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Cost accounting systems structure and information quality properties: An empirical analysis

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Cost accounting systems structure and information quality properties: An empirical analysis

Abstract

Purpose: This paper explores the relationships among cost accounting systems structure and information quality properties through an integrated framework of cost system design and use.

Design/methodology/approach: In our framework, cost accounting systems structure is defined in terms of the level of detailed information existence, the cost disaggregation according to behaviour, the scope of variances calculation and the frequency of cost information provision. Cost information quality expresses its perceived usefulness by the users in terms of relevance, accuracy, timeliness, usability, compatibility with their needs, up-to-datedness, reliability, and thoroughness for decision-making purposes. In order to investigate the existing relationships, data was gathered from 119 leading Greek manufacturing companies via a questionnaire survey.

Findings: Our empirical findings indicate that the majority of cost accounting systems structure characteristics exert a statistically significant positive influence on cost information quality dimensions. Only the systems' ability to disaggregate costs according to behaviour and their capability to generate customised to user specifications reports were not found to be statistically significantly associated with information quality.

Research limitations/implications: We believe that our conclusions have important implications for researchers and professionals with respect to cost systems design as well as cost systems evaluation.

Originality/value: The innovation of the study lies on the development of an integrated framework that encompasses both cost systems structure characteristics and cost information effectiveness features.

Keywords: Management accounting systems, Cost accounting systems structure, Cost information quality, Survey, Greece.

Article type: Research paper

Cost accounting systems structure and information quality properties: An empirical analysis

1. Introduction

A critical research issue in the management accounting literature relates to the management accounting systems ability to provide information that assists managers to make better decisions. During the last decades many researchers support the use of more sophisticated management accounting systems on the basis of the refinement of information these systems offer. Similarly, a considerable number of business consultants encourage organizations to introduce recently developed management accounting techniques, such as activity-based costing and balanced scorecard, in order for them to improve the level of information quality, and as a result to enhance decision-making.

Although the issue of whether a management accounting (or cost accounting) system is able to provide information of high quality is not new, it still attracts a lot of attention in the literature. The pressing need to use a cost system that provides relevant information, enhances flexibility and contributes to more effective operational and strategic control is dictated by a number of factors, such as the introduction of modern manufacturing practices, the increase of the fixed manufacturing costs as a proportion of total product cost, the increase of the intensity of competition especially in low-cost markets, etc. ([Chiapello and Lebas, 2001](#); [Cooper and Kaplan, 1986](#); [Eccles, 1991](#); [Kaplan, 1984](#); [Neely, 1999](#); [Otley, 1994](#)).

This paper analyzes the associations among cost systems structure attributes and cost information quality properties. More specifically, the study tries to explore whether specific attributes that are indicative of cost accounting systems sophistication exert an influential role on the quality of information used for decision-making. The innovation of the study lies on the development of an integrated framework that encompasses both cost systems structure characteristics and cost information effectiveness features. Thus, our research goes beyond the previous research works that usually focus on specific aspects of cost system design and use (see for example, [Chenhall and Morris, 1986](#); [Tillema, 2005](#)). Also, this study enhances the research agenda in Greece in relation to management accounting systems implementation that is mostly concentrated on activity-based costing related issues ([Ballas and Venieris, 1996](#); [Cohen *et al.*, 2005](#); [Pavlatos and Paggios, 2007](#); [Venieris and Cohen, 2008](#)).

The paper is organized as follows. Section 2 presents the literature review. In Section 3 the research hypotheses are developed, while in Section 4 the methodology employed is described. Section 5 is devoted to the measurement of the variables examined, followed by the presentation of research findings in Section 6. Finally, the research conclusions are presented in Section 7.

2. Literature review

Management accounting systems (MAS) structure is usually defined by four distinct characteristics. These characteristics are: the level of detail of cost information, the ability to disaggregate costs according to behaviour, the extent to which variances are calculated and the frequency at which cost information is provided to users (Chenhall and Morris, 1986; Feltham, 1977; Hilton, 1979; Khandwalla, 1972; Simons, 1987). The level of detail refers to the aggregation of information around periods of time or areas of interest such as responsibility centres or functional areas. The second characteristic of MAS structure relates to the extent to which a management accounting system can classify costs according to a fixed/variable, direct/indirect and controllable/non-controllable categorization. The third attribute of MAS structure indicates the extent to which a management accounting system allows the analysis of the differences that emerge between budgeted and actual results and, finally, the fourth dimension of MAS structure relates to the degree to which information is provided on request as well as the frequency of reporting systematically collected information. The level of cost accounting systems functionality is approximated by the extent to which these systems embed the four main structure characteristics. More functional cost accounting systems are those that can provide more detailed information, better classify costs according to behaviour, calculate more variances, and report information more frequently (Pizzini, 2006).

The other construct examined in the paper, besides MAS structure, is the level of cost information quality. Researchers have employed different attributes of information that serve as measurements of the effectiveness of a management accounting system. First of all, the degree to which a cost accounting system provides high quality information can be reflected by the extent to which the latter is relevant and useful for decision making. Relevance is indicative of the extent to which a cost system provides the information that managers need in order to make decisions in relation to the introduction of new products or services, pricing, redesign of processes, etc. As far as usefulness is concerned, it measures the degree to which managers rely on cost information in order to make decisions (Pizzini, 2006).

Besides the aforementioned attributes of cost information quality (e.g. relevance and usefulness), the effectiveness of accounting information systems, in general, has been measured in relevant research papers in terms of user needs satisfaction, accuracy, thoroughness, timeliness, as well as the degree to which information is up-to-date (see for example, [Nicolaou \(2000\)](#)).

More specifically, Hoque (2000) measured the use of cost information in terms of its appropriateness for monitoring the firm's organizational activities, such as the evaluation of managers' efficiency, the recognition of non-value adding activities, the valuation of inventories, the analysis of customers' profitability, the design of production and sales strategy and so on. [Baird et al. \(2004\)](#) measured cost information decision usefulness as the possibility for cost distortions incurrence in the determination of product / service costs, as a result of product / service diversity and overhead cost contribution to total costs. Furthermore, they examined the degree to which cost data is important for pricing and cost reduction decisions, and the level of reliability data must possess so that a business unit can compete successfully in a market. The statistical analysis of the data they collected, showed that the existence of high potential for cost distortion in product and service costs is significantly associated with the perceived usefulness of cost information for decision making purposes.

Research findings provided by [Chenhall and Morris \(1986\)](#) suggest that analytical information is perceived as useful by managers of subunits who have interdependent operations. Furthermore, their findings suggest that the assimilation of information from many sources into a broad scope MAS is of particular relevance to managers in uncertain environments. [Kaplan \(1988\)](#) claims that a good product cost system should report expenses incurred not only at each responsibility center, but also across the organization's entire value chain, while Feltham (1977) concluded that the expected effect of decisions based on aggregate information is likely to be less compared to that based on detailed information. In the same vein, [Pizzini \(2006\)](#) found that cost accounting systems that are better, compared to other systems, at supplying detail and classifying costs provide more relevant and useful data, which in turn leads to better financial performance. That is, more functional cost systems seem to supply managers with more relevant data, which they use to make performance-enhancing decisions. Similarly, Al-Omiri and Drury (2007) found a positive relationship between the importance given to cost information and the level of cost system sophistication.

Prior literature places emphasis on management accounting systems' role in relation to providing information useful for planning and control decisions ([Kaplan, 1983](#)), which ultimately adds value to the enterprise ([Gupta and Gunasekaran, 2005](#)). Like formal accounting systems, cost systems are used as tools of corporate strategy ([Cooper and Kaplan, 1988](#)). [Nicolaou \(2003\)](#) provides supportive evidence that perceptions of effectiveness of a firm's cost management system can be a valid indicator of how well the system is designed to support strategic and operational decision needs that are necessary for the implementation of manufacturing strategy.

More accurate information about production and support activities and product costs focuses management's attention on the products and processes with the most leverage in increasing profits. Also, better knowledge of product costs is a useful tool for making more effective decisions about product design, price setting, entering / leaving markets etc., and encouraging continual operating improvements ([Cooper and Kaplan, 1988](#)). According to [Kaplan \(1988\)](#), seriously distorted product costs can result to a losing competitive strategy by deemphasizing and overpricing products that are highly profitable and by expanding commitments to complex, unprofitable lines.

However, it should be noted that researchers' views on the associations between management accounting systems functionality and the degree to which cost data is relevant and useful do not always coincide (see for example, [Datar and Gupta, 1994](#); [Dopuch, 1993](#); [Noreen, 1991](#)).

3. Hypothesis development

Within our research framework cost accounting systems structure is defined in terms of the level of detailed information existence, the dimension of cost disaggregation according to behaviour, the scope of variances calculation and the frequency of cost information provision.

Level of detailed information existence

The level of detail of cost information refers to the extent to which information is presented in various forms depending on the criterion of analysis selected such as the customer level or the cost centre level. The higher the level of detail the greater the extent to which the information necessary for making a specific decision is available. This means that the availability of detailed information saves managers' valuable time that would otherwise be spent on formatting cost data each time they had to make a decision. It is, thus, expected that the higher the level of detail the

greater the extent to which information is sufficient and has the appropriate level of analysis for decision-making purposes. Moreover, it is expected that highly detailed information provides a clearer and more realistic view of the costs associated with cost objects and contributes to a better understanding of the way these cost objects affect performance. Finally, it is hypothesized that the higher the level of detail the greater the degree to which costs are analyzed for different purposes and the more appropriate and useful the information for decision making is.

Cost disaggregation according to behaviour

The second dimension of cost accounting system's structure, that is its ability to disaggregate costs according to behaviour, reflects the extent to which the system classifies and associates costs in relation to activity alterations (i.e., fixed – variable costs), cost objects (i.e., direct – indirect costs) and managers' actions (i.e., controllable – non-controllable costs). It is expected that better knowledge of cost behaviour provides a more realistic depiction of the impact of managers' actions on costs, allows a more accurate calculation of the costs associated with activities or products and assists managers to better understand cost objects contribution to performance. Furthermore, it is expected that a system which allows better understanding of cost structure, provides information at an appropriate level of analysis for decision making purposes, satisfies users' information queries and, it is, therefore, more intensively used when decisions are made.

Scope of variances calculation

The third characteristic of cost accounting systems structure studied is the extent to which variances are calculated. Variance analysis allows a close monitoring of the degree to which budgeted cost and revenue targets are realized. Comparing budgeted to actual results forces managers to evaluate whether their estimations are close to reality, analyze the reasons that explain the deviations from budgets and modify estimations whenever needed. It is assumed that by undertaking an extensive variance analysis the budgets are modified in such a way that they better reflect reality on a frequent basis. As a consequence, the cost estimations are more accurate and reliable and, ultimately, more effective decisions are made. It is, thus, expected that information derived from a cost accounting system that calculates variances to a significant extent, better meets users' needs and it is, thus, more extensively used for decision making purposes.

Frequency of cost information provision

The fourth characteristic of cost accounting systems structure is the frequency of cost information provision. This dimension has to do with the degree at which information is provided on a regular basis and it is available upon request. Also, frequency is indicative of the degree to which information quantifies the consequences of recent actions. It is hypothesized that when the information that is available to users is frequent and it is provided in a timely manner, it reflects a more up-to-date and reliable estimation of costs. This, in turn, safeguards that the system provides faster feedback on recently made decisions. Under these conditions, the attribute of frequency helps managers to identify potential problems as well as opportunities in time and make more well-informed and effective decisions. Therefore, the frequency of information provision is related to its relevance in performing managerial tasks, its suitability for user needs satisfaction and its usefulness for decision making.

The above arguments lead to the following research hypotheses:

H1: The existence of detailed information, the system's ability to disaggregate costs according to behaviour, the extent to which variances are calculated and the frequency at which information is provided to users will be positively associated with cost accounting information relevance.

H2: The existence of detailed information, the system's ability to disaggregate costs according to behaviour, the extent to which variances are calculated and the frequency at which information is provided to users will be positively associated with cost accounting information accuracy.

H3: The frequency at which information is provided to users will be positively associated with cost accounting information timeliness.

H4: The frequency at which information is provided to users will be positively associated with the extent to which cost accounting information is up-to-date.

H5: The existence of detailed information, the system's ability to disaggregate costs according to behaviour, the extent to which variances are calculated and the frequency at which information is provided to users will be positively associated with the extent to which cost accounting information meets users' needs (compatibility).

H6: The existence of detailed information, the system's ability to disaggregate costs according to behaviour and the extent to which variances are calculated will be positively associated with the extent to which cost accounting information has the appropriate level of analysis (thoroughness).

H7: The existence of detailed information, the system's ability to disaggregate costs according to behaviour, the extent to which variances are calculated and the frequency at which information is provided to users will be positively associated with cost accounting information reliability.

H8: The existence of detailed information, the system's ability to disaggregate costs according to behaviour, the extent to which variances are calculated and the frequency at which information is provided to users will be positively associated with cost accounting information exploitation for decision-making (usefulness).

Table 1 presents both the expected relations as well as the expected signs of these relations among cost accounting systems structure characteristics and information quality properties.

Insert Table 1 approximately here

4. Research design

In order to test the hypothesized relations among cost accounting systems structure characteristics and information quality properties empirical data was collected from the Greek manufacturing industry. We focused on sizable companies that would be likely to have an established management accounting function. The survey instrument was sent to 514 (five hundred fourteen) large manufacturing Greek firms which are included in the ICAP database. The selection criteria used for sampling purposes were the sales revenues, the total assets and the number of employees for year 2006. The collection of data lasted for four months, from November 2007 to March 2008. The questionnaire, accompanied by a cover letter where a brief reference to the scope of the study was made, was addressed to the Chief Financial Officer of each firm [1]. A total of 119 (one hundred nineteen) firms fully completed and returned the questionnaire, yielding a 23.15% response rate [2]. Table 2 presents descriptive statistics in relation to the financial characteristics of the sample.

Insert Table 2 approximately here

Typical reasons for non-response were lack of time and the fact that participation in surveys is either inconsistent with company policy or a low priority task. Of the 119 (one hundred nineteen) managers who completed the questionnaire, 80.7% hold top executive positions in financial, cost accounting or budgeting departments. This enhances the reliability of the data collected, since the respondents were in position to know the extent to which their firms' cost accounting system was actually utilized

as well as the functional characteristics of the system in use. The respondents' average time in service within the sample company was 11 years and in their current position 7 years.

5. Variables measurement

The questionnaire developed for the purpose of the study contained questions suitable for measuring both the cost accounting systems structure characteristics and the information quality properties variables. The questions as well as the descriptive statistics of the relevant variables are presented in the Appendix.

Cost accounting systems structure

According to our framework of analysis, cost accounting systems structure includes four dimensions, the level of detail of cost information, the system's ability to disaggregate costs according to behaviour, the extent to which variances are calculated and the frequency at which cost information is provided to users. These four dimensions are measured via six variables as presented below.

Following Pizzini's (2006) methodology we used two questions to quantify the existence of detailed cost information (see Q1.1 and Q1.2 in Appendix). In Q1.1 respondents were asked to indicate the extent to which their company's cost accounting system allows the analysis of costs at several levels (e.g. customer level). Factor analysis was used in order to reduce the dimensionality of the question. One factor emerged with eigenvalues in excess of one, with the factor solution accounting for 50.92% of the total variation in data. The measure for detailed cost information existence reflects the degree to which the cost accounting system analyzes costs by cost centre, product and activity (factor DET_1) [3]. Cronbach's alpha statistic of 0.68 indicates satisfactory internal reliability for the specific scale (Hair *et al.*, 1998). In Q1.2, respondents were asked to specify the degree to which their company's existing cost accounting system allows the development of customized reports that correspond to user specifications (DET_2). A 5-point Likert-type scale was used for both questions with anchors of 1 "not at all" and 5 "to a very great extent".

The cost accounting systems' ability to disaggregate costs according to behaviour was measured through Q.2, in line with Pizzini (2006). Respondents were asked to indicate the extent to which their existing costing system could distinguish direct and indirect costs, fixed and variable costs and controllable and non-controllable costs on

a Likert-type scale ranging from 1 (not at all) to 5 (to a very great extent). Data was factor analyzed to reduce the dimensionality of the question. One factor was extracted which accounts for 63.46% of the total variation in data, while all three question items satisfied the criterion of the minimum factor loading (factor DISAGG). Cronbach's alpha statistic of 0.70 indicates that the responses used to calculate the specific construct are internally consistent.

In order to measure the extent to which variance analysis is conducted, respondents were asked (Q.3) to specify the degree to which their cost accounting system calculates a number of variances, drawn from management accounting literature (Hilton *et al.*, 2003), on a Likert-type scale ranging from 1 (not at all) to 5 (to a very great extent). Factor analysis was used to reduce the dimensionality of the question. One factor emerged with eigenvalues greater than one, with the factor solution accounting for 62.72% of the total variation in data. The factor that calculates the extent of variance analysis reflects the degree to which a cost accounting system calculates variances in relation to direct labour rate and efficiency, variable manufacturing overhead, non-manufacturing overhead, direct materials quantity and activities cost (factor VAR). Cronbach's alpha statistic of 0.87 indicates satisfactory internal consistency of the construct.

Finally, two questions were used in order to measure the frequency at which cost information is provided to users (Q4.1 and Q4.2). Managers were asked to indicate the degree to which the cost accounting system provides frequent reports on a systematic basis (FREQ_1), while the second question aimed at capturing the timeliness of the systems (FREQ_2). Both questions were drawn from the instrument developed by [Chenhall and Morris \(1986\)](#) and were expressed in a 5-point Likert-type scale with anchors of 1 "not at all" and 5 "to a very great extent".

Table 3 presents the results of the factor analyses performed regarding cost accounting systems structure characteristics.

Insert Table 3 approximately here

Quality of cost information

Our research framework includes eight dimensions of cost information quality. These are relevance, accuracy, reliability, timeliness, usability, up-to-datedness, compatibility with decision makers' needs and thoroughness suitable for decision-making purposes.

In order to measure the relevance of cost accounting information we followed Pizzini's (2006) two-stage approach. We used two questions (Q5.1 and Q5.2) in order to gather data for the calculation of this cost information quality parameter. In the first question (Q5.1) managers were asked to rate the importance they recognize in the availability of cost information while performing several tasks, such as the measurement and the evaluation of departmental performance, the recognition of value-adding activities, on a Likert-type scale ranging from 1 (not at all important) to 5 (very important). In the second question (Q5.2) respondents had to indicate the extent to which their company's existing cost accounting system is capable of providing cost information in order to perform the abovementioned tasks. Their answers were given on a 5-point Likert-type scale with anchors of 1 "not at all" to 5 "to a very great extent" [4]. Subsequently, in order to calculate the value of the variable that measures the relevance of cost accounting information (RELEV) we made the following mathematical transformations. We calculated for each company the average of the absolute differences between the respondents' ratings in relation to the extent to which their company's system provides information for performing an activity and the perceived importance of having cost accounting information available while performing the specific activity. The value of RELEV for each company was calculated as the difference between the company's average and the maximum sample average difference. Thus, the value of RELEV for the cost accounting system, which has the least relevant information, is zero.

As for the rest properties of cost accounting information, single-item questions were used. These questions asked managers to express their agreement or disagreement in relation to a number of statements. More specifically, managers were asked (Q6.1-Q6.7) to rate the extent to which they agree that the cost accounting information is accurate (ACC), up-to-date (DATE) and reliable (REL), is provided in a timely manner (TIME), meets decision makers' needs (NEEDS), has the appropriate level of analysis for decision making purposes (APPR) and is actually used by managers during the decision process (USE). A 5-point Likert-type scale was used for all the above questions with anchors of 1 "strongly disagree" to 5 "strongly agree". Similar instruments have been used in analogous research surveys ([Nicolaou, 2000 and 2003](#); [Pizzini, 2006](#)).

6. Research findings

The research hypotheses were tested via the following eight multivariate regression models:

$$\text{RELEV} = \beta_{0_1} + \beta_{1_1} \text{DET}_1 + \beta_{2_1} \text{DET}_2 + \beta_{3_1} \text{DISAGG} + \beta_{4_1} \text{VAR} + \beta_{5_1} \text{FREQ}_1 + \beta_{6_1} \text{FREQ}_2 + \varepsilon_1 \quad (1)$$

$$\text{ACC} = \beta_{0_2} + \beta_{1_2} \text{DET}_1 + \beta_{2_2} \text{DET}_2 + \beta_{3_2} \text{DISAGG} + \beta_{4_2} \text{VAR} + \beta_{5_2} \text{FREQ}_1 + \beta_{6_2} \text{FREQ}_2 + \varepsilon_2 \quad (2)$$

$$\text{TIME} = \beta_{0_3} + \beta_{1_3} \text{DET}_1 + \beta_{2_3} \text{DET}_2 + \beta_{3_3} \text{DISAGG} + \beta_{4_3} \text{VAR} + \beta_{5_3} \text{FREQ}_1 + \beta_{6_3} \text{FREQ}_2 + \varepsilon_3 \quad (3)$$

$$\text{DATE} = \beta_{0_4} + \beta_{1_4} \text{DET}_1 + \beta_{2_4} \text{DET}_2 + \beta_{3_4} \text{DISAGG} + \beta_{4_4} \text{VAR} + \beta_{5_4} \text{FREQ}_1 + \beta_{6_4} \text{FREQ}_2 + \varepsilon_4 \quad (4)$$

$$\text{NEEDS} = \beta_{0_5} + \beta_{1_5} \text{DET}_1 + \beta_{2_5} \text{DET}_2 + \beta_{3_5} \text{DISAGG} + \beta_{4_5} \text{VAR} + \beta_{5_5} \text{FREQ}_1 + \beta_{6_5} \text{FREQ}_2 + \varepsilon_5 \quad (5)$$

$$\text{APPR} = \beta_{0_6} + \beta_{1_6} \text{DET}_1 + \beta_{2_6} \text{DET}_2 + \beta_{3_6} \text{DISAGG} + \beta_{4_6} \text{VAR} + \beta_{5_6} \text{FREQ}_1 + \beta_{6_6} \text{FREQ}_2 + \varepsilon_6 \quad (6)$$

$$\text{REL} = \beta_{0_7} + \beta_{1_7} \text{DET}_1 + \beta_{2_7} \text{DET}_2 + \beta_{3_7} \text{DISAGG} + \beta_{4_7} \text{VAR} + \beta_{5_7} \text{FREQ}_1 + \beta_{6_7} \text{FREQ}_2 + \varepsilon_7 \quad (7)$$

$$\text{USE} = \beta_{0_8} + \beta_{1_8} \text{DET}_1 + \beta_{2_8} \text{DET}_2 + \beta_{3_8} \text{DISAGG} + \beta_{4_8} \text{VAR} + \beta_{5_8} \text{FREQ}_1 + \beta_{6_8} \text{FREQ}_2 + \varepsilon_8 \quad (8)$$

where,

DET_1: the extent to which the system analyzes costs by cost centre, product and activity

DET_2: the extent to which the system allows the preparation of customized reports according to users' specification

DISAGG: the extent to which the system classifies costs according to behaviour

VAR: the extent to which the system calculates variances

FREQ_1: the extent to which the system provides frequent reports on a systematic basis

FREQ_2: the extent to which the system provides information upon request

RELEV: the extent to which cost information is relevant for decision-making

ACC: the extent to which cost information is accurate

TIME: the extent to which cost information is provided in time

DATE: the extent to which cost information is up-to-date

NEEDS: the extent to which cost information meets users' needs

APPR: the extent to which cost information has the appropriate level of analysis

REL: the extent to which cost information is reliable

USE: the extent to which cost information is used to make decisions

The correlation matrix of all variables is presented in Table 4. Pearson's correlation coefficients for combinations of all variables demonstrate significant associations between cost systems structure dimensions and information quality properties in the expected direction. A similar picture is presented in relation to Spearman's correlation coefficients. The correlations among the structure features of the cost accounting systems are of medium magnitude (darker shaded area). This finding

offers an indication that the design of cost accounting systems in practice is heterogeneous. Additionally, the correlations among the information quality characteristics are also of medium magnitude (lighter shaded area). This finding is an indication that each cost information quality dimension reflects a distinct feature in relation to cost information usefulness for decision making purposes.

Insert Table 4 approximately here

The results of the Ordinary Least Squares (OLS) regressions are displayed in Table 5. All models are significant ($F_{sig} = 0.000$) and the adjusted R^2 range from 25.1% to 50.3%. The results of regression equation 1 reported in Table 5 indicate that relevance of cost accounting information (RELEV) is positively and significantly associated with the degree to which variances are calculated (VAR) and the extent to which reports are provided on a systematic basis (FREQ_1), while, contrary to expectations, a negative and significant association was found between the extent to which costs are analyzed by cost centre, product and activity (DET_1) and cost accounting information relevance (RELEV). One possible explanation for this unexpected negative association is that detailed cost information may be satisfactory in terms of accuracy, reliability and meeting managers' needs as discussed below but at the same time it may not constitute the most appropriate presentation of cost data when decisions are to be made.

With respect to regressions 2 and 5, the statistical analysis indicates that the accuracy of cost accounting information (ACC) as well as the system's ability to meet users' needs (NEEDS) are positively and significantly associated with the extent to which costs are analyzed by cost centre, product and activity (DET_1), the degree to which variance analysis is conducted (VAR) and the extent to which information is provided upon request (FREQ_2). The abovementioned associations are in the expected direction.

The results of regressions 3 and 4 also support our hypotheses. They provide supporting evidence that the more frequent the cost information (FREQ_1 and FREQ_2) the greater the extent to which the latter is provided in time (TIME) and is up-to-date (DATE) and the more variances are calculated (VAR).

Regression 6 statistical results present a positive association between the degree to which variances are calculated (VAR) and the extent to which cost information has the appropriate level of analysis (APPR). Moreover, the results show that the

dependent variable is positively and significantly associated with the frequency of cost information dissemination (FREQ_1 and FREQ_2).

The results of regression 7 provide supporting evidence that the greater the extent to which a cost accounting system analyzes costs by cost centre, product and activity (DET_1) and permits variance calculation (VAR) the more reliable the information that it provides to users (REL).

A positive and statistically significant association between the extent to which cost information is used for decision making (USE) and frequency of information provision (FREQ_1 and FREQ_2) is revealed by the results of regression 8. The signs of the regression coefficients are in the expected direction.

Finally, it should be noted that neither the extent to which the cost accounting system allows the preparation of customized reports according to users specifications (DET_2) nor the degree to which costs are classified according to behaviour (DISAGG) are found to be significant predictors of any of the dependent variables.

Insert Table 5 approximately here

7. Conclusions

Our paper has sought to provide insight into the associations among cost accounting systems structure characteristics and cost information quality properties. In order to test our research hypotheses, we used the responses provided by 119 leading manufacturing firms in Greece. In general, our data provides supportive evidence that positive associations among cost systems structure attributes and cost information quality properties exist. More specifically, the cost accounting structure in terms of detailed information existence, variance calculation and frequency in reports preparation exerts an influential role on the relevance, accuracy, timeliness, usability, compatibility, up-to-datedness, reliability, and thoroughness of information for decision-making purposes. On the contrary, the systems' ability to disaggregate costs according to behaviour and to generate customised reports was not found to be statistically significantly associated with information quality. Overall, our findings support the theoretical argument put forward in the management accounting literature that more functional cost accounting systems provide information of higher quality (e.g. [Chenhall and Morris, 1986](#); [Feltham, 1977](#); [Pizzini, 2006](#)).

Moreover, our empirical results indicate that the correlations that exist among the cost accounting systems structure features are statistically significant albeit of medium magnitude. This finding offers an indication that the cost accounting systems

used in practice share heterogeneous attributes. Additionally, as the correlations that exist among the information quality characteristics are also positive and of medium magnitude we can infer that each cost information quality dimension reflects a distinct feature in relation to cost information usefulness for decision-making purposes.

The research conclusions of our study have important implications for both professionals and researchers. Firstly, the paper presents an integrated model that captures various aspects of the design and use of cost accounting systems. In our paper we present an application of this model in the manufacturing sector. However, thanks to its generic nature, the model is easily applicable to different industry settings as well. Secondly, the study indicates that managers recognize the importance of receiving sophisticated cost information during the decision making process, while at the same time the design of cost systems was found to be a significantly explanatory factor of the quality of cost information. These findings could, therefore, sensitize the designers of cost systems technical facets to the underlying qualities of information that users perceive as useful. Moreover, the instruments of information quality that were examined in this study could provide a useful basis for measuring and evaluating the level of satisfaction users perceive from their existing company cost accounting system. Such an evaluation could also be performed within the context of a post-implementation review. Within that scope, the objective might be to identify those areas that should be addressed in future system development projects.

The above discussion of results suggests a number of useful directions for future research. The fact that our study was constrained to manufacturing firms only, limits the ability to generalize the results to other industries. Thus, the study would be repeated in other sectors of the economy, so as to achieve a better generalization of the results. Finally, our research framework has relied on perceptual measures of both cost systems structure and information quality. Future research could examine the effects of cost system design choices in quantifiable measures of firm performance such as the profitability and cost structure.

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Appendix

Variables measurement

Level of detail of cost accounting information

Q1.1 Identify to what extent the cost accounting system provides data that allows you to analyze costs by (1: not at all, 5: to a very great extent):

	Mean value	St. Deviation
• Customer	3.28	1.49
• Product	4.60	0.73
• Cost centre	4.53	0.85
• Activity	3.95	1.27
• Geographic region	3.01	1.58

Q1.2 Identify to what extent the cost accounting system allow the preparation of customized reports according to user specifications (1: not at all, 5: to a very great extent) (Variable **DET_2**, Mean value: 4.12, St. Deviation: 0.80).

Ability to disaggregate costs according to behaviour

Q2 Identify to what extent the cost accounting system categorizes costs into (1: not at all, 5: to a very great extent):

	Mean value	St. Deviation
• Direct and indirect	4.25	0.85
• Fixed and variable	3.89	1.08
• Controllable and non-controllable	3.29	1.19

Extent to which variances are calculated

Q3 Identify to what extent the cost accounting system calculates the following variances (1: not at all, 5: to a very great extent):

	Mean value	St. Deviation
• Direct materials price variances	3.85	1.21
• Direct materials quantity variances	3.77	1.23
• Direct labour rate variances	3.66	1.18
• Direct labour efficiency variances	3.17	1.23
• Variable manufacturing overhead variances	3.53	1.14
• Fixed manufacturing overhead variances	3.55	1.13
• Non-manufacturing overhead variances	3.50	1.24
• Activities cost variances	3.05	1.32

Frequency at which cost accounting information is provided to users

Q4.1 Identify to what extent the cost accounting system provides reports frequently on a systematic, regular basis (1: not at all, 5: to a very great extent) (Variable **FREQ_1**, Mean value: 3.86, St. Deviation: 0.96).

Q4.2 Identify to what extent the cost accounting system provides information upon request (1: not at all, 5: to a very great extent) (Variable **FREQ_2**, Mean value: 3.78, St. Deviation: 1.02).

Relevance of cost accounting information

Q5.1 Regardless of the degree to which you actually use cost accounting information in performing the following tasks, indicate the importance that you consider cost accounting information plays in performing them (1: not at all important, 5: very important):

	Mean value	St. Deviation
• Measurement and evaluation of managers' performance	3.34	1.18
• Measurement and evaluation of departmental performance	3.72	1.12
• Measurement of activities' productivity	4.01	1.01
• Recognition of value-adding activities	3.94	1.01
• Recognition of non-value-adding activities	3.86	1.04
• Preparation of customer profitability analyses	4.07	0.93
• Analysis of differences between budgeted and actual results	4.24	0.95
• Budget preparation	4.30	0.89
• Cost control	4.43	0.72
• Pricing	4.01	1.01
• Benchmarking	3.50	1.10
• Capital budgeting	3.78	0.97
• Negotiation with suppliers	3.76	0.94
• Discount policy	3.78	1.01
• Evaluation of special orders' profitability	3.68	1.00

	Mean value	St. Deviation
• Product design	3.68	1.02
• Short-term decision making (e.g. make-or-buy decisions)	3.83	0.97
• Introduction or discontinuing of products	3.90	1.00
• Enter new markets or drop existing markets	3.63	0.97
• Valuation of inventories	4.41	0.88
• Sales and production strategy	4.07	0.82

Q5.2 Identify to what extent the existing cost accounting system in your company provides the information you need in order to perform the following tasks: (1: not at all, 5: to a very great extent)

	Mean value	St. Deviation
• Measurement and evaluation of managers' performance	2.82	1.19
• Measurement and evaluation of departmental performance	3.35	1.26
• Measurement of activities' productivity	3.41	1.18
• Recognition of value-adding activities	3.34	1.17
• Recognition of non-value-adding activities	3.28	1.15
• Preparation of customer profitability analyses	3.49	1.27
• Analysis of differences between budgeted and actual results	3.79	1.21
• Budget preparation	3.81	1.17
• Cost control	4.10	0.90
• Pricing	3.51	1.23
• Benchmarking	3.14	1.20
• Capital budgeting	3.43	1.16
• Negotiation with suppliers	3.47	1.11
• Discount policy	3.40	1.14
• Evaluation of special orders profitability	3.21	1.18
• Product design	3.22	1.12
• Short-term decision making (e.g. make-or-buy decisions)	3.46	1.02
• Introduction or discontinuing of products	3.37	1.15
• Enter new markets or drop existing markets	3.28	1.14
• Valuation of inventories	4.32	0.97
• Sales and production strategy	3.79	1.05

(Variable **RELEV**, Mean value: 1.79, St. Deviation: 0.50, Min: 0.00, Max: 2.40, Q₁: 1.55, Q₂: 1.88, Q₃: 2.15)

Other cost accounting information quality characteristics

Identify to what extent you agree with the following statements (1: strongly disagree, 5: strongly agree)

- Q6.1 Our cost accounting system provides accurate information (Variable **ACC**, Mean value: 4.00, St. Deviation: 0.75).
- Q6.2 Our cost accounting system provides up-to-date information (Variable **DATE**, Mean value: 3.94, St. Deviation: 0.75).
- Q6.3 Our cost accounting system provides reliable information (Variable **REL**, Mean value: 4.14, St. Deviation: 0.71).
- Q6.4 Our cost accounting system provides information in a timely manner (Variable **TIME**, Mean value: 3.92, St. Deviation: 0.84).
- Q6.5 Our cost accounting system provides information that meets decision makers' needs (Variable **NEEDS**, Mean value: 3.93, St. Deviation: 0.77).
- Q6.6 Our cost accounting system provides information at an appropriate level of analysis for decision-making purposes (Variable **APPR**, Mean value: 3.79, St. Deviation: 0.89).
- Q6.7 Users make use of cost accounting information when they make decisions (Variable **USE**, Mean value: 3.95, St. Deviation: 0.88).

Endnotes

[1] Before starting the dissemination of the survey instrument, the questionnaire was pilot tested. Interviews were conducted with the senior financial managers of three large manufacturing firms. The pilot test did not reveal any shortcomings regarding either the content or the phrasing of the questions.

[2] Non-response bias tests were undertaken to compare demographic data and answers to the questionnaire questions between early and late respondents. No significant differences were found in terms of demographic data as well as measures of cost accounting systems structure and quality of information.

[3] Principal Components Analysis was used to obtain the initial factor solution, which was rotated orthogonally (Varimax) in order to reach a final solution. One factor with eigenvalues greater than one was extracted. The measure of detailed cost information existence was calculated by taking arithmetic averages of scores on the items which loaded greater than 0.50 on the relevant factor. The same process was followed for all factor analyses conducted in our study.

[4] Similar instruments have been employed in previous studies as well ([Baird *et al.*, 2004](#); [Hoque, 2000](#); [Nicolaou, 2003](#)).

		Information quality properties							
		Relevance	Accuracy	Timeliness	Up-to-datedness	Compatibility	Thoroughness	Reliability	Usability
Cost accounting systems structure characteristics	Existence of detailed information	+	+	?	?	+	+	+	+
	Ability to disaggregate costs according to behaviour	+	+	?	?	+	+	+	+
	Extent to which variances are calculated	+	+	?	?	+	+	+	+
	Frequency at which information is provided to users	+	+	+	+	+	?	+	+

Note: The question marks shown in some cells indicate that no arguments can be raised by the authors or traced in previous research papers regarding the expected direction of the specific relations.

Table 1: Expected relations among cost systems structure characteristics and information quality properties

	Mean	St.	Q₁	Q₂	Q₃
	deviation				
Sales revenues (in 000 €)	106,462.09	145,034.78	24,764.28	51,622.60	102,536.88
Total assets (in 000 €)	151,653.73	300,105.42	25,417.19	63,354.13	147,790.00
Number of employees	404	401	144	260	550
<i>N = 119</i>					

Table 2: Descriptive statistics of the sample companies

Factors	Loadings	% of variance	KMO	Bartlett's test	Cronbach's alpha	Mean Value*
Factor DET_1		50.919%	0.625	77.043 (sig: 0.000)	0.675	4.38
<i>The cost accounting system permits cost analysis by:</i>						
▪ Cost centre	0.843					
▪ Product	0.782					
▪ Activity	0.728					
Factor DISAGG		63.459%	0.613	62.982 (sig: 0.000)	0.696	3.83
<i>The cost accounting system categorizes costs into:</i>						
▪ Fixed and variable	0.872					
▪ Direct and indirect	0.790					
▪ Controllable and non-controllable	0.721					
Factor VAR		62.720%	0.823	300.843 (sig: 0.000)	0.874	3.49
<i>The cost accounting system calculates:</i>						
▪ Direct labour rate variances	0.897					
▪ Variable manufacturing overhead variances	0.857					
▪ Non-manufacturing overhead variances	0.817					
▪ Direct labour efficiency variances	0.800					
▪ Direct materials quantity variances	0.725					
▪ Activities cost variances	0.625					

Table 3: Factor analyses results

*The Scale is 1 "not at all" to 5 "to a very great extent"

	RELEV	ACC	TIME	DATE	NEEDS	APPR	REL	USE	DET_1	DET_2	DISAGG	VAR	FREQ_1	FREQ_2
RELEV		0.223**	0.241**	0.385***	0.270***	0.468***	0.278***	0.308***	-0.016	0.332***	0.289***	0.457***	0.354***	0.172*
ACC	0.248***		0.665***	0.616***	0.738***	0.728***	0.749***	0.604***	0.485***	0.421***	0.472***	0.471***	0.456***	0.434***
TIME	0.292***	0.685***		0.682***	0.634***	0.624***	0.671***	0.507***	0.390***	0.414***	0.446***	0.489***	0.545***	0.416***
DATE	0.375***	0.615***	0.739***		0.627***	0.673***	0.702***	0.657***	0.277***	0.416***	0.433***	0.482***	0.494***	0.444***
NEEDS	0.310***	0.744***	0.631***	0.598***		0.791***	0.681***	0.609***	0.400***	0.407***	0.430***	0.481***	0.361***	0.412***
APPR	0.411***	0.705***	0.638***	0.641***	0.824***		0.717***	0.753***	0.341***	0.524***	0.572***	0.584***	0.544***	0.469***
REL	0.218**	0.752***	0.714***	0.659***	0.704***	0.677***		0.678***	0.414***	0.441***	0.431***	0.457***	0.435***	0.359***
USE	0.229**	0.578***	0.529***	0.610***	0.615***	0.709***	0.618***		0.339***	0.505***	0.506***	0.469***	0.516***	0.440***
DET_1	0.049	0.437***	0.308***	0.186*	0.357***	0.327***	0.350***	0.262***		0.314***	0.363***	0.300***	0.363***	0.354***
DET_2	0.273***	0.388***	0.387***	0.364***	0.365***	0.475***	0.391***	0.501***	0.326***		0.523***	0.511***	0.582***	0.321***
DISAGG	0.305***	0.404***	0.400***	0.389***	0.373***	0.537***	0.363***	0.398***	0.292***	0.493***		0.633***	0.512***	0.347***
VAR	0.402***	0.388***	0.414***	0.447***	0.431***	0.518***	0.349***	0.411***	0.286***	0.439***	0.666***		0.437***	0.246**
FREQ_1	0.333***	0.411***	0.512***	0.475***	0.334***	0.504***	0.348***	0.447***	0.378***	0.566***	0.499***	0.435***		0.390***
FREQ_2	0.173*	0.399***	0.457***	0.451***	0.395***	0.473***	0.342***	0.414***	0.312***	0.283***	0.330***	0.203**	0.347***	

Notes: * statistically significant at 10% significance level, ** statistically significant at 5% significance level, *** statistically significant at 1% significance level

Pearson correlations are above the diagonal while Spearman correlations are below the diagonal DET_1: the extent to which the system analyzes costs by cost centre, product and activity; DET_2: the extent to which the system allows the preparation of customized reports to the specification of users; DISAGG: the extent to which the system classifies costs according to behaviour; VAR: the extent to which the system calculates variances; FREQ_1: the extent to which the system provides frequent reports on a systematic basis; FREQ_2: the extent to which the system provides information upon request; RELEV: the extent to which cost information is relevant for decision making; ACC: the extent to which cost information is accurate; TIME: the extent to which cost information is provided in time; DATE: the extent to which cost information is up-to-date; NEEDS: the extent to which cost information meets users' needs; APPR: the extent to which cost information has the appropriate level of analysis; REL: the extent to which cost information is reliable; USE: the extent to which cost information is used to make decisions

Table 4: Correlation matrix

	Regression 1		Regression 2		Regression 3		Regression 4	
	Dependent variable: RELEV		Dependent variable: ACC		Dependent variable: TIME		Dependent variable: DATE	
	β coefficient	t-statistic	β coefficient	t-statistic	β coefficient	t-statistic	β coefficient	t-statistic
Intercept	1.128	3.810***	0.901	2.272**	0.861	1.940**	1.512	3.669***
DET_1	-0.165	-2.602***	0.253	2.969***	0.140	1.466	-0.013	-0.143
DET_2	0.047	0.671	0.040	0.417	-0.016	-0.147	0.030	0.306
DISAGG	-0.040	-0.555	0.073	0.756	0.007	0.066	0.017	0.172
VAR	0.215	3.653***	0.161	2.039**	0.228	2.594***	0.217	2.651***
FREQ_1	0.117	2.004**	0.112	1.440	0.278	3.187***	0.198	3.125***
FREQ_2	0.039	0.829	0.147	2.342**	0.162	2.312**	0.204	2.442**
F _{value} (F _{sig.})	6.796 (0.000)		12.474 (0.000)		12.466 (0.000)		10.861 (0.000)	
Adj. R ²	25.1%		39.8%		39.8%		36.3%	
N	113		113		113		113	

(cont.)

<i>(cont.)</i>	Regression 5		Regression 6		Regression 7		Regression 8	
	Dependent variable: NEEDS		Dependent variable: APPR		Dependent variable: REL		Dependent variable: USE	
	β coefficient	t-statistic	β coefficient	t-statistic	β coefficient	t-statistic	β coefficient	t-statistic
Intercept	1.094	2.542***	0.216	0.500	1.451	3.632***	0.572	1.226
DET_1	0.186	2.010**	0.014	0.146	0.187	2.182**	0.054	0.540
DET_2	0.098	0.956	0.118	1.142	0.115	1.206	0.174	1.559
DISAGG	0.044	0.421	0.156	1.494	0.038	0.391	0.140	1.242
VAR	0.225	2.633***	0.267	3.118***	0.157	1.976**	0.135	1.457
FREQ_1	0.006	0.069	0.179	2.105**	0.090	1.146	0.179	1.954**
FREQ_2	0.169	2.488**	0.213	3.115***	0.094	1.493	0.191	2.580***
F _{value} (F _{sig.})	9.504 (0.000)		18.508 (0.000)		9.181 (0.000)		12.443 (0.000)	
Adj. R ²	32.9%		50.3%		32.1%		39.8%	
N	113		113		113		113	

Notes: ** statistically significant at 5% significance level, *** statistically significant at 1% significance level

DET_1: the extent to which the system analyzes costs by cost centre, product and activity; DET_2: the extent to which the system allows the preparation of customized reports to the specification of users; DISAGG: the extent to which the system classifies costs according to behaviour; VAR: the extent to which the system calculates variances; FREQ_1: the extent to which the system provides frequent reports on a systematic basis; FREQ_2: the extent to which the system provides information upon request; RELEV: the extent to which cost information is relevant for decision making; ACC: the extent to which cost information is accurate; TIME: the extent to which cost information is provided in time; DATE: the extent to which cost information is up-to-date; NEEDS: the extent to which cost information meets users' needs; APPR: the extent to which cost information has the appropriate level of analysis; REL: the extent to which cost information is reliable; USE: the extent to which cost information is used to make decisions

Table 5: Regressions results