Relationship between strategic management accounting techniques and profitability – a proposed model

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Summary

Purpose – *The purpose of this study is to propose a comprehensive strategic model to manage profitability. Strategic management accounting concepts and tools are adopted to explore and manage the main profitability drivers (cost, assets, and revenue).*

Design/methodology/approach – *A deductive approach is used to identify the variables of the profitability model. Phase one of this study rely on reviewing prior literature in the field in order to identify the key profitability drivers that uses in managing profitability (costs, assets and revenue).Phase two of the research focuses on testing the perceptions of the managers of Egyptian "Information and communications technology" sector, the relative merits of such a model.*

Findings – *The most important finding in the current study, which has not been investigated in previous studies, is that the proposed comprehensive profitability model which contains cost, the assets and revenue techniques was a better predictor of profitability than the alternative models, which contain a combination of two variables.*

Originality/value – *As the first study of its kind, this model contributes to the theoretical literature in the field. It is also a practical contribution in managing profitability of the Egyptian "Information and communications technology" sector.*

Keywords *Intellectual capital, Customer value management, Profitability management Strategic management accounting, Customer profitability analysis*

Paper type *Research paper*

1. Introduction

This research focuses on management accounting tools at a strategic level and their utilization to maximize profitability in commercial organizations. Improving profitability is important, but to achieve this, companies use different approaches and different management accounting tools. In utilizing management accounting, a strategic perspective is required to ensure the maximization of profitability. Strategic management accounting has created an opportunity for companies to change the way they "manage" profitability and to define a new strategic profitability model that can improve profitability. Therefore, the main purpose of this study is to develop a strategic comprehensive profitability model.

This paper reports on an exploratory study where the key drivers of profitability were determined. Strategic management accounting tools were then identified for each "profit driver" to establish a proposed comprehensive model of strategic management accounting to maximize profitability in companies. The model takes into account key strategic dimensions that affect profitability and uses the most appropriate strategic management accounting techniques to manage profitability. The research measured the perceptions of managers to these management accounting tools and their importance in maximizing profitability to refine the strategic management accounting profit maximization model. Thus, the creation of the model and the findings offer both theoretical and practical contributions to the strategic management accounting field.

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This paper reflects findings from a theoretical model development and primary data collection from managers in the Egyptian information and communications technology (ICT) sector. The model principles provide a basis for further research in "strategic profitability management" and further testing of the proposed profitability model in different industry situations, both industry sectors and different countries. Hence, this paper creates a new knowledge related to strategic profitability management which can be further developed both from a conceptual and practical implementation perspective.

2. Research context

In traditional management accounting, focus is often on a single dimension, such as costs (Helmrich, 1989), but from a strategic perspective, a more holistic view is required. Even though cost is an important part of the financial picture, it does not represent the whole (Brands, 1999). One of the main characteristics of strategic management is the change of focus towards effectiveness, which means "doing the right things" that maximize the results of total activities rather than an efficiency-only focus, which means "doing the thing right" (Hosking, 1993 and Loeb, 1994). Under the traditional profit system, the focus can be on reducing costs by using traditional management accounting techniques (i.e. focusing on efficiency). It does not focus on "doing the right thing", which maximizes the activity results, possibly by focusing on revenues or assets, which may have a greater impact on profitability (i.e. by focusing on effectiveness) (Helmrich, 1989). This is supported by Hosking (1993), who concludes that most companies concentrate 90 per cent of profit improvement efforts on increasing efficiency, even though about 90 per cent of the company's added values are generated by increasing effectiveness.

Strategic management requires changing from an "inside-out" approach to an "outside-in" approach by meeting customer needs and creating value for customers (McNair *et al.*, 2001a; Waldron, 2011). This affirms that profit improvement cannot be achieved by reducing (internal) costs alone, but rather by redirecting resources to the places that lead to improved profitability and customer satisfaction (Roslender *et al.*, 1998), hence the need for strategic management accounting that is more integrative in nature to the strategic decision-making process. Thus, profitability is viewed as the result of a number of factors, such as the company's competitive position in the market and the competitive pattern across time, instead of the traditional management accounting view which is internally focused, for example, on cost (Abuo-Alfutouh, 2004). A key aspect has to be to first determine what "drives" profitability, prior to considering measures required for monitoring profitability strategically.

Most previous studies in this area have focused on one "driver" for improving profitability, for example either revenues or costs. There are a number of studies that have focused on the cost dimension for profitability improvement through applying different strategic management accounting techniques (Brausch, 1994; Dalci *et al.*, 2010; Essia, 2001; Lenhardt, 2004, 2005; McGowan, 2009; Porter, 1985, 1998; Shank and Govindarajan, 1992; and Shank, 1989). Equally, a number of authors have focused on revenues as a main driver for improving profitability (Hemi, 1998; Woodlock *et al.*, 2001; Kennedy and King, 2004; Armour and Mergy, 2003; and Smith and Wright, 2004). They tend to share a common objective focusing on company resources to generate revenues instead of focusing on cost reduction. They also agree that an increase of revenues will only be achieved through focusing on customers.

Moreover, limited studies have considered the use of assets driver (focus on one driver) for improving profitability in the Egyptian ICT sector by focusing on intellectual capital as a strategic assets element (Seleim and Ashour, 2004, 2006). The main focus of Seleim and Ashour (2004) study was to build a measurement system which consists of the key intellectual capital indicators in Egyptian software companies. The other study of Seleim and Ashour (2006) examined the relationship between human capital and organizational performance within software companies in Egypt. Moreover, a national intellectual capital

model has been developed by Bontis (2004). This study investigated the interrelationships among the elements of the intellectual capital and the relationship between such elements and the financial results in ten Arabic countries (Egypt was one of them). Intellectual capital is a key strategic asset in ICT companies and it is positively affected by performance results. However, no empirical studies have focused on a comprehensive strategic profitability model in the Egyptian ICT sector.

A few studies have tried to combine drivers, mainly focused on two main drivers: revenues and costs (Christopher, 2002a, 2002b; Fontaine, 2004; Raaij, 2005; Noone and Griffin, 1997, 1998). These studies have been limited to addressing the concept of "profit", not the broader discussion of "profitability". According to Christopher (2002a), focusing on profit requires taking three variables into account. These are price, volume and mixture. Price and volume can be affected by the market and the creation of customer relations. The third variable, mixture, can be affected by three factors (improving contribution margin, improving and increase in sales and developing the product to achieve a higher contribution). According to Christopher (2002b), profit management consists of three leverages. These leverages are increasing contribution margin, increasing sales revenues and reducing fixed costs.

Fontaine (2004) emphasizes that real profitability management requires cost reduction and sales increase at the same time, rather than managing sales growth and cost reduction separately. According to Fontaine, this can be achieved by focusing on six elements (capacity limits, average selling price, average product cost of materials, operating expenditure, work in-process and other revenues that are not directly related to product sales). Raaij (2005) shows how using the customer profitability analysis technique can lead to a better managing of revenues and costs that have to be incurred to secure those revenues. This is further confirmed by the study of Noone and Griffin (1997, 1998), which explains how customer profitability analysis can be used in managing costs and revenues and the most appropriate strategies that can be used to reduce costs and increase revenues together.

Limited studies have extended use of the profitability concept by focusing on the key profitability elements that are determined by analysing the components of key profitability measures, such as return on assets (Helmrich, 1989; Stapleton *et al.*, 2002). Key elements of profitability are cost, assets and revenue. However, previous studies have not explained how these can be managed together in a coherent (holistic) model.

This paper explores the development of such a strategic management accounting model to assist managing profitability. No previous research in this subject area has combined three key drivers in such a way. In addition, no previous research in this subject area has been conducted in Egypt, and hence, this exploratory research adds new knowledge in the field, both through the theoretical development and industry testing of the model. The lack of management accounting literature that concerns a comprehensive strategic view in managing profitability in an Egyptian context, including the three key profitability drivers (cost, assets and revenue) and managing them using strategic management accounting techniques, supports the need for this study.

3. Research methodology and methods

Given the exploratory nature of the research, a deductive approach was used to investigate what should be included in such a profitability model. Phase 1 of the research reviewed previous studies in the field and from this the key drivers in managing profitability from the literature were established as costs, assets and revenue. Once the drivers had been established from the literature, further secondary research was undertaken to determine which strategic elements are most important at theoretical and industrial levels and which strategic management accounting techniques are most appropriate to manage each strategic element and each identified driver.

In building the relationships within the model, the main focus is on the direct relationships between the proposed variables (strategic management accounting techniques) and profitability to manage profitability, not the intervening main drivers (cost, assets and revenue). As the focus is on the strategic and holistic view of the drivers combined, this paper focuses on that level, not the intervening/individual drivers.

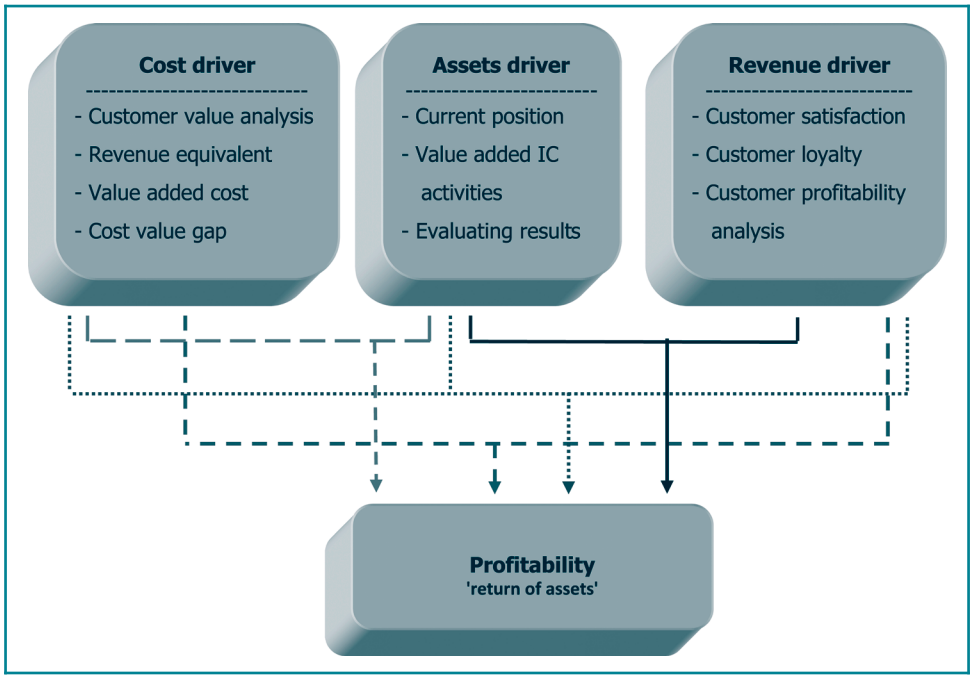
To develop such a model, customer focus and intellectual capital are identified as the most important strategic elements in the field of study. In addition, the most appropriate management accounting techniques to the areas of the three established drivers (costs, assets and revenue) and to the two strategic elements (customer focus and intellectual capital) are considered. This led to a number of techniques being identified for appropriate inclusion in the model, such as customer value-driven cost management, intellectual capital management (analysing and evaluating the current position of intellectual capital, identifying value-adding intellectual activities and evaluating results) and customer value management (customer satisfaction, customer loyalty and customer profitability analysis) (Appendix 1); these are then integrated into a coherent model for managing profitability.

The outcome of Phase 1 of the research was a suggested integrated model, illustrated in Figure 1. The dependent variable is profitability, being "driven" through the independent variables of costs, assets and revenue, with specific strategic management accounting tools being utilized to aid the management of profitability at the strategic level.

As previously identified, previous research in this area generally focused on one driver, sometimes two, but not this holistic view of managing profitability, so there is a question as to whether such a comprehensive model (combining three key drivers) is actually a better approach than focusing on an individual driver, or a combination of any two specific drivers.

The concept of strategic profitability management can be defined as the process of improving and maximizing profitability by effectively managing the main drivers of profitability, namely, revenues, costs and assets, through the use of a number of strategic management accounting techniques that combine together.

Figure 1 The proposed profitability model



Phase 2 of the research tested, through management perceptions, the relative merits of such a model. The proposed profitability model (Figure 1) reflects how integration between the cost, assets and revenue techniques affects profitability to determine which of the various combinations of the variables (drivers) provides the best explanation of profitability. In essence, it is assumed that the integration between the three drivers better predicts the level of profitability than the use of any combination between any two drivers, such as cost and assets, cost and revenue or assets and revenue. Therefore, it was anticipated that the more the comprehensive profitability model containing the three elements is used, the greater profitability can be managed.

The profitability model hypotheses are tested through evaluating the perceptions of managers about the impact of such a model on profitability. The relative weight of the three drivers is beyond the scope of this exploratory study. Thus, hypotheses for the profitability model can be formulated as follows:

H1. Cost and assets techniques are related to profitability.

H2. Cost and revenue techniques are related to profitability.

H3. Revenue and assets techniques are related to profitability.

H4. Cost, assets and revenue techniques are more related to profitability than any of the relationships identified above.

4. Approach to testing the model

ICTs increase companies' productivity, thereby fueling the growth of the global economy and helping companies be more competitive. Moreover, ICTs expand the reach and effectiveness of social development projects which achieve great benefits in different areas such as healthcare, education and environmental preservation. Although developing countries have faced various challenges, ICTs hold tremendous potential to help overcome these challenges and create new opportunities in developing countries (Anonymous, 2004).

Following the huge global developments in ICT in the early part of the twenty-first century, Egypt as one of the developing countries has also witnessed development in this field. The EMICT (2009) cited that a leading research and information analysis company called RNCOS stated in its report that the ICT industry in Egypt has emerged as a rapidly growing sector (the development of spending on the Egyptian ICT sector; the development of investments in the Egyptian ICT sector; the development of revenue in the Egyptian ICT sector; the development of the number of ICT companies; and the development in the number of ICT employees). This report also positions Egypt in the second place in terms of IT industry development among all Middle East countries. This is further confirmed in the report published by BMI (2007). This was affirmed in the Egyptian MICT report in 2007, which cited that the UK IT week magazine report stated that Egypt was trying to become the India of the Middle East in terms of ICT, as it sought to increase its share of the global outsourcing market. This position would show Egypt as a new growth market, and lead to creating new and profitable opportunities.

Due to the importance of the ICT sector for economies which creates opportunities to increase profitability and enhance the Egyptian economy as a whole, there is a need in this sector for the suggested profitability model to help managing profitability. Moreover, to reduce variables in the sample, the model was tested in the Egyptian ICT sector, so country and sector variations were not variables that could impact on the results.

Due to time and resource restrictions, a judgement sample is used in the current study. The current study focuses only on the ICT members of the Chamber of Information Technology and Communication (CITC). The determination of such a sample is justified as follows: firstly, all the members are registered in the Federation of Egyptian Industries and have annual financial reports, in addition to which, they have financial departments and hence

have specialists in the accounting field who are more likely to be interested in the current study. Secondly, the CITC has a database, which includes detailed information about company profile, profit and loss accounts, ratios and trends and all site and trading addresses contact details. All of this information makes it easy to contact possible respondent companies, which represents a difficult task in Egypt as a developing country.

The sample is drawn from the Federation of Egyptian Industries' database. So within the Egyptian ICT sector (population), the sample included all those members of CITC. The sample frame was 467 organizations (the total membership of CITC at the time) (FEI, 2008). The unit of analysis is the individual organizations. The respondents were financial and senior managers within the organizations, because they are able to comment accurately on the aspects in the questionnaire, as they have expertise in the accounting field at the strategic level in the organization.

4.1 Questionnaire development

The method used for data collection was a questionnaire. A self-administrated questionnaire, delivered and collected by hand, was utilized to test the proposed model. As a theoretical model of strategic profitability was created by reviewing the literature and adopted from the secondary research, this model was then used to develop the questionnaire to test the proposed model. The objective of this questionnaire was to collect data about the perception of managers related to each variable in the model and their relationships, which can then be used in evaluating the developed profitability model. To achieve this objective, the questionnaire was divided into three main sections (costs, assets and revenue).

Care was taken to ensure that questions covered all theoretical constructs contained in the proposed model. In addition, a 5-point Likert-type scale (from 1 "not important" to 5 "very important" for some questions and from 1 "completely disagree" to 5 "completely agree" in others) was used in most questions.

In this research, closed-question format was deemed the most appropriate type for the length of the questionnaire adopted. In addition, due to the pressure of respondents' time and a cultural dislike of such open questions, as they require a detailed answer, closed questions were deemed to be most appropriate.

As the respondents are Egyptian, therefore, the questionnaire format and related questions were designed to fit the Egyptian standards and norms for format, which requires a tabular-formatted design and the use of a sub-numbering system to specify the items of each construct. This format reduces the perceived time consumed in completion of the questionnaire, as it appears to be clear and easy to read.

As the study was conducted in Egypt, the questionnaire was translated into Arabic to suit local users. To ensure consistency between English and Arabic versions, the questionnaire was translated back into English using a "back translation" approach before being distributed to ensure linguistic and (and most importantly) conceptual equivalence.

The questionnaire was pre-tested and evaluated by six reviewers, two academics familiar with the Egyptian ICT industry, one academic statistician specializing in accounting research and three practitioners. Reviewers were asked to test the questionnaire and identify unclear items and suggest changes. Changes were made, based on the comments and suggestions received from the reviewers.

4.2 Response rate strategies

Questionnaires were distributed by hand to 467 individuals. After one week, companies which had not replied within the first week were phoned to remind them. After three weeks, a reminder letter with another copy of the questionnaire was delivered by hand to companies which had not replied. In all, 277 companies apologized for not completing the questionnaire. Of the completed questionnaires, 80 were completed and collected after the

first delivery. Fifty were collected after the first follow-up process. A further 60 were collected after the second follow-up process. A total of 190 completed questionnaires were received.

4.3 Response bias

Once all questionnaires were returned, a test was conducted to ensure that there was no significant difference between the responses received in the early and late stages of data collection. To enact this, the first and last 60 questionnaires were compared. The figure of 60 was used based on the slightly smaller number of questionnaires received in Phase 2 and to ensure an equal sample size for comparison. The testing was done through the application of the two-sample Kolmogorov–Smirnov test. This is appropriate, given the nature of the data, level of measurement and sampling. It also enables all points across the answer distribution to be compared.

The test showed that of the 120 variables, there was no significant difference in all but six cases. This represents a relative small percentage of the variables, and visual examination of the distributions demonstrated that the difference was due to the presence of a few respondents whose answers were consistently higher in relation to these specific variables. These respondents were in the late questionnaire group. Given that they are more likely to be general outliers in terms of these variables than evidencing a consistent response bias over all items, they were therefore included in the analysis (Appendix 1).

5. Data analysis approach

5.1 Factor analysis for the variables of the proposed techniques

As an initial step, descriptive statistics was conducted for cost, assets and revenue variables (Appendix 2 and Appendix 3). Furthermore, structural factor analysis was applied for variables of the proposed cost, assets and revenue techniques to examine the underlying relationships between variables. Common factor analysis was used. Choosing the appropriate method of common factor analysis depends on the distribution of the data (Fabrigar *et al.*, 1999). Due to the non-normality of cost, assets and revenue items, principal axis factoring was used as an extraction method.

The Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy indicated that the (17, 68 and 26) sampling items are adequate for structural factor analysis, with KMO measure = (0.8, 0.9 and 0.7), respectively, which can be described as "meritorious" (Hair *et al.*, 1998). In addition, the significance level for Bartlett's test is 0.00 (less than 0.05). Such results indicate that the data for all cost, assets and revenue variables are appropriate for using factor analysis.

5.1.1 For cost technique variables. Among the 17 items included in the analysis, 15 have communality values ranging from 0.4 to 0.7 (from lower to moderate), which are common magnitudes in social science (Velicer and Fava, 1998). On the other hand, two items have communality values less than 0.4, which means that they do not fit well with a factor solution and should be dropped from the analysis (Velicer and Fava, 1998). In addition, most of the items have a factor loading greater than 0.69, indicating a strong correlation between items and the factor they belong to. Furthermore, all items are loaded highly on only one factor and are not split-loaded on another factor above 0.32 (Tabachnick and Fidell, 2001). Principal axis factoring with varimax provides a four-factor solution with eigenvalues of 1.0 or above being extracted, and the 17 items which are retained under the four factors explain 61 per cent of the variance in the data set. The first factor accounts for 20 per cent of the variance, the second for 18 per cent, the third for 18 per cent and the fourth for 5 per cent. None of the remaining factors is significant. For reliability analysis, Cronbach's alpha is calculated to test reliability and internal consistency for each factor. The result indicates that the alpha coefficient for all factors is above 87 per cent, which is higher than the standard estimates of 0.70 (Howitt and Cramer, 2008). In addition, the Spearman

intercorrelation for the four factors is significant at the 0.001 level. The factors are labelled according to the commonality of items loading on each factor and are as follows: customer value analysis, value-added costing, cost–value gap and revenue generated from customer value.

5.1.2 For assets technique variables. All 68 items included in the analysis have communality values ranging from 0.4 to 0.8, which again are common in social science (Velicer and Fava, 1998). In addition, all 68 items have a factor loading above 0.62, which is "very significant" and indicates a strong correlation between items and the factor they belong to. Furthermore, all items are loaded highly on only one factor and are not split-loaded on another factor above 0.32 (Tabachnick and Fidell, 2001). Principal axis factoring with varimax suggests that three factors with eigenvalues of 1.0 or above are extracted, and 68 items are retained under the three factors explaining 65 per cent of the variance in the data set. The first factor explains 34 per cent of the variance, the second for 16 per cent and the third for 15 per cent. None of the remaining factors is significant. For reliability analysis, Cronbach's alpha is calculated to test reliability and internal consistency for each factor. The result indicates that the alpha coefficient for all factors is above 80 per cent, which is higher than the standard estimates of 0.70 (Howitt and Cramer, 2008). In addition, the Spearman intercorrelation for the four factors is significant at the 0.001 level.

The factors are labelled according to the commonality of items loading on each factor as follows: current intellectual capital, value-adding intellectual capital and evaluating the effectiveness of intellectual capital.

5.1.3 For revenue technique variables. Fourteen items from 26 included in the analysis have communality values ranging from 0.4 to 0.7 (from lower to moderate), which are common magnitudes in social science (Velicer and Fava, 1998). Nine items have communality values above 0.7, which represent high communality. On the other hand, three items have communality values less than 0.4, which means that they do not fit well with factor solution and should be dropped from the analysis (Velicer and Fava, 1998). In addition, most of the items have a factor loading above 0.49. Furthermore, all items are loaded highly on only one factor and are not split-loaded. Principal axis factoring with varimax provided a three-factor solution with eigenvalues of 1.0 or above, and 26 items are retained under the three factors which explain 60 per cent of the variance in the data set. The first factor explains 20 per cent of the variance, the second for 20 per cent and the third for 20 per cent. None of the remaining factors are significant. For reliability analysis, Cronbach's alpha is calculated to test reliability and internal consistency for each factor. The result indicates that the alpha coefficient for all factors is above 85 per cent, which is higher than the standard estimates of 0.70 (Howitt and Cramer, 2008). In addition, the Spearman's intercorrelation for the four factors is significant at the 0.001 level.

The factors are labelled according to the commonality of items loading on each factor and they are labelled as follows: customer satisfaction, customer loyalty and customer profitability analysis.

5.2 Relationship between the proposed cost, assets and revenue techniques and profitability

Given the nature of the research, including the nature of the questionnaire, it lends itself to statistical analysis of the data. Ordinal regression was utilized for the various combinations of the three proposed drivers (cost with asset techniques; cost with revenue techniques; asset with revenue techniques; and cost, asset and revenue techniques) to find the best combination, which meets the proportional odds assumption, fits data well, significantly predicts profitability and produces the highest pseudo *R*-square statistics.

In building ordinal regression models for profitability, the five link functions provided by SPSS were tried. Although negative log-log function seems to be the best choice because of the lower categories of the dependent variable, not only negative log-log function is

used, but also Logit link function, as it achieves better fit and meets the assumption of parallel lines of an ordinal dependent variable (Johnson and Albert, 1999).

Table I can help assess whether the assumption that the parameters are the same for all categories is reasonable. The assumption is not violated, as the finding is non-significant for all models. This means that there is no significant difference between the models, indicating the relative effect of predictor variables is consistent across all levels of profitability. Such a result means that ordinal regression can be run for all of these models.

Table II includes the −2 log likelihood values for both the intercept-only model and final model with predictors. The difference between the log likelihood values can be interpreted as chi-square distribution statistics. The significant chi-square statistic ($p < 0.05$) indicates a significant improvement over the intercept-only model, which suggests that the model gives better prediction (McCullagh and Nelder, 1989). Such a table shows that all models are fit well to the data, showing the predictors' added significant value to models.

Table III shows measures that assess the overall goodness of fit of the ordinal regression model. There are two goodness-of-fit statistics. They are the Pearson's chi-square statistic and deviance chi-square. These statistics test whether the observed data are inconsistent with the fitted model. A well-fitting model is non-significant according to these tests, which means that the data and model prediction are similar. The above table shows that for all combinations of variable models, the data in that the expected and observed values did not significantly differ as evidenced by Pearson chi-square and by deviance chi-square statistics.

Table IV shows that there are three measures which are analogous to *R*-squared in ordinal least regression. All should be taken as additional measures of model effect size. The three measures are Cox and Snell's *R*-square (Cox and Snell, 1989), which is a well-known generalization of the usual measure designed to apply when maximum likelihood estimation is used. However, with an ordinal dependent variable, it has a theoretical maximum value of less than 1.0. For this reason, Nagelkerke (1991) proposed a modification that allows the index to take values in the full zero to one range. McFadden's *R*-square (McFadden, 1973) is another version based on the log likelihood kernel for the intercept-only model and the full estimated model.

The analysis of the *R*-square measures for all models indicates that correlations between predictors and profitability for cost and assets, cost and revenue and assets and revenue techniques are quite similar. This means that the three combinations have the same size effect on profitability. In addition, the final model which contains cost, assets and revenue techniques is the best model because its predictors are strongly associated with the profitability. It can be concluded that profitability is better predicted by the model

Table I Test of parallel lines

Combination of variables	χ^2	*df*	*Significance*
Cost and assets techniques	11.4	7	0.12
Cost and revenue techniques	10.2	7	0.18
Assets and revenue techniques	2.8	6	0.83
Cost, assets and revenue techniques	17.0	10	0.075

Table II Model fitting information

Combination of variables	*Link function*	χ^2	*df*	*Significance*
Cost and assets techniques	Logit	146.0	7	0.00
Cost and revenue techniques	Logit	142.1	7	0.00
Assets and revenue techniques	Logit	154.2	6	0.00
Cost, assets and revenue techniques	Negative log-log	207.5	10	0.00

Table III Goodness of fit

Combination of variables	χ^2	*df*	*Significance*
Cost and assets techniques			
Pearson	237.4	371	1.0
Deviance	224.7	371	1.0
Cost and revenue techniques			
Pearson	306.5	371	1.0
Deviance	228.9	371	1.0
Assets and revenue techniques			
Pearson	240.7	372	1.0
Deviance	216.8	372	1.0
Cost, assets and revenue techniques			
Pearson	174.9	368	1.0
Deviance	163.5	368	1.0

Table IV Pseudo R^2

Combination of variables	R^2 *measures*	*Values*
Cost and assets techniques	Cox and Snell	0.54
	Nagelkerke	0.63
	McFadden	0.39
Cost and revenue techniques	Cox and Snell	0.53
	Nagelkerke	0.61
	McFadden	0.38
Assets and revenue techniques	Cox and Snell	0.56
	Nagelkerke	0.65
	McFadden	0.42
Cost, assets and revenue techniques	Cox and Snell	0.67
	Nagelkerke	0.78
	McFadden	0.56

containing "cost management technique", "assets management technique" and "revenue management technique" together.

Table V shows that all predictors in the four models are significant in predicting profitability, except "evaluating intellectual capital" in the first model, "Gap" in the second model and "customer loyalty" in the third model. These variables do not have a statistically significant effect on profitability. In contrast, these variables have a statistically significant effect on profitability in the overall model. In addition, all regression coefficients in all models have a positive value, which means that for a one unit increase in each predictor variable, the profitability level is expected to change to a higher level by its respective regression coefficient, while other variables in the model are held constant.

6. Discussion

The purpose of this model is to manage overall profitability from a strategic perspective. This requires dealing with profitability as a result of a number of drivers by understanding how each driver affects profitability and how these drivers are managed by using appropriate strategic management accounting techniques to manage overall profitability. To achieve this purpose, costs, assets and revenue are used together as the main drivers for managing profitability from a comprehensive perspective for the purpose of strategic management accounting. Moreover, the current study investigated the influence of the integration between the proposed (cost, assets and revenue) techniques on profitability.

A major finding of this study reveals that all the proposed strategic management accounting techniques used in managing costs, assets and revenue are significant in predicting profitability in the comprehensive model. This means that each proposed

Table V Parameter estimates

Variables	*Estimate*	*Wald*	*df*	*Significance*
Customer value analysis	0.89	12.0	1	0.001
Revenue equivalent	1.0	9.5	1	0.002
Value add costing	1.8	35.0	1	0.000
Gap	0.57	4.8	1	0.028
Current intellectual capital	1.7	14.7	1	0.000
Value add intellectual capital	4.0	37.6	1	0.000
Evaluating intellectual capital	0.63	2.0	1	0.148
Customer value analysis	1.3	22.9	1	0.000
Revenue equivalent	0.76	5.5	1	0.018
Value add costing	1.4	20.0	1	0.000
Gap	0.02	0.07	1	0.79
Customer satisfaction	2.6	21.7	1	0.000
Customer loyalty	1.0	19.9	1	0.000
Customer profitability analysis	1.4	18.4	1	0.000
Current intellectual capital	2.9	28.8	1	0.000
Value add intellectual capital	0.44	3.0	1	0.082
Evaluating intellectual capital	1.5	23.9	1	0.000
Customer satisfaction	1.9	19.1	1	0.000
Customer loyalty	3.2	22.7	1	0.000
Customer profitability analysis	1.1	5.7	1	0.017
Customer value analysis	1.6	12.6	1	0.00
Revenue equivalent	1.8	35.8	1	0.00
Value add costing	0.98	7.5	1	0.006
Gap	2.9	24.4	1	0.00
Current intellectual capital	1.1	9.4	1	0.002
Value add intellectual capital	1.1	23.4	1	0.00
Evaluating intellectual capital	0.70	6.6	1	0.010
Customer satisfaction	1.5	26.7	1	0.00
Customer loyalty	0.38	3.5	1	0.006
Customer profitability analysis	0.60	8.1	1	0.004

technique used in managing costs or assets or revenue affects the overall profitability in the comprehensive model. This emphasizes that there is a significant relationship between cost and profitability, assets and profitability and revenue and profitability.

The findings of the current study support works of Brausch (1994); Dalci *et al.* (2010); Essia (2001); Lenhardt (2004, 2005); McGowan (2009), Porter (1985, 1998); Shank and Govindarajan (1992), and Shank (1989), in that there is a significant relationship between strategic management accounting techniques that are used in managing cost and profitability. However, these studies did not use the same strategic cost techniques proposed by the current study. They also support the works of Hemi (1998), Woodlock *et al.* (2001), Kennedy and King (2004), Armour and Mergy (2003), and Smith and Wright (2004), in that there is a significant relationship between strategic revenue techniques and profitability. However, different techniques have been used by the current study. Furthermore, it supports the works of Seleim and Ashour (2004, 2006), in that there is a significant relationships between intellectual assets and profitability in the Egyptian ICT sector. However, different techniques have been used by the current study.

A significant result of this study suggests that there is a positive correlation between the combinations of revenue and assets, revenue and cost and cost and assets and profitability. Therefore, the hypotheses (*H1*, *H2*, *H3* profitability) that each form of integration of these models is related to profitability can be accepted. This finding emphasizes that there is a significant relationship between each combination and profitability. This means that profitability could be managed also by focusing on two drivers which could be revenue and assets, revenue and cost or cost and assets. This represents a boarder view than focusing on one driver.

This is supported by the works of Christopher (2002a, 2002b) and Fontaine (2004), in that there is a positive relationship between cost and revenue on one hand and profitability on

the other hand. However, this study examines the relationships between the different combinations of the three drivers not just two drivers as the previous studies. In addition, the current analysis reveals that there is a slight variation between the three combinations of models (revenue and assets, revenue and cost and cost and assets) related to the correlation between their variables and profitability. This emphasizes that all combinations have the same effect on profitability and all of them have the same importance for managing profitability. Such a finding confirms that companies seeking to effectively and strategically managing profitability should focus on the three drivers together and manage them via a coherent model.

Furthermore, the most important finding in the current study that has not been investigated in previous studies is that the proposed comprehensive model for managing profitability (which included cost, the assets and revenue techniques) predicted a higher level of profitability and its predictors are most strongly associated with the profitability. This result emphasizes that integration between the above three variables better predicts profitability than the alternative models, which contain any combinations of any other two variables. This means that integration between the three proposed variables improves profitability. Therefore, the hypothesis (*H4* profitability) that integration between the three models is more related to profitability than any of the relationships can be accepted. Thus, profitability should be managed from a comprehensive perspective, which takes into account the most important drivers that may affect profitability, and manages them using appropriate techniques (e.g. customer value-driven cost management; intellectual capital management; and customer value management).

There is a lack of literature related to identifying profitability drivers and explaining how these drivers should be managed from a comprehensive strategic perspective. The findings of the current study support (Helmrich, 1989; Stapleton *et al.*, 2002) works in that there is a positive relationship between sales, expenditure and assets, and the return on wealth. Their study identified three profitability drivers (sales, expenditure and assets) and examined their influence on return on wealth as a measure of profitability. Although this previous study concluded that companies aiming to improve profitability should manage the three drivers, it did not clarify how they could be managed in a coherent (holistic) model using strategic management accounting techniques, which represents one of the most important contributions of the current study.

The proposed strategic profitability model concerns managing cost, assets and revenue using strategic management accounting techniques. Such a model changes the focus from the concept of cost management to a broader and more inclusive concept of profitability management by focusing on the three key drivers of profitability cost, assets and revenue. This new focus provides management accounting with a new tool to identify strategic information about where companies make profit and redirect resources to places that lead to improved profitability through clearly determining profit drivers. In addition, such a new model expands the range of information offered by management accounting and improves the role of strategic management accounting. It allows to combine various strategic management accounting techniques that focus on customer, together. This combination provide customer with strategic information to create a competitive superior value which leads to improved profitability.

Moreover, it focuses on a balance of financial and non-financial information in managing profitability together. For instance, it uses both forms of information in managing revenue where it adopted customer profitability technique as a financial measure and adopted financial and non-financial indicators for managing customer satisfaction and customer loyalty. In addition, it used both measures in managing intellectual capital resources. Such a focus is an important factor to offer different strategic information.

Finally, the proposed profitability model emphasized both internal and external environments by using strategic management accounting techniques that focus on both

dimensions. It does so by adapting an attribute-based costing and value creation model that focuses on the customer as an external element and the internal activities in managing cost. In addition, it used customer profitability analysis, which focuses on external element represented in customer and internal element represented in cost, and customer satisfaction and customer loyalty in managing revenue. It also adapted intellectual capital indicators to manage intellectual capital resources that contain both internal (process, technology and employee) and external (customer) resources. Such an emphasis is also to expand the range of information offered by management accounting and to improve the role of strategic management accounting in managing profitability. This means that the proposed model can be used as an important strategic tool for managing profitability in the strategic management accounting context.

A successful implementation of the strategic profitability model in the ICT sector requires a multi-functional team, where management accountants work closely with marketing, operations management, product development and general management employees. To effectively manage cost, the multi-functional team should determine the most important factor that affects profitability.

As ICT companies are characterized by vigorous competition, which requires focusing on customers to achieve competitive advantage, the most important factor that affects profitability is representative in customer value creation. In addition, they should use the most appropriate cost technique that affects customer value, which is named customer value–cost management. Thus, a particular focus must be given to develop an internal information system to identify the activities and divide them into three categories (waste activities, value-adding business activities and core value-adding activities), to focus on the core value-adding activities, which directly affect customers. These data must be collected from the internal process and from the external (marketing). Operation manager and product development manager should identify the attributes of each product. In addition, management accountant should play a big role through costing various product attributes and monitoring the performance of such attributes over time and reporting these costs regularly. Moreover, to manage assets effectively for improving profitability, the key element that affects profitability should be determined.

ICT companies are an excellent setting to understand the features of a knowledge-based economy, as they are characterized by extensive dependence on intellectual capital and they lack tangible assets. The suggested profitability model should focus mainly on intellectual capital as the key element that affects profitability in managing assets. The major challenge in the application of the proposed model is to identify the key intellectual capital resources that create value and achieve strategic goals and to determine the key activities that significantly affect intellectual capital. To effectively manage such intellectual capital, management accountant should develop an appropriate measurement system that contains both financial and non-financial indicators.

Furthermore, ICT companies that manage revenue for the purpose of managing profitability should focus on customers as the most important element that affects profitability. In addition, they should effectively manage the value that customers obtain from the company which is representative in customer satisfaction and customer loyalty. Therefore, the marketing team should carefully analysis the marketing and collect data that help the management accountant in developing financial and non-financial indicators to evaluate customer satisfaction and loyalty. Also, the team members should provide the management accountant with information about revenue from each customer and the cost of each one to analyse the profitability of each customer and identify the value that company gets from its customers.

It can be concluded that a successful implementation of the proposed model requires a successful coordination and communication between all members in the suggested multi-functional team. In addition, it requires a relevant and strong database which includes

the relevant data related to customers, intellectual capital and all activities within the company. This can help the management accountant to develop the proposed model.

The construction of such a coherent model could provide ICT companies with strategic information related to customers and intellectual capital with their relationships with cost, assets and revenue. Such information could be used to improve profitability.

For the Egyptian ICT sector, more attention should be paid to developing such a required database. Furthermore, the suggested multi-functional team needs extra training courses to improve their skills and develop their knowledge related to strategic management and strategic management accounting.

7. Conclusion

One of the most important requirements of strategic management accounting is to change its focus from the concept of cost management to a broader and more inclusive concept of profitability management. This requires dealing with profitability as the result of a number of drivers, understanding how all drivers affect profitability and managing them by using a set of appropriate strategic management accounting techniques.

There has been a lack of attention paid by researchers to studying the integration between the drivers that affect profitability (cost, assets and revenue). Furthermore, there has also been a lack of attention given by researchers to the management of such drivers using strategic management accounting techniques together in a coherent model. This paper makes a number of distinct contributions to the management accounting literature. The major contribution of this paper is the proposition of a new comprehensive model for managing profitability to fulfil the requirements of strategic management accounting. This model focuses on managing together the most important drivers of profitability (cost, assets and revenue), which has not been addressed in the existing literature. This study proposed a strategic management accounting technique for managing each driver, which also has not been addressed in the existing literature. This comprehensive model creates a new strategic database that can be used in managing profitability from a strategic perspective, which also has not been discussed in the existing studies.

The study was conducted in the Egyptian ICT sector and provides specific information of value in this specific sector, not addressed in the existing literature.

The quantitative analysis of the comprehensive profitability model indicated that the proposed strategic management accounting techniques used in managing costs, assets and revenue are significant in predicting profitability in the comprehensive model. A key result was that the comprehensive profitability model was the best model in predicting a higher level of profitability.

As with any study, there are limitations. As this study was conducted only in a single country and in a single sector, that of the Egyptian ICT sector, while this is one of the most appropriate sectors for the proposed profitability model, such a focus could be viewed as a limitation. The findings of this study are influenced by the particular nature and characteristics of the Egyptian ICT sector. Therefore, the generalization of findings beyond the Egyptian ICT sector should be made with caution. Another limitation is that the use of judgement sampling in the current study may increase the risk of producing bias and inefficient parameter estimates, which should be taken into consideration (Guo and Hussey, 2004). However, judgement sampling is the best choice in the current study for reasons related to the availability of data and to ensure access to qualified respondents in the Egyptian ICT sector.

The current study found that a customer-focused strategy used in managing costs and revenue strongly affected profitability. However, further examination of the influence of competitor-focused strategy and related strategic management accounting techniques

such as strategic cost analysis and target costing on profitability might be required as another significant driver in strategic management accounting.

The influence of using other strategic management accounting techniques in managing each driver such as process-based costing and value-based management techniques on profitability is another interesting area for future research. Additional effort is needed to develop other non-financial indicators for managing intellectual capital, customer satisfaction and customer loyalty to explore their relationship with profitability.

Further work is also needed to examine the strength of interrelationships and overlap among the cost, assets and revenue drivers. This can be achieved by using appropriate statistical methods such as the path analysis and structural equation modelling to determine the relationship between the three constructs on one hand and between the three constructs and profitability on the other hand. Using such statistical techniques would also help to determine the weighting of each driver when related to profitability.

As an exploratory study, this research achieved its aim. However, given the identified limitations and its exploratory nature, there is still much research that can be developed in this area, and future research studies can develop and test this model in alternative environments.

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Appendix 1

Definitions of model variables

Customer value-driven cost management technique. The proposed technique used in managing cost is adapted from the attribute-based costing approach, which is advanced by Bromwich (1990), and the customer value creation model, produced by McNair *et al.* (2001a, 2006). Within this research, this is termed the "customer value-driven cost management technique". This technique includes the four suggested steps that could be used to manage cost for the purpose of strategic profitability management. These steps are, namely, customer value analysis, measuring revenue equivalent, determining and measuring value-added cost and identifying cost–value gap and decision-making.

Customer value analysis. Bridging the gap between value and cost begins with translating market concepts and putting them in the form of a list of attributes that represent customer preferences (McNair *et al.*, 2001b) and that express the factors affecting customer preferences in the market (Green and Srinivasan, 1990).

Measuring revenue equivalent. It is suggested that this could be called "value-weighed revenue". The total revenues are distributed over the selected alternative attributes by using the expected customer value (as calculated in the previous step) for each attribute, to reach the revenue achieved by each attribute for the company (McNair *et al.*, 2006).

Determining and measuring value-added cost. To determine value-added cost, using the "value creation model" is suggested (McNair *et al.*, 2001b, 2006).

Identifying cost–value gap and decision-making. The basis of the company's ability to make profits is to understand the relationship between costs and the value. This is realized through understanding the relationship between what the customer will pay for the product or service, and the cost incurred by the company to supply what the customer wishes in the form of product attributes (McNair *et al.*, 2006).

Intellectual capital management

The proposed assets technique is adapted from studies by Larsen *et al.* (1999), Canibano *et al.* (2002), Fabritius (2003), and Mouritsen *et al.* (2004), which focus on the value creation approach. The main purpose of the proposed technique is not to determine the financial value of intellectual assets or its different elements, but rather to help in realizing the ultimate goal, i.e. achieving profitability. This is done through identifying and defining the main intellectual resources that cause value creation, analysing the current status of them,

determining value-added intellectual capital activities and evaluating whether such activities achieve companies' goals or not. This can be measured using both financial and non-financial indicators that are expected to affect profitability (Low, 2000; Bollen *et al.*, 2005). Such indicators are adapted from Kaplan and Norton (1996), Canibano *et al.* (1999), Liebowitz and Suen (2000), Phillips and Phillips (2002), Canibano *et al.* (2002), De Pablos, (2003), Fabritius (2003), Metwalli (2003), Chen *et al.* (2004), Bose (2004), Mouritsen *et al.* (2004), Abdel-Maksoud *et al.* (2005), Al-Kheyal (2005), Al-Gendy (2005) and Essia, (2007). Therefore, it could be suggested that intellectual capital can be managed using three key stages, namely, analysis and evaluation of current status of intellectual assets, identification of value-adding intellectual activities and evaluating results.

Customer value management

The value that the customer obtains from the company is translated into behavioural results represented mainly in customer satisfaction and loyalty. Therefore, the objective must be to increase customer satisfaction and boost loyalty to achieve the customer's value and improve profitability. Customer satisfaction and loyalty have been proposed as sub-drivers in managing revenue for purposes of profitability management.

Customer satisfaction represents an attempt to define the customer's view of the products and services provided by the company and to show the problems faced by customers when they deal with the company.

Customer satisfaction measurement is proposed based on two main pivots, as shown by Figure A1.

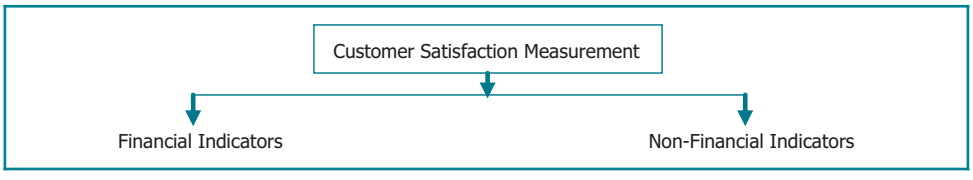
Both financial and non-financial indicators are used in the revenue model to measure customer satisfaction for the purpose of profitability management.

Customer loyalty. This refers to the tendency of current customers to obtain products and services from the same company in the future. Customer loyalty represents the main key to customer retention (Kumar and Shah, 2004). Customer loyalty can be translated into financial and non-financial indicators (Balogu, 2004).

The concept of customer profitability analysis. The concept of customer profitability analysis has been discussed in many studies. According to Smith and Dikolli (1995), customer profitability analysis refers to the reporting and analysis of customer revenues and customer costs. This is further developed by the study conducted by Mohamed (1998), which defined customer profitability analysis as the description and recording of the contribution of each customer or group of customers to the company's profit, provided that the contribution to profit represents the difference between the revenues earned from the customer and the total costs related to such customer. This is further supported by Raaij (2005), who viewed customer profitability analysis as the process of revenue and cost distribution for a segment of customers or an individual customer by applying the activity-based costing approach. This definition focuses on the approach suggested for customer profitability analysis, i.e. the activity-based costing approach. Horngren *et al.* (2006) add a key dimension in their definition which is analysis, and they explain that customer profitability analysis is based on reporting and analysing revenues earned from customers and the cost incurred to earn those. This analysis explains the reasons for income differences among customers, with the result of focusing on the customer who significantly contributes to income.

From the above definitions, it can be concluded that customer profitability analysis is a technique for recording and analysing all the revenues earned from customers, whether at the individual customer level or at the group level, and the costs incurred to earn such revenues, with a view to defining the contribution of each customer or group of customers in achieving company's profit. This means that profits are calculated at the level of customers rather than products.

Figure A1 Customer satisfaction measurement



Appendix 2

Table AI Response bias test

Variables	*Mann–Whitney* U	*Wilcoxon W*	*Z*	*Asymptotic significance (two-tailed)*
c1.1	1,577.500	3,407.500	−1.296	0.195
c1.2	1,763.000	3,593.000	−0.210	0.834
c1.3	1,580.000	3,410.000	−1.217	0.224
c1.4	1,678.000	3,508.000	−0.694	0.488
c1.5	1,777.500	3,607.500	−0.128	0.898
c2.1	1,623.500	3,453.500	−1.052	0.293
c2.2	1,555.500	3,385.500	−1.423	0.155
c2.3	1,737.000	3,567.000	−0.348	0.728
c2.4	1,723.500	3,553.500	−0.427	0.669
c2.5	1,603.000	3,433.000	−1.104	0.269
c3.1	1,763.000	3,593.000	−0.213	0.831
c3.2	1,365.000	3,195.000	−2.634	0.008
c4.1	1,794.500	3,624.500	−0.030	0.976
c4.2	1,681.000	3,511.000	−0.677	0.498
c4.3	1,735.500	3,565.500	−0.364	0.716
c4.5	1,670.500	3,500.500	−0.729	0.466
c5.1	1,712.500	3,542.500	−0.488	0.626
c6.1	1,748.000	3,578.000	−0.295	0.768
c6.2	1,647.500	3,477.500	−0.866	0.386
c6.4	1,441.000	3,271.000	−2.083	0.037
a1.1	1,783.000	3,613.000	−0.100	0.920
a1.2	1,677.500	3,507.500	−0.699	0.485
a1.3	1,557.000	3,387.000	−1.420	0.156
a1.4	1,683.000	3,513.000	−0.708	0.479
a2.1	1,611.000	3,441.000	−1.064	0.287
a2.2	1,575.500	3,405.500	−1.276	0.202
a2.3	1,515.000	3,345.000	−1.584	0.113
a3.1.1	1,591.500	3,421.500	−1.158	0.247
a3.1.2	1,770.000	3,600.000	−0.166	0.868
a3.1.3	1,719.500	3,549.500	−0.445	0.657
a3.1.4	1,760.000	3,590.000	−0.222	0.824
a3.1.5	1,703.500	3,533.500	−0.539	0.590
a3.1.6	1,734.000	3,564.000	−0.378	0.706
a3.1.7	1,700.500	3,530.500	−0.549	0.583
a3.1.8	1,797.000	3,627.000	−0.017	0.987
a3.1.9	1,628.500	3,458.500	−1.011	0.312
a3.2.1	1,590.000	3,420.000	−1.164	0.244
a3.2.3	1,712.500	3,542.500	−0.487	0.626
a3.2.4	1,617.000	3,447.000	−1.043	0.297
a3.2.5	1,740.000	3,570.000	−0.336	0.737
a3.3.1	1,688.000	3,518.000	−0.629	0.530
a3.3.2	1,745.000	3,575.000	−0.319	0.750
a3.3.3	1,692.000	3,522.000	−0.617	0.538
a3.3.5	1,658.000	3,488.000	−0.815	0.415
a3.4.1	1,742.500	3,572.500	−0.332	0.740
a3.4.2	1,747.500	3,577.500	−0.296	0.768
a3.4.3	1,477.500	3,307.500	−1.805	0.071
a3.4.4	1,767.500	3,597.500	−0.182	0.856
a4.1.1	1,478.500	3,308.500	−1.789	0.074
a4.1.2	1,687.500	3,517.500	−0.629	0.529
a4.1.3	1,757.000	3,587.000	−0.239	0.811
a4.1.4	1,745.000	3,575.000	−0.312	0.755
a4.2.1	1,718.000	3,548.000	−0.472	0.637
a4.2.2	1,647.000	3,477.000	−0.996	0.319
a4.2.4	1,742.500	3,572.500	−0.316	0.752
a4.3.1	1,713.000	3,543.000	−0.488	0.626
a4.3.2	1,602.000	3,432.000	−1.120	0.263

(*Continued*)

Table AI

Variables	*Mann–Whitney* U	*Wilcoxon W*	*Z*	*Asymptotic significance (two-tailed)*
a4.3.3	1,622.000	3,452.000	−0.986	0.324
a4.3.4	1,522.000	3,352.000	−1.586	0.113
a4.3.5	1,601.500	3,431.500	−1.123	0.261
a4.3.7	1,733.000	3,563.000	−0.381	0.703
a4.4.1	1,780.500	3,610.500	−0.110	0.913
a4.4.2	1,733.500	3,563.500	−0.385	0.700
a4.4.4	1,707.500	3,537.500	−0.532	0.594
a5.1.1	1,581.000	3,411.000	−1.292	0.196
a5.1.2	1,647.000	3,477.000	−0.892	0.373
a5.1.3	1,567.000	3,397.000	−1.400	0.161
a5.1.4	1,693.500	3,523.500	−0.621	0.535
a5.1.5	1,715.000	3,545.000	−0.502	0.615
a5.1.6	1,676.500	3,506.500	−0.727	0.467
a5.1.7	1,610.500	3,380.500	−0.604	0.546
a5.2.1	1,780.500	3,610.500	−0.110	0.913
a5.2.3	1,733.500	3,563.500	−0.385	0.700
a5.2.4	1,707.500	3,537.500	−0.532	0.594
a5.3.2	1,748.000	3,578.000	−0.290	0.772
a5.3.3	1,675.500	3,505.500	−0.700	0.484
a5.3.4	1,727.000	3,557.000	−0.406	0.684
a5.3.5	1,562.000	3,392.000	−1.319	0.187
a5.3.6	1,471.000	3,301.000	−1.929	0.054
a5.4.1	1,498.500	3,328.500	−1.721	0.085
a5.4.2	1,798.500	3,628.500	−0.009	0.993
a5.4.3	1,497.000	3,327.000	−1.699	0.089
a5.4.4	1,726.000	3,556.000	−0.443	0.658
r1.1	1,740.000	3,570.000	−0.364	0.716
r1.2	1,590.000	3,420.000	−1.273	0.203
r1.3	1,704.000	3,534.000	−0.564	0.573
r2.1	1,727.000	3,557.000	−0.413	0.680
r2.2	1,769.500	3,599.500	−0.177	0.859
r2.3	1,467.000	3,297.000	−1.877	0.060
r2.4	1,708.500	3,538.500	−0.514	0.607
r2.5	1,694.500	3,524.500	−0.589	0.556
r2.6	1,737.000	3,567.000	−0.356	0.722
r3.1.1	1,699.000	3,529.000	−0.568	0.570
r3.1.2	1,661.500	3,491.500	−0.774	0.439
r3.1.3	1,690.500	3,520.500	−0.609	0.542
r3.1.4	1,747.000	3,577.000	−0.298	0.765
r3.1.5	1,722.000	3,552.000	−0.436	0.663
r3.1.6	1,780.500	3,610.500	−0.111	0.911
r3.2.3	1,799.500	3,629.500	−0.003	0.998
r3.2.4	1,568.000	3,398.000	−1.305	0.192
r3.2.5	1,605.000	3,435.000	−1.093	0.274
r3.2.6	1,529.000	3,359.000	−1.501	0.133
r3.2.8	1,453.000	3,283.000	−1.990	0.047
r3.2.9	1,531.500	3,361.500	−1.582	0.114
r4.1	1,402.000	3,232.000	−2.201	0.028
r4.2	1,515.500	3,345.500	−1.587	0.112
r4.3	1,418.000	3,248.000	−2.129	0.033
r4.4	1,378.000	3,208.000	−2.441	0.015
r4.5	1,372.500	3,202.500	−2.423	0.015
r4.6	1,618.000	3,448.000	−1.007	0.314
r5.1	1,632.500	3,462.500	−0.913	0.361
r5.2	1,786.000	3,616.000	−0.100	0.920
r6.1	303.000	2,133.000	−8.315	0.000
r6.2	193.500	2,023.500	−8.976	0.000
r6.3	223.000	2,053.000	−8.734	0.000
r6.4	196.500	2,026.500	−8.876	0.000
r6.5	332.000	2,162.000	−8.124	0.000
p_c	1,777.000	3,607.000	−0.130	0.897
p_a	1,729.500	3,559.500	−0.407	0.684
p_r	269.500	2,099.500	−8.564	0.000

Appendix 3

Table AII Descriptive statistics for cost variables

	N	*Minimum*	*Maximum*	*Mean*	*SD*
vac	190	2.6	4.8	4.023	0.5807
gap	190	3.2	5.0	4.125	0.5346
cva	190	2.8	5.0	4.038	0.5264
re	190	3.0	5.0	4.363	0.6191
Valid *N* (listwise)	190				

Table AIII Descriptive statistics for assets variables

	N	*Minimum*	*Maximum*	*Mean*	*SD*
cic	190	2.9	4.7	3.927	0.4778
vic	190	3.0	4.7	4.034	0.4986
mic	190	3.2	5.0	4.294	0.4533
Valid *N* (listwise)	190				

Table AIV Descriptive statistics for revenue variables

	N	*Minimum*	*Maximum*	*Mean*	*SD*
cs	190	2.8	4.7	4.035	0.5450
cl	190	2.7	5.0	4.018	0.6540
cpa	190	2.8	5.0	4.004	0.6473
Valid *N* (listwise)	190				

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