is supposed of SHILP model by Farag, et al., (2015);

KPI1: Satisfaction.

KPI2: Highly competitive advantage

KPI3: Increasing ROI.

KPI4: Loyalty.

KPI5: Profitability.

### **The Data Envelopment Analysis Model (DEA)**

Tsang and Chen, (2013) define the DEA as a linear programming-based methodology that can evaluate Decision Making Units (DMUs) qualitatively, as well as, quantitatively and that also calculates multiple inputs and outputs. The term DMU can be used either for comparing different firms or the efficiency of one firm over period. Additionally, the DEA is first proposed by Charnes, Cooper and Rhodes (CCR), (1978). However, Banker, Charnes and Cooper.,(1984) have further developed the DEA model which referred to as (BCC), in subsequent years, DEA has received much attention and a large number of researchers studies, and it has been used as the basis of developing various models of performance evaluation. The underlying concept of measuring efficiency through DEA is an efficient frontier function. So a set of efficient and inefficient units have emerged. For example, Omid, Ghojabeige, Delshad and Ahmadi., (2011) argue that analysis of inefficient units involves two aspects. First, it can show the maximum input level in order to attain a given amount of outputs. Second, it can show the highest output level attained for a given amount of input.

### **Expectancy theory Outcomes**

Oliver, (1974) defines Expectancy theory as based on individual motivations to select specific behaviours over others due to personal expectations of what the behaviour and actions should be. In essence, the motivation of the behaviour selection is determined by the desirability of the outcome. However, at the core of the theory is the cognitive process of how an individual processes the different motivational elements. This is done before making the ultimate choice. The outcome is not the sole determining factor in making the decision of how to behave. In addition, Montana,

Patrick, Charnov and Bruce.,(2008) argue that this theory emphasises, the need for organisations to relate rewards directly to performance, and to ensure that the rewards provided are those rewards deserved and desired by the recipients. In the proposed model, in accordance with expectancy theory and the analysis presented in prior literature review, all performance evaluation models are dependent on application to the original GBSC. Thus, the CIC PM evaluation indices are based on this proposed model as follows;

- i. An empirical analysis depends on a case study. Therefore, in order to become highly competitive, and to increase student loyalty, as well as anticipating profitability in accordance with expectancy theory, the following EQ KPIs improvements are suggested.
- ii. Performance measurement evaluation indices are collected from the BSC literature and screened by the professional questionnaires and interviews as a basic research evaluation tool.
- iii. On the one hand, the SHILP model is suggested to determine the causal relationship between the activities and the outcomes in the 3rd GBSC and to achieve the optimal outcomes. On the other hand, this model conjoined with the DEA model in order to improve CIC EQ efficiency, and also to enhance EQ effectiveness.

### **The Development of the KPI model**

This objective of this section is to develop a model to measure CIC KPIs. The proposed model is built on applying to the 3rd GBSC through the relationship between SL and profitability. This is based on a trend analysis of SSF PM and comparative data based on internal benchmarking. Micheli, and Mari, (2014) argue that the KPIs are determined as descriptions of key success factors related to institution sustainability. Each of KPI has a different degree of importance and it is weighted by using the Analytic Hierarchy Process (AHP). In essence, each of KPI's point is based on its trend over the last five years and its current level compared to benchmarks or competitor performance. Consequently, the proposed model contributes to measuring and explaining institutional success by using multi-dimensional KPIs. In addition, it is a tool for organizational self-assessment. The proposed model consists of the following criteria:

- i. Identification of KPIs for SSF is a prerequisite.
- ii. Building a solution system dependent on a liner programming method (SHILP).

- iii. The completion model for obtaining EQ efficiency is dependent on the DEA.
- iv. The optimal private educational module is derived from the CIC quality assurance regulations.
- v. Expecting CIC's profitability is dependent on expectancy theory.

Based on the above criteria, the proposed model identifies a list of KPIs related to each one. In order to be more realistic, an expert group at the quality assurance unit, and CIC management, as well as an expert group at the higher education ministry forum analyzed the selected KPIs. The forum's objective is to determine the most relevant and realistic KPIs in the HEI. If there are too many KPIs, it would be difficult to manage and measure. Consequently, the experts need to select the most significant KPIs which directly influence HEI performance. In order to classify this list in descending order of relevance, a survey was conducted involving experts directly involved in HEI activities. In this case, a questionnaire was compiled based on an accounting course of 200 undergraduate students. As shown in appendix C. The form of this questionnaire gauges SSF content as follows; (Course, and the Course Material such as Textbooks, Hand-outs, Slides, Professor, E-Learning/ Course Management System (CMS) and Teaching Assistant / Lab Assistant), and what the distribution of expert responses are for each criterion. The five-point scale used is "Strongly agree", "agree", "Neither agree nor disagree", "Disagree" and "Strongly disagree". As shown in Appendix A. The results of the selected KPIs correspond to the degree of importance which is given to each.

## **Research Method**

This case study research focuses on both qualitative and quantitative approaches in order to examine the application of the 3<sup>rd</sup> GBSC. In addition, it assesses the reliability of the measurements used in the questionnaire, which submitted by the quality assurance unit at the CIC. At the end of the second semester, 2016, 200 SSF questionnaires were distributed to civil engineering students on a financial accounting course. However, 89 SSFs were collected from students which, as shown in tables 2 and 3 represent a response rate of 44.5 per cent. This compares favourably to Ismail, et al. (2015) whose usable questionnaire rate 37.4 per cent. Thus, the suggested KPIs are derived from prior research consistent with Ismail et al. (2015) and Yi Wuet al. (2011). Therefore, the

objective of this section is to develop the KPIs measurement model, and subsequently, the EQ regulations. The KPI model has been built from a combination of the following factors:

- i. Ministry of Higher Education (MHE) Requirements,
- ii. Canadian International College (CIC) Requirements,
- iii. Departmental requirements (such as quality assurance department),
- iv. Trend analysis according to SHILP and the DEA models,
- v. Comparative data according to internal benchmarking,
- vi. Improving financial performance through application of expectancy theory.

**Table 2: The study sample**

	N	%
Initial questionnaires	200	100%
Returned questionnaires	100	50%
Less: questionnaires with missing data	11	5.5%
Usable questionnaires	89	44.5%

**Table 3: The questionnaire sample**

Sample	Academic year	Faculty/ specialization	Time	Age	Living area	Grads	No. (SSF)	Per percent
Students	The first level	Faculty of engineering / civil specialization	1 <sup>st</sup> June, 2016	From 18 to 20 years old	Cairo	Mixed Grads (satisfaction/good / very good/excellent)	89	44.5%

The KPIs are defined as a description of key success factors related to CIC's sustainability. In addition, the model can be used as a benchmark for the improvement of KPIs. Furthermore, KPIs have become standardized across industries, it has become much simpler to find comparable performance measurement systems, in both national and international approaches. Furthermore, the KPIs make up the individual measurements of the performance against the targets or the goals. However, in order to view this performance as a part of the overall business performance, these KPIs were collated into groups. For example, the KPIs were categorised in order to examine the application of the 3<sup>rd</sup> GBSC as well as the development of the KPIs.

### Empirical analysis based on the SHILP model

The focus was on the optimal outcomes which impact on maximising profit. This in accordance with Farag, et al (2015), who also use this model to establish the relationship between these two variables by suggesting that a constant factor in the PMs is H12 (performance measurement in financial accounting SSF) (The exam levels were acceptable, and language used in questions was clear). This factor was selected based on CIC's management, and CIC's quality assurance unit view as stated in the interviews as shown in table 4. Also, it appears, therefore, that this is the most objective PM for CIC students. However, in this research study, CIC managers, shareholders, and quality assurance unit interviews have been included, in order to achieve greater reliability of results for analysis of the application of the 3<sup>rd</sup> GBSC. Moreover, the mathematical model detects variable cells for the five categories in the SSF and derives constraints cells by calculating the optimal outcomes for each one. Consistent with SHILP model Farag, et al., (2015) reveal the PM ranks, as shown in Appendix B, where every PM has a rank number (These ranked numbers are diverted from the SHILP programme software) indulges of the SSF categories as follows; course (x1) \$\$\$ 18, course material (x2) \$\$\$ 16, professor (x3) \$\$\$ 17, e-learning (x4) \$\$\$ 18 and teaching assistant (x5) \$\$\$ 19.

**Table 4: The interviews sample**

Sample	CIC's management	CIC's shareholders	CIC's quality assurance unit
Initial interviews numbers	12	6	25
Initial interviews per cent	100 %		
Less: interviews with missing responses	4	3	5
interviews with missing responses per cent	33.3%	50%	20%
Usable interviews numbers	8	3	20
Usable interviews per cent	66.7%	50%	80%

Based on the data collected from professional questionnaire and interviews, the following equations have been proposed by Farag, et al., (2015) through a linear programming formula

Maximize:

$$P = \sum_{j=1}^k c_j x_j ,$$

Subject to:

$$\sum_{j=1}^k w_{ij} x_j \geq \sum_{j=1}^k w_{ij} ; \quad i = 1, n$$

$$x_j \leq 5mN ; \quad j = 1, k$$

**Where:**

$x_j$  : Decision variables;

$c_j$  : Cost of KPIs;

$w_{ij}$  : Weighed values of KPIs

n: number of KPIs'

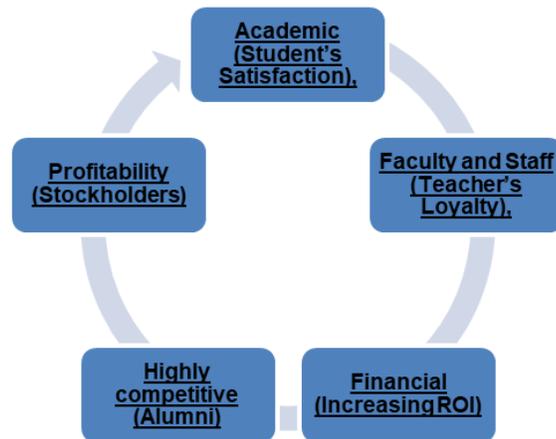
k: number of SSF categories

m: number of SSF subcategories

n: number of students' sample

In addition, we suggest the development of KPIs. As shown in Table.5, we arrange the causality structure among SS, SL and profitability from KPIs1 to KPIs5. It is employed by this research to introduce the weighted costs of SSF categories as follows;

W11 (aggregation of strongly agree response of x1); W12 (aggregation of agree response of x1); W13 (aggregation of neither agree nor disagree response of x1); W14 (aggregation of disagree response of x1); and W15 (aggregation of strongly disagree response of x1). The same procedures are pursued for the other categories. Further, we collect total costs for each category from C1 to C5, to fulfil the financial formal reporting requirements, this report aims to offer a glimpse on the broad range of the Colleges' activities, and the development of its resources; and the strength of its financial performance in the relation of its stated vision and mission. In addition, this report is created by the student affairs department, and the academic affairs department and the department of international affairs.

**Figure.3: Developing KPIs for CIC – reasonable relationship Engineering School at Zayed Campus**

### Developing a model of weighted KPIs.

Consistent with the suggested SHILP model, Figure 3 reveals the causal and effectual relationship based on the development of KPIs and the application of the 3rd GBSC. Therefore, this suggested model has been used to examine the financial accounting course and aggregate results. In addition, reference has been made to the positive and negative points in the PMs of EQ, in order to achieve a comprehensive higher competitive advantage for all faculties and courses with regard to enhancement of financial performance.

**Table 5: KPIs Outcomes**

Categories	KPI1	KPI2	KPI3	KPI4	KPI5	Cost
	Activity	Outcome	Outcome	Outcome	Outcome	
Course (x1)	*W11	W12	W13	W14	W15	*C1
The Course Material (Textbooks, Hand-outs, Slides) (x2)	W21	W22	W23	W24	W25	C2
Professor (x3)	W31	W32	W33	W34	W35	C3
E-Learning/ Course Management System (CMS) (x4)	W41	W42	W43	W44	W45	C4
Teaching Assistant / Lab Assistant (x5)	W51	W52	W53	W54	W55	C5

-\* W= weighted and \*C= Cost

### Optimal outcomes through the SHILP model

Table 6 shows the establishment of total influence of the 3<sup>rd</sup> GBSC perspectives' influences (activities and outcomes) of developing KPIs. It computes the optimal outcomes for five categories as follows:

The number of categories in SSF is five (5).

The result of the first one x1 is (8010); and, we could conduct the optimal outcomes for each category through pursuing the same treatment. In accordance with the above treatment of the optimal outcomes, the model assesses a cost of the course (x1) equals (1602.0). The assessment of the KPIs reliability through aggregating weighted value from KPIs 1 to 5 divided by its costs to reveal the KPIs weighted value for financial accounting course before the application of the SHILP model. Table 6 also, compares the mean weighted value of target optimal EQ outcomes with the current weighted value of cost before the application of the 3<sup>rd</sup> GBSC.

**Table 6: Optimal Outcomes**

Categories	Cost	Optimal outcomes
Course (x1)	*1,602.0	*8,010
The Course Material (Textbooks, Hand-outs, Slides) (x2)	445.0	2,225
Professor (x3)	1,424.0	7,120
E-Learning/ Course Management System (CMS) (x4)	445.0	2,225
Teaching Assistant / Lab Assistant (x5)	890.0	4,450

-\*Optimal outcome for course(x1) =  $5 \times 89 \times 18$  (number of performance measurements in SSF) = 8010

-\*Cost for course(x2) =  $8010 / 5 = 1602.0$

### **KPIs: The weighted Values of Financial Accounting Course.**

Table 7 shows the estimated weighted values for the KPIs prior to the application of the 3<sup>rd</sup> GBSC in accordance with to the aggregation of the five SSF responses divided by the total costs for each category. Thus, this model reveals the weighted KPIs values and estimated costs of the current performance measurement system (PMS), based on data both from the school hierarchy, and the BSC structure.

Table 7: Weighted Values of KPIs

Categories	KPI1	KPI2	KPI3	KPI4	KPI5	Cost
	Activity	Outcome	Outcome	Outcome	Outcome	
Course (x1)	0.05	0.07	0.13	0.4	0.13	1,602.0
The Course Material (Textbooks, Hand-outs, Slides) (x2)	0.16	0.07	0.10	0.3	0.12	445.0
Professor (x3)	0.03	0.02	0.08	0.4	0.2	1,424.0
E-Learning/ Course Management System (CMS) (x4)	0.3	0.3	0.12	0.07	0.02	445.0
Teaching Assistant / Lab Assistant (x5)	0.04	0.01	0.05	0.4	0.2	890.0

Weighted (KPIs) of Course (x1):

Course (x1) KPI1 =  $86/1602 = 0.05$

Course (x2) KPI2 =  $125/1602 = 0.07$

Course(x3) KPI3 =  $214/1602 = 0.13$

Course(x4) KPI4 =  $721/1602 = 0.4$

Course (x5) KPI5 =  $222/1602 = 0.13$ .

Note: Similarly of calculating Course (x1) we could get the weighed value of the other categories KPIs.

### KPIs: Total Activities and Outcomes

Consistent with the estimation of current PMS of EQ, table 8 shows the weighted values of total activities and outcomes. Therefore, in accordance with the SHILP model treatment, this study considers that the costs of the five categories are the weighted value of the activities. Further, the aggregation value relevance is defined as the total activities plus the outcomes. Consequently, an assessment of reliability was conducted by measuring the weighted value of the outcomes. The process led to identifying the difference between the current EQ PMs for the financial accounting course, and the new one based on application of the 3<sup>rd</sup> GBSC.

Table 8: Weighted Value of Total Activities and Outcomes

Categories	Activities	Outcomes	Total
Course (x1)	1,602.0	3370	4972*
The Course Material (Textbooks, Hand-outs, Slides) (x2)	445.0	713	1158
Professor (x3)	1,424.0	3055	4479
E-Learning/ Course Management System (CMS) (x4)	445.0	337	782
Teaching Assistant / Lab Assistant (x5)	890.0	2080	2970

The weighted value of outcomes for Course(x1) = aggregation of general valuation relevance (4972) – weighted value of cost (activities) (1602) = 3370

\*Total value of general valuation relevance = summation of (strongly disagree) response =  $86*1$  + summation of (disagree) response =  $125*2 = 250$  + summation of (Neither agree nor disagree) response =  $214*3 =$  summation of (agree) response =  $721*4 +$  summation of (strongly agree) response =  $222*5$ , the total is = 4972.

Note; similarly, of calculating Course (x1) we could get the weighed value of the outcomes for the other KPIs categories.

## Reliability Testing

This section of the empirical study assesses the reliability of the SHILP model. An examination of the reliability and validity of the research questionnaires has been undertaken using variety methods. In addition, we assess the optimal outcomes per cent of the SSF categories, and the benchmarking outcomes per cent for evaluating the positive and negative points in current EQ PMs. Then, this leads to develop PM KPIs.

## Questionnaires reliability

The questionnaire form contains 54 PMs which have been designed based on current EQ student satisfaction data. Consistent with Valmohammadi, Servati., (2011) the respondents are asked to respond to questions using a Likert scale (ranging from 1 to 5) for their answers. The Statistical Package for the Social Sciences (SPSS) software was used to scrutinise the reliability of the questionnaire, and then the 3rd GBSC was applied. The internal consistency of a set of measurement items by McAuley and Courneya (1994) refer to the degree to which items in the set are homogeneous. Internal consistency can be estimated by assessing the reliability of each coefficient such as by applying Cronbach's Alpha. Thus, the reliability of each questionnaire category was calculated via Cronbach's  $\alpha$ , comparable with constant question (H12) and SSF categories. The results of this reliability test are 0.32 (H12 with x1 PMs), 0.36 (H12 with x1 and x2 PMs), 0.54 (H12 with x1, x2 and x3 PMs), 0.48 (H12 with x1, x2, x3 and x4 PMs), and 0.53 (H12 with x1, x2, x3, x4 and x5 PMs). As shown in table 9. Therefore, it can be conducted that questionnaire reliability is initially acceptable, however, there needs to improvements in PM KPIs. This was suggested by the increase in the Cronbach's alpha result. Which reflects to increasing the Cronbach's alpha result. Furthermore, the results indicate that the correlation of coefficients increase with the numbers of SSF PMs, which also, leads to increasing questionnaire reliability. It is expected that the correlation of coefficients will increase with the development of SSF KPIs

**Table 9, the results of Cronbach's alpha.**

Cronbach's Alpha	Cronbach's a Based on standardized items	Number of items	SSF Categories	Squared multiple correlation
0.326	0.385	20	H12, x1	0.567
0.636	0.413	23	H12, x1, x2	0.602
0.546	0.588	40	H12, x1, x2, x3	0.719
0.481	0.521	45	H12, x1, x2, x3, x4	0.734
0.531	0.578	54	H12, x1, x2, x3, x4, x5	0.810

### Questionnaires validity

Valmohammadi, et al (2011) define the validity of a measurement as the extent to which it measures what it is intended to measure. Content validity is not evaluated numerically, it is judged subjectively for different categories in the study. Thus, in this investigation the SSF PMs are established using this method. For example, the selection of the SSF PMs align with the desired goals of the CIC strategy, i.e. increasing student loyalty and CIC profitability respectively. Indeed, the correlation coefficient is used to measure the degree of correspondence between sets of values where the points on the measurement scale are not equidistant. It is used with non-parametric data - either two ordinal variables or an ordinal, and an interval variable. As shown in table 10 the correlation coefficient for SSF questionnaire. Question H12 is chosen as a constant factor (dependent variable), based on interviews with managers and the quality assurance unit, and identifies the connection with the other PMs in the SSF. Thus, the correlation between the two variables is reflected in the degree to which variables are linearly related.

In table 8, the results show a high coefficient of 0.991 for H12. This result has ensured that the constant item (H12) is included in the SHILP model.

**Table 10, Results of correlation analysis**

Question No.	Correlation coefficient	p-value	Number of responses
H1	0.069	0.512	89
H2	0.028	0.792	89
H3	0.205	0.053	89
H4	0.196	0.113	89
H5	0.065	0.543	89
H6	- 0.102	0.340	89
H7	0.192	0.072	89
H8	0.086	.423	89
H9	0.051	0.632	89
H10	0.029	0.786	89

H11	0.089	0.406	89
H12	0.991*	0.001	89
H13	0.086	0.420	89
H15	0.138	0.727	89
H16	0.732	0.037	89
H17	0.958	0.006	89
H18	0.228	0.023	89
H19	0.161	0.131	89
H20	0.752	0.034	89
H21	- 0.341*	0.001	89
H22	0.202	0.137	89
H23	0.577	0.060	89
H24	0.305	0.110	89
H25	0.811	0.026	89
H26	0.578	0.060	89
H27	0.428	0.085	89
H28	0.201	0.137	89
H29	0.741	0.035	89
H30	0.299	0.111	89
H31	0.905	0.010	89
H32	0.118	0.167	89
H33	- 0.175	0.100	89
H34	0.427	0.077	89
H35	0.747	0.035	89
H36	0.390	0.092	89
H37	0.233	0.028	89
H38	0.138	0.197	89
H39	0.395	0.091	89
H40	0.160	0.135	89
H41	0.641	0.050	89
H42	0.315	0.003	89
H43	0.261	0.120	89
H44	0.259	0.121	89
H45	0.190	0.075	89
H46	- 0.297	0.112	89
H47	0.849	0.020	89
H48	0.903*	0.001	89
H49	0.604	0.056	89
H50	0.158	0.139	89
H51	0.802*	.002	89
H52	- 0.174	0.145	89
H53	0.395	0.091	89
H54	0.419	0.089	89

\*p-value < 0.005 is significant

### The developing KPIs via the SHILP model

Table 11 shows the estimated of KPIs weighted values after the application of the new model. It has been conducted by Farag, et al., (2015) system for the evaluation of the new weighted KPIs values was developed after testing respondents' opinion in the SSF on the suitability of the proposed KPIs for EQ. Also, an evaluation of the new KPIs was conducted after analysing CIC management interview responses. Thus, this study offers a comparison between the existing KPIs, and the new proposed ones aimed at the achievement of optimal outcomes through 3<sup>rd</sup> GBSC implementation. Also, Table 11 shows the new weighted values of KPIs activities and outcomes based on the optimal outcomes SHILP results. The development of KPIs in relation to the implementation of the 3<sup>rd</sup> GBSC, could lead to PMs improvements and enhance KPIs in EQ.

**Table 11, Estimation of Weighted Values of KPIs after applying the New Model**

Categories	KPI1	KPI2	KPI3	KPI4	KPI5	Optimal outcomes
	Activity	Outcome	Outcome	Outcome	Outcome	
Course (x1)	0.01	0.03	0.08	0.3	0.13	8,010
The Course Material (Textbooks, Hand-outs, Slides) (x2)	0.03	0.02	0.06	0.2	0.12	2,225
Professor (x3)	0.007	0.009	0.04	0.3	0.2	7,120
E-Learning/ Course Management System (CMS) (x4)	0.07	0.12	0.07	0.05	0.02	2,225
Teaching Assistant / Lab Assistant (x5)	0.009	0.006	0.03	0.3	0.2	4,450

Weighted KPIs through SHILP model of Course (x1)

Course (x1) KPI1 =  $86/8010 = 0.01$

Course (x2) KPI2 =  $250/8010 = 0.03$

Course(x3) KPI3 =  $642/8010 = 0.08$

Course(x4) KPI4 =  $2884 /8010 = 0.3$

Course (x5) KPI5 =  $1110 /8010 = 0.13$ .

Note: Similarly of calculating Course (x1) we could get the weighed value of the other KPIs categories.

### Total KPIs activities and outcomes based on the 3<sup>rd</sup> GBSC

In accordance with the estimation of new KPIs in the 3<sup>rd</sup> GBSC, Farag, et al., (2015) attempt to explain an analysis for determining a new weighted value of outcome perspectives based on

optimal outcomes. Hence, table 12 shows the estimation of weighted value activities in accordance with the new model, and is, for the purposes of this investigation, the relevant weighted value.

**Table 12: Estimation of Activities Weighted Values**

Categories	Activities	Outcomes	Total
Course (x1)	4972	3038	8,010
The Course Material (Textbooks, Hand-outs, Slides) (x2)	1158	1067	2,225
Professor (x3)	4479	2641	7,120
E-Learning/ Course Management System (CMS) (x4)	782	1443	2,225
Teaching Assistant / Lab Assistant (x5)	2970	1480	4,450

The weighted value of outcomes (3rd GBSC KPIs) for Course(x1) = total optimal outcomes (8010) - aggregation of general valuation relevance (4972) = 3038

Note; similarly of calculating Course (x1) we could get the weighed value of the outcomes for the other KPIs categories.

### The 3<sup>rd</sup> GBSC KPIs optimal outcomes and benchmarking

Table13 shows the results of the SHILP model. Thus, CIC's EQ unit could reveal both the positive and negative EQ points in relation to the financial accounting course. For instance, in the first SSF category is (course x1). The optimal outcome percentage is 62, compared to benchmark percentage of 80. Therefore, this model presents an opportunity to improve KPIs through the application of the 3rd BSC and improving KPIs. CIC's management should start to prepare a budget to perform their roles rather than on self-financing. Then, all the budgets would be directed towards student satisfaction services and the improvement of EQ. In turn, this could lead respectively to increasing student loyalty, competitive advantage, and profitability.

**Table 13: Results of SHILP Model**

Categories	Benchmarks	Optimal Outcomes
Course (x1)	80%*	62%
The Course Material (Textbooks, Hand-outs, Slides) (x2)	90%	52%
Professor (x3)	80%	63%
E-Learning/ Course Management System (CMS) (x4)	90%	33%
Teaching Assistant / Lab Assistant (x5)	80%	67%

Per cent of optimal outcomes Course (x1) = aggregation of general valuation relevance (4972) / optimal outcomes (8010) = 62 %

Per cent of (internal Benchmarking) outcomes for Course (x1) collected from centralization campus of CIC at new Cairo location = 80%

\*Note; similarly of calculating per cent of outcomes Course (x1) we could get the optimal outcomes per cent of other categories and benchmarking outcomes per cent of the other categories.

### DEA model analysis of DMUs efficiencies

Chiang, and Lin., (2009) argue that the basic concepts of BSC and the DEA for measuring management performance are complementary. For example, it is suggested that the BSC can provide appropriate performance outputs for the DEA. In addition, the DEA can set benchmarking for EQ of the courses based on their inputs and outputs, as well as, transform performance measures into managerial information. Accordingly, the synergy of the BSC and DEA can translate the appropriate performance indices into managerial implications.

This study investigation focuses on the identification of efficiency strategies used on twelve courses based in the Civil Engineering Faculty. Data from the SSF is used to compare with benchmarking courses at the CIC central location. The results indicate that interrelationships between the two perspectives of the 3rd GBSC are empirically valid. The DEA with output orientation was used to calculate the relative efficiency for these courses (DMUs). In addition, as shown in table 14, Charnes, et al., (1978) CCR model was employed to calculate EQ efficiency. Consistent with the application of the CCR model Richards, (2003) reveals that course efficiency is represented through the DMU, and furthermore, that this model presents DMU efficiency relative to the other DMUs. Whereas another DMU is inefficient relative to the other DMUs.

**Table 14. Input and output factors**

Factors (DMUs)	Unit (Students' satisfaction)/inputs	Unit (Students' satisfaction) benchmark /outputs
Financial Accounting (DMU1)	X1(course), X2(course material), X3 (Professor), X4 (E-learning), X5 (Teaching assistant)	X1(course benchmark), X2(course material benchmark), X3 (Professor benchmark), X4 (E- learning benchmark), X5 (Teaching assistant benchmark)
Sciagraphy (DMU2)	X1, X2, X3, X4 and X5	X1 BM, X2 BM, X3 BM, X4 BM and X5 BM.
History of Architecture (DMU3)	X1, X2, X3, X4 and X5	X1 BM, X2 BM, X3 BM X4 BM and X5 BM.
Measurement (DMU4)	X1, X2, X3, X4 and X5	X1 BM, X2 BM, X3 BM, X4 BM and X5 BM.
Communication (DMU5)	X1, X2, X3, X4 and X5	X1 BM, X2 BM, X3 BM X4 BM and X5 BM.
Structure Analysis I (DMU6)	X1, X2, X3, X4 and X5	X1 BM, X2 BM, X3 BM, X4 BM and X5 BM.
Drawing (DMU7)	X1, X2, X3, X4 and X5	X1 BM, X2 BM, X3 BM X4 BM and X5 BM.
Mechanics (DMU8)	X1, X2, X3, X4 and X5	X1 BM, X2 BM, X3 BM, X4 BM and X5 BM.
Manufacturing (DMU9)	X1, X2, X3, X4 and X5	X1 BM, X2 BM, X3 BM, X4 BM and X5 BM.
Arabic (DMU10)	X1, X2, X3, X4 and X5	X1 BM, X2 BM, X3 BM 4 BM and X5 BM.
Information System (DMU11)	X1, X2, X3, X4 and X5	X1 BM, X2 BM, X3 BM X4 BM and X5 BM.
Math I (DMU12)	X1, X2, X3, X4 and X5	X1 BM, X2 BM X3 BM, X4 BM and X5 BM.

This analysis has been conducted by using comparative benchmarking methods to evaluate course efficiency and management performance strategies. The results of this comparative analysis appear in table15. As can be seen in table13 that this study is built on CCR model and, considers the DMUs (courses) efficiencies are calculated based on the SHILP model results. In accordance with the efficiency score developed by Padron, Akdeniz, and Calantone, (2014), the following was applied:

Efficiency score = weighted sum of outputs/weighted sum of inputs

Espin, Aparicio, Gimenez, and Pastor., (2014) highlight that the units with efficiency score equal to one are efficient when they lie within the efficiency frontier. However, the units with a score less than one are inefficient, because some other unit or unit combination can produce the same output with fewer inputs. Further, in measuring course efficiency based on the application of the DEA model, Kao, (2014) output CCR model is used as follows:

Maximize:

$E_k^{CCR}$	$= \max. \sum_{r=1}^s U_{rk} Y_{rk}$
	s.t. $\sum_{i=1}^m V_i X_{ik} = 1$

$$\sum_{r=1}^s U_r Y_{rk} - \sum_{i=1}^m V_i X_{ik} \leq 0, \quad j=1, \dots, n$$

$$U_r, V_i \geq \varepsilon, \quad r=1, \dots, s, \quad i=1, \dots, m$$

$$0 \leq U_r, V_i \leq 1$$

Where  $U_r$  and  $V_i$  are virtual multipliers and  $\varepsilon$  is a small non- Archimedean number imposed to avoid ignoring any factor in calculating efficiency Charnes, et al., (1984). In addition,  $E_k^{CCR}$  is the DMU (the course) according to the CCR model and  $K$  is the name of the company (Faculty of Engineering). Also,  $s$  and  $m$  are the number of outputs and number of inputs respectively. Further,  $Y_{rk}$  and  $X_{ik}$  values are the total outputs and the total inputs of a DMU, thus  $r$  equals  $1, 2, \dots, s$  and  $i$  equals  $1, 2, \dots, m$ . Furthermore, it is suggested that an output is dependent on its benchmarking at the same faculty in CIC's centralisation location and includes the following three steps: 1) identifying best performance; 2) setting benchmarking goals; and 3) implementation.

**Table 15. The CCR model efficiencies score**

DMUs	CCR model score	Benchmarking score
(DMU1)	48.07	0.90
(DMU2)	100.00	0.80
(DMU3)	42.01	0.85
(DMU4)	71.39	0.90
(DMU5)	82.06	0.85
(DMU6)	26.09	0.80
(DMU7)	90.72	0.90
(DMU8)	97.04	0.90
(DMU9)	72.79	0.85
(DMU10)	69.35	0.80
(DMU11)	74.75	0.80
(DMU12)	100.00	0.90

The results show efficiency score for each course in accordance with the CCR model and reveal course EQ efficiency in comparison to that for benchmarking courses. This process presents an opportunity to improve EQ course KPIs which have low efficiency scores as mentioned above.

### **Using expectancy theory to predict CIC profitability.**

The prediction of CIC's profit derives from implementation of the 3rd GBSC. Sloof, and Praag.,(2008) identify three components of expectancy theory as follows: the first, effort performance (EP) is where expectancy is concerned with effort which is positively corrected by performance. It is expected in the current research model that in order for the effective application of the 3<sup>rd</sup> GBSC, improvements need to be made to the EQ KPIs. Thus, this could lead to achieving an association (EP). In other words, that positive action in PM KPI improvements may lead to positive outcomes. Lau, et al., (2014) argue that the second component of expectancy theory is performance – outcome (PO) expectancy and refers to instrumentality. Simply expressed, an outcome expectation is dependent on performance. Therefore, it appears that this factor could also have a positive effect on motivation to exert effort, which could ensure the implementation of the current research model. Further, Chiang, and Jang, (2008) refer to the third component as valence, this factor builds on a person's expectancy, is the belief of increasing the subjective expectations of great effort will lead to high level of performance. This factor builds on personal expectation. For example, the belief that, by increasing subjective expectations, great effort will lead to higher

levels of performance. Simply, the conviction that an increase in activity quality will lead to higher outcome quality.

With reference to the discussion above, this research model focuses on EQPMs improvement through the implementation of the 3<sup>rd</sup> GBSC. This emphasises the need to exert effort of improving PMs in general and financial performance in particular. Moreover, it aims to improve student loyalty, create a competitive advantage for CIC, based on expectancy theory performance outcomes, as well as, lead to respectively an increase in prediction profitability.

## **Discussion and conclusion**

The main purpose of this study is to develop the PMS and EQ in Egypt's PHES, based the application of the 3<sup>rd</sup>GBSC. Appendix A shows the suggested KPIs. Additionally, the activities and outcomes of the 3<sup>rd</sup> GBSC perspectives have been separated. Five categories of SSF have been itemised, starting with student satisfaction and ending with student loyalty, as well as CIC profitability. With an adequate PMS aimed at KPIs enhancement through the 3<sup>rd</sup> GBSC application, each category percentage corresponds to KPIs improvement target and is comparable to benchmark percentages, and SSF benchmarking data collected from the CIC central location. Moreover, this paper has the potential to contribute to the development of emerging economies in general and Egypt's PHES. Its findings reveal that the application of the 3<sup>rd</sup> GBSC has a significant impact on the improvement of the CIC's EQKPIs. Further, this application increases expectations of profitability based on expectancy theory. It presents a practical example for the evaluation of EQ KPIs efficiency through the DEA. We offer the first application of the 3<sup>rd</sup> GBSC is addressed accordance with the assessment of efficiency and EQ benchmarking, which as yet, has been developed in Egypt's PHES. In addition, this case study has been built on qualitative as well as quantitative approaches. We prepare the interviews and questionnaires, as shown in tables 3&4 aim to answer the research questions.

The answers to these research questions have been tested through application of mathematical models based on the linear programming concept of the SHILP and DEA models. In addition, these proposed models reveal the progress of current KPIs for the financial accounting course. About

KPIs for the activities and outcomes perspectives, the SSF of 89 students from 200 students distributed were aggregated, as shown in table 2. Furthermore, we suggest that KPIs of student satisfaction could be introduced in order to progress current KPIs and PMS. This development would build on the literature concerning the application of the BSC in the HES as detailed in Appendix A. the KPIs for the activities and outcomes were divided in the strategy linkage model of the DS in order to test the 3<sup>rd</sup> GBSC for each category. Hence, this point illustrates the answer to the first research question. In essence, this investigation tests the SSF categories in order to achieve the optimal outcomes of SSF weighted values, and it reveals the optimal percentage of SSF categories, compared with its cost, as a result of the development of strategy Weighted Value of KPIs (WVKPIs), this case study has potentially provided the CIC management with an overview of the current PMS, as shown in tables 7 and 8. For example, as shown in tables 11 and 12, the SHILP model details the improved WVKPIs.

A further point deserves attention; that of using the concept of the SHILP model as a means of internal benchmarking (see table 13). As a result, the reliability and validity of questionnaires, through application of the SPSS, has been tested during the study process. An additional advantage is that these outcomes could lead to the re-design of the PMS and enable CIC management to compare their budget. This model is useful for the improvement of KPIs and PMs. It describes what could happen a few years into the future and aids setting target. In addition, the DEA model was applied in order to evaluate score efficiencies through EQ course benchmarking. As can be seen in table 15, this presents an opportunity to improve the EQ PMs of courses which have low efficiency.

Finally, CIC profitability has been predicted on the basis of expectancy theory which enhances the reliability of the study model. In accordance with the above discussion, it is suggested that possible answers to research questions 2,3 and 4 have been identified.

In addition, some suggestions for future research are offered and summarised as follows:

- i. This study uses a 3<sup>rd</sup> GBSC model to improve KPIs and builds on the causality relationship between activities and outcomes. In addition, in accordance with Wu et al. (2011) it is recommended that a further study could be directed towards forming a comprehensive strategy map. This could be achieved through a more detailed analysis

- of the causality structure amongst university KPIs, and measurement variances could be disclosed in financial reports.
- ii. Hoque (2014) determine international variation in design and usage of BSC in both private and public sectors (in global). A future study could provide some explanation as follows:
- a) comprehensive justification of similarities and differences in 3<sup>rd</sup> GBSC practice and its effectiveness in different types of setting across private and public sectors;
  - b) examination of whether individual motivation for using balance scorecard measures in decision-making is a function of expectancy performance and outcomes;
  - c) According to expectancy theory, an investigation as to whether and how causal relationships between 3<sup>rd</sup> GBSC perspectives could be the outcome of facilitating strategic organisational and employee learning. Also, they could assess the impact on strategy organisational outcomes. Further, who supports 3<sup>rd</sup> GBSC practice and who opposes it?

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