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The influence of managerial competence on the relationship between cost accounting systems and financial performance: A quantitative study of social welfare organizations

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Abstract

This study was conducted to examine how the abilities of business managers affect the relationship between cost accounting systems and financial performance. The data has been obtained from social welfare organizations. Multiple regression analysis without an interaction term was first conducted as the base model followed by hierarchical multiple regression analysis to verify the increase in explanatory power by adding an interaction term. All independent variables, adjustment variables and control variables except dummy variables were centralized to facilitate the interpretation of the interaction term. A regression diagnosis was conducted after the exclusion of outliers. The statistical analysis environment R was used for the analysis. The findings of the study suggest that among the four functionalities of cost accounting systems, detailed cost ascertainment and reporting frequency may affect organizational performance through interactions with the abilities of business managers. This study may be viewed as a first step in examining the effects of the interaction between the functionality of cost accounting systems and the abilities of business managers on the financial performance of organizations.

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1. Introduction

Organizations develop a highly functional cost accounting system because they use the information obtained from the system for business management and to improve organizational performance. The relationship between the functionality of cost accounting systems and organizational performance has been studied based on the economics of information (Feltham, 1977; Hilton, 1979) and case studies (Shank & Govindarajan, 1993). Recently, Pizzini (2006) examined the relationship between the functionality of cost accounting systems and financial performance and found that hospitals that can provide detailed cost information for each cost accounting object have higher financial performance.

Business managers can make rational decisions by appropriately using the cost information provided. However, studies based on the upper echelons theory (Hambrick, 2007; Hambrick & Mason, 1984) suggest that managers' cognitive frameworks and abilities differ depending on their educational backgrounds and years of experience and thus they use the same information. Therefore, if they are given the same information, they use it in different ways. In this study, we examine the possibility that the effect of business managers using cost information to improve the financial performance of an organization may differ depending on the ability of each business manager to use cost information.

The structure of this paper is as follows: In Section 2, we summarize previous studies on the functionality of costing systems and the financial performance of organizations and derive hypotheses by adding the knowledge of upper-level theories to them. Section 3 explains the research object and the method of manipulating and analyzing variables. Section 4 describes and discusses key findings. Section 5 summarizes this study and describes future issues.

2. Organization of Previous Studies and Derivation of Hypotheses

The purpose of this paper is to examine how the abilities of business managers affect the relationship between cost accounting systems and financial performance. In this section, we first summarize studies on the relationship between the functionality of cost accounting systems and the financial performance of organizations and then we summarize studies using upper management theory on the impact of the ability of business managers. Finally, we derive hypotheses based on these studies.

2.1. Relationship between the Functionality of the Cost Accounting System and the Financial Performance of the Organization

Many studies report that costing system information improves organizational performance (Chenhall & Morris, 1986; Feltham, 1977; Hilton, 1979; Shank & Govindarajan, 1993). According to Pizzini (2006), the functionality of a costing system is influenced by the following four design elements: (1) the degree to which detailed costs can be determined for each costing object. (2) The degree to which cost information can be classified. (3) The frequency of reporting cost information. (4) The thoroughness of variance analysis.

First, (1) regarding the detailed cost accounting for each cost accounting object, a study based on the economics of information has shown that the gain from decision-making changes depending on whether different types of cost elements are aggregated into one or whether different cost elements are accounted for separately (Feltham, 1977). In other words, if detailed cost information is not available, the gain from decision-making is small but if detailed cost information is available, the gain from decision-making is large. (2) According to research on the categorization of cost information, precise categorization of cost information into direct and indirect costs as well as fixed and variable costs makes detailed cost information helpful (Shank & Govindarajan, 1993). In addition, information based on the classification of controllable and uncontrollable costs is useful for business managers to evaluate the performance of their subordinates. (3) According to the frequency of reporting cost information, frequent provision of cost information provides managers with feedback on their decision-making and information on the latest developments. Such information can be used as a guide when considering future alternatives (Chenhall & Morris, 1986). Furthermore, an analytical study conducted by Hilton (1979) showed that the more accurate the information is in CVP decision-making, the more valuable the costing system that supplies the information is. (4) Managers can use variance analysis to help them choose the best action for certain problems (Shank & Govindarajan, 1993).

Managers do not always use cost information only for economically rational decision-making. They may use cost information to make profit-reducing and profit decisions due to compensation contracts or political

costs. In addition, providing comprehensive and frequent cost information may result in information overload for managers and lower the quality of their decision-making due to the limited information processing capacity of business managers (Edmunds & Morris, 2000). Pizzini (2006) herself points out that a highly functional cost accounting system may hinder performance improvement. However, she points out that even considering these possibilities, a highly functional costing system has advantages.

According to Pizzini's (2006) framework, a more functional costing system is one that properly classifies precise data, often offers it to company management and also provides information based on variance analysis. A more functional cost accounting system produces better information which management can use to improve decision-making. As a result, financial performance is enhanced. According to contingency theory, significant advantages are gained by the organisation when strategy, organisational design, the external environment and costing system functionality are well-aligned. Pizzini (2006) examined the relationship between the functionality of the costing system and organizational financial performance using data from U.S. hospitals. The results showed that the detailed costing of each costing object was positively related to the financial performance of the organization. However, other elements of cost accounting system design, such as cost information classification, reporting frequency and variance analysis were not clearly demonstrated by an organization's financial performance. The results suggest that variance analysis is negatively related to the financial performance of the organization which raises questions about the consistency of the results with previous studies.

2.2. Impact of the Competence of Business Managers

In Pizzini's (2006) study, controlling for the effects of significant variables based on contingency theory did not always lead to the discovery of a favourable relationship between the effectiveness of the costing system and the financial performance of the organisation because other significant variables were not taken into account. The ability of company managers to use cost information in decision-making and the awareness of how cost information affects organisational members' behaviour are examples of such variables.

There are two possible ways to overcome the limitations of Pizzini's (2006) research. The first is to analyze this relationship claiming that changes in financial performance occur when information from the costing system influences the attitudes and actions of organisational members (Birnberg, Luft, & Shields, 2006). The alternative strategy is to concentrate on top management and explain how differences in top management's capacity to use cost information might affect the link between the functioning of the cost accounting system and financial performance. This paper focuses on the ability of business managers at the top of an organization while it has been pointed out that decisions made by top management can significantly change an organization's financial performance. Few studies have focused on the ability of organizational top management to make decisions using cost information to fill the research gap.

Business managers vary in their abilities to use cost information (Bonner, 2008). There are differences in the ability of business managers, the relationship between the functionality of cost accounting systems and the financial performance of an organization may vary depending on the abilities of business managers. In other words, if the business managers have the necessary skills and knowledge to use cost information, they are likely to lead the organization to improve its financial performance by effectively using cost information. However, managers with inferior skills will not be able to use cost information to improve business performance. In other words, managers have the ability to adjust the relationship between the functionality of the cost accounting system and organizational performance.

Upper management theory explains this difference in the abilities of business managers. According to upper management theory, the output of an organization changes depending on the characteristics of the upper echelons (Hambrick, 2007; Hambrick & Mason, 1984). According to Hambrick (2007), there are two central ideas of upper theory: (1) Business managers act on personalized interpretations of the strategic situations they face. (2) This interpretation is a function of the experience, values and personalities of business managers. In other words, according to upper-level theory, each company manager has a unique cognitive framework when the same information is given, the interpretation and decision-making will change. However, it is difficult to measure the cognitive framework of business managers. Therefore, upper-level theories frequently use demographics such as educational background, years of work experience and gender as proxy factors in the cognitive framework of business managers.

Management accounting research using upper-level theory has been increasing in recent years. These studies mainly examine how upper management characteristics affect the design elements of management accounting and costing systems (Hiebl, 2014; Naranjo-Gil, 2009; Naranjo-Gil & Hartmann, 2007). However, the influence of the characteristics of upper management on the relationship between costing systems, management accounting systems, management control systems and organizational performance has not been studied (Hiebl, 2014).

Therefore, this study explores the idea that highly competent business managers will be able to use the cost accounting system and thereby enhance the organization's financial performance, whereas managers with low competence would not be able to make use of the data provided by the cost accounting system and would not be able to do so.

Hypothesis: The higher the managerial control capability of the manager, the stronger the positive relationship between the functionality of the cost accounting system and the financial performance of the organization.

3. Overview of Research Methods and Data

3.1. Research Subject

In this study, we conduct a study of social welfare organizations and their managers who operate special nursing homes for older people. We focused on nursing care corporations run by social welfare organisations and their business managers for three reasons. First, the functionality of the cost accounting system is expected to vary greatly depending on the organization and appropriate data can be obtained for hypothesis verification. Second, we expected a large variation in the abilities of business managers. Third, it is highly significant to clarify some aspects of the business management of social welfare organizations which are important service providers in society.

However, the nursing care industry has altered the business environment and more organisations are starting to implement cost accounting systems. In light of the aforementioned, it is anticipated that social welfare organisations involved in the nursing care business will vary in their level of cost accounting system development. Therefore, we believe that appropriate data can be obtained for hypothesis testing.

The second reason for choosing social welfare organizations as the subject of our study is that we expect a large variation in the abilities of business managers. In recent years, in addition to the traditional family-oriented management of social welfare organizations, participation in management from the financial and consulting industries has been increasing. It can be expected that there is a considerable range of business management skills among business managers of social welfare organizations.

The third reason is that it is highly significant to clarify the actual business management of social welfare organizations. Various management entities including for-profit organizations have entered the market and social welfare organizations have been placed in an intensely competitive environment. Efficient and effective management by modifying and adapting the business management system adopted by for-profit companies will enhance the competitiveness of social welfare organizations. However, few studies have quantitatively clarified basic facts such as the actual business management systems of social welfare organizations and whether the development of business management systems is positively related to the financial performance of the organizations. Clarifying such basic facts is significant because it provides basic data for considering the improvement of the management of social welfare organizations which are important service providers in society.

The participants in this study were business managers familiar with the overall business management of each social welfare organization. We received responses from the organization's substantive managers, including the board of directors' president, the director of the main facility and the administrative director. We confirmed that the individuals in these roles are in control of the organization's substantive management in the pilot interviews described below. The utilisation of cost information may differ based on the educational background and business management experience of the people in these roles which was also validated by the pilot interviews. Therefore, the assumption of the upper management theory that the characteristics of management affect the usage style of cost information seems to have certain validity for social welfare organizations.

The data used for hypothesis testing were collected in the following steps: (1) pilot interviews, (2) preparation of a questionnaire, (3) preparation of a list of recipients of the questionnaire, (4) sending and collection of the questionnaire and (5) collection of financial data on the respondent organizations. First, as preparatory work for the questionnaire, we interviewed social welfare organizations in different regions that we confirm from books, websites and survey materials actively engaged in management accounting and cost accounting. Questionnaires were developed based on previous research and interview results. The questionnaire was pilot-tested by two managers of two social welfare organizations and was modified based on their opinions. A list of social welfare organizations (1,368 organizations) operating special nursing homes in the metropolitan area was created and 1,000 organizations were randomly selected from the list. Questionnaires were sent to 1,000 organizations and received responses from 244 firms (response rate: 24.4%). We collected the financial statement data (from April 2021 to March 2022) for the companies that replied to the questionnaire in order to conduct the hypothesis testing. Financial statements were collected mainly from the websites of the organizations and the local government where the organizations are located. The following method was used to eliminate data from 5 organisations out of the 165 organisations for whom the required data for hypothesis testing were available. The hypotheses were tested using data from 160 organizations.

We conducted an analysis based on Widener (2007) to evaluate the problem of non-response bias. The sample was divided into three groups in order of arrival and we checked whether there were statistically significant differences between the variables used in the analysis for early arrivals (53 firms) and late arrivals (53 firms).

The Welch's t-test indicated a statistically significant difference between the early and late arrivals in terms of the respondents' years of business management education at the 5% significance level. Therefore, there is a non-response bias issue, hence it is best to be cautious when generalising the analyses' findings.

3.2. Variables

In the basic model of this study, the financial performance of the organization is placed as the dependent variable, the functionality of the cost accounting system as the independent variable and the ability of business managers as the adjustment variable and the relationship between them is shown. The financial performance of the organization was operationalized by ROS, the functionality of the cost accounting system by four scales based on Pizzini's (2006) scale and the ability of business managers by the number of years of experience in business management practice and years of business management education. The details are explained in the following sections:

3.2.1. Dependent Variables

We use the ratio of the increase or decrease in service activity income to service activity revenue which is equivalent to the ratio of operating income to sales in a for-profit business as the dependent variable. This ratio is considered an indicator that reflects the strength of the profitability of the main business of social welfare organizations. This ratio is referred to as ROS in this work.

Do managers of non-profit nursing homes place importance on profit amount and profit margin? The acquisition of profit (an income and expenditure balance) has been highlighted by various organisations as one of their key goals in the interviews done prior to the research.

However, the ultimate goal was to expand the business with the acquired profit in order to provide services to the elderly who do not have access to nursing care services or to improve their services that are not profitable but have a significant social impact. The social welfare organisation would have greater financial resources to complete its original objective if the amount of profit was higher.

The dependent variable in this study is ROS which is the result of dividing the difference between an increase and decrease in service activities by their income in order to account for the influence of size.

3.2.2. Independent Variables and Adjustment Variables

A modified version of Pizzini's (2006) scale was used to evaluate the costing system's functionality from four aspects: (1) the degree to which detailed cost information can be grasped for each costing object (detail) , (2) the degree to which cost information can be classified (classify), (3) the frequency of reporting cost information (frequency) and (4) the degree of thoroughness of variance analysis (variance analysis). In this paper, we modified the variance analysis questions that were thought to be challenging for managers of social welfare organisations to comprehend based on the interview survey and the pilot study (see Appendix 1). In addition, the wording was adjusted to fit the management environment of social welfare organizations. Q1 is a measure of detail, Q2 is a measure of classification, Q3 is a measure of frequency consisting of reversal items and Q4 is a measure of variance.

Pizzini (2006) conducted an exploratory factor analysis and confirmed that four functionalities were extracted. We checked whether the results of this analysis were replicated in the present study. Following Pizzini's (2006), exploratory factor analysis was conducted by standardizing the responses to each question item to a mean of 0 and a standard deviation of 1. Four factors were extracted based on the eigenvalues exceeding 1. 4-factor, varimax rotation and maximum likelihood methods were used to perform factor analysis. Table 1 shows the results of the factor analysis. Although the results of the factor analysis in this study differed slightly from those of Pizzini (2006)[1], each variable was scored in this study giving priority to conceptual definitions.

According to Pizzini (2006), the value of the functionality of the cost accounting system for each organization was obtained by standardizing the responses to each question item and then taking the average of the items comprising the four scales of detail, classification, frequency and variance. Thus, the mean value of each scale is 0.

[1] For example, Q1_1 has the highest factor loadings for the second factor, but this is thought to be because cost classifications such as variable/fixed and direct/indirect costs are mainly used at the facility and business level in Indian social welfare organizations, and such cost classifications are not often used when cost accounting targets are detailed. This is thought to be because such cost classifications are not performed as much when cost accounting targets become more detailed. The reason why the understanding of cost information at the facility and business level is considered to be advanced is that social welfare organizations are subject to business, base, and service level accounting, and the accounting information in these categories is regularly monitored. In addition, in this study, the 20 question items in Pizzini's (2006) were reduced to 14 items in accordance with the survey targets. This may be another reason why the analysis results differ from those of Pizzini's (2006).

Table 1. Results of factor analysis

Variable	Question no.	Factor 1	Factor 2	Factor 3	Factor 4	Cronbach's alpha coefficient	Correlation coefficient with overall satisfaction with accounting information
Detail	Q1 _1: Preparation of costs by facility or project	0.15	0.50	0.17	0.15	0.82	0.41***
	Q1_2: Preparation of departmental costs	0.68	0.19	0.15	0.22		
	Q1_3:Preparation of costs by field staff	0.75	0.20	0.19	0.13		
	Q1_4: Creation of costs by user	0.86	0.18	0.05	0.06		
	Q1_5: Creating costs by service	0.74	0.25	0.15	0.02		
Frequency	Q3_1: Frequency of reporting to top management	0.04	0.08	0.34	0.12	0.74	0.37***
	Q3_2: Frequency of reporting to middle management	0.15	0.12	0.54	0.08		
	Q3_3: Frequency of reporting to the field supervisor	0.09	0.13	0.87	0.10		
	Q3_4: Frequency of reporting to field staff	0.13	-0.04	0.72	0.13		
Classify	Q2_1: Distinguish between variable and fixed costs	0.24	0.73	0.10	0.14	0.82	0.23***
	Q2_2: Distinction between direct and indirect costs	0.21	0.86	0.09	0.10		
	Q2_3: Distinction between manageable and unmanageable costs	0.42	0.52	0.13	0.17		
Variance	Q4_1: Analysis of revenue variance	0.10	0.23	0.19	0.59	0.76	0.11
	Q4_2: Expenditure variance analysis	0.18	0.15	0.20	0.89		

Note: Bolded numbers are those with factor loadings of 0.3 or greater. In the table, *** denotes 1% significance.

The reliability of the four scales was assessed by Cronbach's alpha coefficient which ranged between 0.74 and 0.82 confirming the reliability of the four scales (Nunnally & Bernstein, 1994). To assess the validity of the scales, correlation coefficients were calculated with overall satisfaction with accounting information (7-point Likert scale, 1 = not satisfied at all, 7 = completely satisfied). Pizzini (2006) also calculated correlation coefficients between measures of accuracy and timeliness of cost information provided by cost accounting systems and the functionality of cost accounting systems to confirm the validity of the scale. In this study, we followed this approach and used the overall satisfaction with accounting information which can be measured by a single item taking into account the length of the questionnaire. A positive correlation coefficient, although not statistically significant was found for variance. Thus, at least detail, frequency and classification were shown to have some criterion-related validity.

We use business management experience (job year) and business management education as adjustment variables in this study since these factors are thought to reflect the managerial skills of business managers. In previous studies, the number of years was often used as a proxy variable to reflect the ability of business

managers (Bonner, 2008). In this paper, we make the assumption that a manager's ability to manage a firm will increase with the length of their business management training and experience. We chose to use the two measures because they accurately reflect various managerial skills. In other words, this measure reflects the level of competence in the practical use of cost information. On the other hand, the number of years of business management education is considered a measure that reflects the manager's knowledge of the use of cost information. Since we believe that the ability to use cost information practically is not necessarily the same as the amount of academically organized knowledge on the use of cost information, we decided to use the two measures.

Table 2. Respondents' positions (N = 160).

	Chairman	Facility director	Office manager	Deputy director	Other	Non-response
Number of responses	11	66	39	6	29	9
Percent	6.9	41.3	24.4	3.8	18.1	5.6

The distribution of job titles is explained here to clarify the characteristics of the respondents. Table 2 shows the results of the job titles of the respondents. Out of the 160 respondents, the most common were facility directors (41.3%) followed by office managers (24.4%). This result is consistent with the results of the pilot interviews. Other responses included directors (4 respondents), general managers of corporate headquarters (2 respondents) and administrative managers (2 respondents) while 10 respondents answered that they were section managers, section chiefs and senior managers who are difficult to assume as actual business managers. We also conducted an analysis excluding these 10 respondents and the non-response data and obtained almost the same results as in the analysis described below.

3.2.3. Control Variables

This study followed Pizzini's (2006) and other earlier studies by using the size of the organisation, the number of years since its founding, the business composition within the organisation, the level of market competition, wage levels by region, and the organization's strategy as control variables.

We used the ordinary logarithm of the organization's total assets for the fiscal year 2021 to determine the size of the organisation (asset). The number of years since the establishment of the organization (age) was calculated as the number of years that elapsed from the date of approval of the establishment of the organization as indicated in the status report of each organization to the end of the financial year 2021. We received responses on whether or not 21 companies were implemented in the questionnaire with regard to the organisational business structure (business dummy). A dummy variable was created for each of the 19 businesses excluding a special nursing home for the aged which was implemented by all organizations and a business related to the mentally disabled which was implemented by only one organization. Thus, the business dummy consists of 21 dummy variables that take a value of 1 if the business is conducted by the organization.

The severity of market competition was measured with reference to Pizzini (2006) who focused on the capacity of nursing homes. We looked at how many special nursing homes had been established by the end of fiscal 2021 in the municipality where each organization's headquarters were situated to compute the Herfindahl-Hershman Index (HHI). Since Pizzini (2006) uses 1 minus the HHI as an indicator of the competitive environment, we use 1 minus the HHI as the value of the intensity of the competitive environment in the municipality where the corporate headquarters is located. The higher this value is, the more intense the competition is. The wage level (payment level) for each region was calculated based on the wages of nursing care workers in each district. In this study, we calculated the ratio of wages in each district to the national average of care worker wages. If the ratio exceeds 1, the wage level in that district is higher than the national average. In other words, payment level indicates the relative wage level of a region.

Prior studies have shown that the adoption of a cost leadership strategy is positively associated with the adoption of a well-functioning cost accounting system (Pavlatos & Paggios, 2009; Pizzini's, 2006). In addition, this paper controls the strategy adopted by the organization since the strategic aspect is considered to have a significant impact on the financial performance of the organization in social welfare organizations. In this study, a partially modified version of Govindarajan and Fisher's (1990) scale was used to measure it. The scale indicates the percentage of their profit that is affected by the cost leadership strategy when the total impact of the cost leadership strategy and the differentiation strategy on profit is set at 100%.

3.3. Analysis Method

In this paper, multiple regression analysis with interaction terms is used to test the hypotheses. Since the dependent variable is a continuous variable and no mediating relationship is assumed in this study, this method of analysis was considered appropriate. In this paper, multiple regression analysis without an interaction term was first conducted as the base model followed by hierarchical multiple regression analysis to verify the increase in explanatory power by adding an interaction term. All independent variables,

adjustment variables and control variables except dummy variables were centralized to facilitate the interpretation of the interaction term (Cohen, Cohen, West, & Aiken, 2003).

In this study, regression diagnosis was conducted after the exclusion of outliers and data from organizations that were problematic for estimation were excluded. Data from organizations with values that did not fall within the mean ± 3 standard deviations of each variable (outliers) were excluded[2]. After excluding outliers, multiple regression analysis of the base model was performed and regression diagnostics were conducted. When cook's distance was focused on, no data exceeded 0.5. Finally, we present the results of the analysis conducted on the data of 160 organizations. The statistical analysis environment R was used for the analysis (Mirisola & Seta, 2013).

Table 3. Descriptive statistics for each variable

Panel A: Descriptive statistics for variables other than business dummy[3]

	N	Mean	SD	Median	Min.	Max.
ROS	160	0.04	0.06	0.03	−0.11	0.26
Job year	160	7.85	6.29	6.00	0.00	30.00
Education (Years)	160	2.10	2.30	1.50	0.00	10.00
Detail	160	0.00	0.77	−0.15	−1.47	1.75
Classify	160	0.00	0.85	0.02	−1.93	1.57
Frequency	160	0.00	0.75	−0.06	−2.15	1.83
Variance	160	0.00	0.90	−0.31	−1.98	1.37
Asset (log10)	160	9.26	0.34	9.22	8.54	10.60
Age (Years)	160	21.39	13.59	18.00	3.00	62.00
Competition	160	0.82	0.19	0.88	0.00	0.99
Payment level	160	1.08	0.06	1.08	1.00	1.18
Strategy (%)	160	42.46	20.18	40.00	0.00	90.00
Detail * Job year	160	−0.20	4.91	0.00	−18.89	16.53
Classify * Job year	160	0.10	5.35	0.01	−19.56	25.36
Frequency * Job year	160	0.16	4.26	0.18	−19.71	16.91
Variance * Job year	160	−0.23	5.17	−0.21	−17.45	18.00
Detail * Education	160	0.26	2.01	0.15	−5.36	10.26
Classify * Education	160	0.29	2.17	0.08	−9.44	8.12
Frequency * Education	160	0.28	1.82	0.06	−4.50	10.79
Variance * Education	160	0.16	2.04	0.28	−6.84	8.08

[2] Even after the treatment of outliers, the maximum values for education and job year deviated from the mean by more than three standard deviations. Therefore, the same procedure was used again to exclude the data containing outliers (n = 156). In this additional analysis, the results remained almost the same, including the values of the coefficients.

[3] The reason why the means of detail, classify, frequency and variance are set to 0 is that the procedure of Pizzini's (2006) to obtain the mean of the standardized items. All the interaction terms are the sum of the independent variables after centralization and the adjustment variables.

Table 3. Continue…

Panel B: Response results for business_ dummy							
	Nursing care facility for the elderly	**Nursing care for residents of specific facilities**	**Home care**	**Home-visit bathing care**	**Home nursing**	**Home-visit rehabilitation**	**Short-term inpatient nursing care**
Number of implementing organizations	5	10	50	8	5	2	7
Percent	3.1	6.3	31.3	5.0	3.1	1.3	4.4
	Short-term admission life care	Day service (day care)	Outpatient rehabilitation	Day care for dementia	Small-scale multifunctional home care	Group home	In-home nursing care support office
Number of people	138	127	8	20	16	29	109
Percent	86.3	79.4	5.0	12.5	10.0	18.1	68.1
	Regional comprehensive support center	Other nursing care businesses	Businesses related to the physically challenged	Businesses related to the mentally handicapped	Other businesses		
Number of people	46	15	15	11	29		
Percent	28.8	9.4	9.4	6.9	18.1		

4. Analysis Results

The descriptive statistics for each variable are shown in Table 3 with a mean ROS of 4% and a median of 3%. The average number of years that business managers have been involved in business administration was roughly 8 years and it appears that experienced business managers responded to the questionnaire but the standard deviation was 6.29 years showing that there was some variation. The average number of years of education in business administration was about 2 years. Four years of education was the next most popular response with 28.1% of respondents. There was a wide range of responses regarding the number of years of experience and education in business administration.

The correlation coefficient matrix among variables (see Table 4) shows that the only costing system functionality that has a statistically significant correlation with ROS is classified with a small correlation coefficient of 0.16 indicating that there is no strong correlation between ROS and costing system functionality. Among the control variables, the size of total assets (logarithm of normal) has a statistically significant positive correlation with ROS.

Table 5 shows the results of a multiple regression analysis with ROS as the dependent variable. The maximum value of VIF is 2.76 for whether or not specified facility resident care is provided (dummy variable), and it can be judged that there is little multicollinearity problem. Table 6 shows the results of the subtests. The results of the subtests are for those cases in which the interaction terms are statistically significant. The results show how the strength of the relationship between the functionality of the cost accounting system and the financial performance of the organization changes when the number of years of experience and education is increased or decreased by a standard deviation from the mean.

First, we can confirm that the entire model's coefficient of determination is statistically considerably higher when compared to the basic model. The adjusted coefficient of determination for the base model is 0.130 while for the full model, it is 0.247. Furthermore, there is a statistically significant interaction term. Therefore, the full model is discussed below[4,5].

According to this model, none of the costing system features have main effects or interaction terms that are statistically significant. Therefore, we turn our attention to the interaction terms: among the eight interaction terms, three are statistically significant and for five the null hypothesis cannot be rejected. In addition, one of the three coefficients has the opposite sign from the hypothesis. Therefore, the results do not strongly support the hypothesis of this paper. The effect of managerial characteristics on strengthening the positive association between cost accounting system functionality and organizational performance was more limited than expected.

First, the coefficient of the interaction between years of experience and reporting frequency (frequency * job year) is positive and statistically significant at the 1% level. The subtest shows that the simple slope has a negative coefficient and is statistically significant for managers with relatively short experience. This may suggest that relatively inexperienced managers are not able to use the information even when frequently provided with it and are not able to make decisions of high enough quality to recover the costs associated with cost accounting systems (Edmunds & Morris, 2000).

Among the interactions between years of education and cost accounting system functionality, the coefficient of the interaction term between years of education and detailed costing (detail *education) is positive and statistically significant at the 5% level. The results of the subtest also showed that the simple slope was statistically significant at the 10% level. Business managers with relatively more years of education tend to make better decisions based on detailed cost information and improve financial performance (Feltham, 1977; Pizzini's, 2006).

On the other hand, the coefficient of the interaction term between frequency of reporting and years of education (frequency*education) was negative and statistically significant at the 1% level. The results of the subtest also show the opposite of the hypothesis. In other words, the result suggests that managers with relatively long years of education will make decisions that lower ROS when they are provided with cost information frequently while managers with short years of education will make decisions that increase ROS when they are provided with cost information frequently. The results suggest that managers with fewer years of education are more likely to make decisions that increase ROS by receiving frequent cost information.

[4] In a multiple regression analysis with an interaction term, it is not appropriate to interpret only the main effect when the interaction term is statistically significant. This is because, in the presence of an interaction, the main effect is not constant and depends on the value of the adjustment variable (Kerlinger & Lee, 1999). Since the pattern of interactions also depends on the sign and magnitude of the coefficients of the explanatory variable, the adjustment variable, and the interaction term, it is not appropriate to interpret the sign and magnitude of the coefficients by looking at them alone (Cohen et al., 2003). Therefore, in this paper, we conducted a back-test when the interaction term was statistically significant (Cohen et al., 2003). In this way, we can understand how the relationship between the functionality of the cost accounting system and organizational performance specifically changes with the years of education and experience of the business managers.

Table 4. Correlation coefficient matrix between variables (excluding dummy variables for business composition)

ROS	1												
Job year (Years)	2	-0.07											
Education (Years)	3	0.02	0.22***										
Detail	4	0.07	-0.04	0.15*									
Classify	5	0.16**	0.02	0.15*	0.61***								
Frequency	6	0.03	0.03	0.16**	0.34***	0.27***							
Variance	7	0.04	-0.04	0.08	0.36***	0.38***	0.34***						
Asset (Log10)	8	0.26***	0.04	0.13*	0.10	0.24***	0.25***	0.10					
Age (Years)	9	0.07	-0.02	0.01	0.05	0.09	0.04	0.01	0.38***				
Competition	10	-0.01	-0.01	0.15*	0.17**	0.21***	0.14*	0.13**	0.13	0.04			
Payment level	11	-0.04	-0.01	-0.05	0.07	0.16**	0.30***	0.15**	0.52***	0.17**	0.18**		
Strategy (%)	12	-0.01	-0.02	0.04	-0.11	-0.08	-0.09	-0.03	-0.02	0.14*	-0.11	0.03	
Detail * Job year	13	0.11	-0.08	0.03	0.02	0.05	-0.02	-0.04	-0.03	-0.08	0.04	-0.14*	-0.12
Classify * Job year	14	0.06	0.02	-0.03	0.05	0.07	-0.02	-0.07	-0.15*	-0.12	0.09	-0.20**	0.05
Frequency * Job year	15	0.17**	-0.07	0.03	-0.02	-0.02	0.00	-0.14*	-0.09	-0.05	0.08	-0.09	-0.03
Variance * Job year	16	0.16**	-0.17**	-0.04	-0.05	-0.08	-0.14*	-0.07	-0.13	-0.05	-0.03	-0.11	-0.03
Detail * Education	17	0.14*	0.02	0.09	0.05	0.14*	0.09	-0.06	0.02	-0.10	0.00	-0.06	0.01
Classify * Education	18	0.09	-0.03	0.04	0.14*	0.22***	0.12	0.00	0.04	-0.06	0.05	-0.07	-0.03
Frequency * Education	19	-0.17**	0.02	0.17**	0.10	0.12	-0.05	-0.1	-0.01	-0.20**	-0.01	0.03	0.08
Variance * Education	20	0.02	-0.03	0.01	-0.07	0.00	-0.12	-0.06	0.02	-0.04	-0.06	-0.01	-0.19**

ROS													
Job year (Years)													
Education (Years)													
Detail													
Classify													
Frequency													
Variance													
Asset (Log10)													
Age (Years)													
Competition													
Payment level													
Strategy (%)													
Detail * Job year													
Classify * Job year	0.58***												
Frequency * Job year	0.36***	0.28***											
Variance * Job year	0.19**	0.29***	0.21***										
Detail * Education	0.21***	0.11	0.20**	0.02									
Classify * Education	0.12	0.18**	0.14*	0.07	0.71***								
Frequency * Education	0.20**	0.13*	0.18**	-0.01	0.44***	0.30***							
Variance * Education	0.22	0.06	-0.02	0.27***	0.24***	0.35***	0.13*						

Note: In the table, * indicates 10% significance, ** indicates 5% significance, and **** indicates 1% significance.

Table 5. Results of hierarchical multiple regression analysis

ROS				
	Base model		Full model	
	Coef.	t-value	Coef.	t-value
Intercept	0.0775	4.861***	0.0763	4.725***
Job year	-0.0006	-0.820	-0.0003	-0.425
Education	0.0006	0.241	0.0015	0.678
Detail	-0.0042	-0.522	0.0011	0.144
Classify	0.0124	1.672*	0.0109	1.557
Frequency	-0.0002	-0.031	-0.0041	-0.578
Variance	-0.0022	-0.352	-0.0007	-0.122
Asset	0.0975	4.804***	0.0963	4.999***
Age	-0.0003	-0.673	-0.0004	-1.147
Competition	-0.0099	-0.373	-0.0223	-0.889
Payment level	-0.2718	-2.759***	-0.2290	-2.385**
Strategy	-0.0001	-0.515	0.0000	-0.022
Detail*Job year			0.0003	0.185
Classify*Job year			0.0002	0.126
Frequency*Job year			0.0032	2.679***
Variance*Job year			0.0016	1.644
Detail*Education			0.0079	2.397**
Classify*Education			-0.0021	-0.659
Frequency*Education			-0.0093	-3.229***
Variance*Education			0.0008	0.332
Business dummy	Yes		Yes	
N	160		160	
AdjustedR^2	0.130		0.247	
R^2	0.294		0.427	
F	1.790**		2.374***	
ΔR^2			0.133	
ΔF			3.516***	

Note: In the table, * indicates 10% significance, ** indicates 5% significance, and **** indicates 1% significance.

Table 6. Subtests of interaction terms

Independent variables	SE	Simple slope	T value	P-value	Moderator
Frequency	0.0110	-0.0244	-2.21	0.029**	Low job year (-1 SD)
Frequency	0.0098	0.0162	1.66	0.100	High job year (+1 SD)
Detail	0.0102	-0.0172	-1.69	0.094*	Low education (-1 SD)
Detail	0.0113	0.0194	1.71	0.090*	High education (+1 SD)
Frequency	0.009	0.0173	1.93	0.056*	Low education (-1 SD)
Frequency	0.0105	-0.0256	-2.45	0.016**	High education (+1 SD)

Note: In the table, * indicates 10% significance, and ** indicates 5% significance.

Eight interaction terms were present and two of them supported the theory. The influence of management characteristics on the favourable relationship between the efficiency of the cost accounting system and organisational performance is minimal at least in social welfare organisations involved in the nursing care industry.

5. Conclusion

The objective of this study was to obtain new findings by conducting an analysis that takes into account the abilities of business managers based on the results of previous studies that have shown that the higher the functionality of the cost accounting system, the higher the financial performance of the organization. In this study, we expected that the positive impact of higher functionality of cost accounting systems on the financial performance of organizations would be enhanced when managers had longer work experience and educational backgrounds. However, among the eight interaction terms related to the hypotheses, the coefficients were not statistically significant for five of the interaction terms and one was statistically significant with the opposite sign to the hypothesis. Only two interaction terms supported the hypothesis. The statistically significant interactions suggest that managers with relatively less managerial experience are less able to use the frequent cost information provided to them resulting in lower financial performance. The results also suggest that the more detailed cost information available in a cost accounting system, the more managers who have a more

systematic knowledge of cost accounting use cost information to improve their decision-making and enhance their financial performance. On the other hand, managers with relatively more systematic knowledge of cost accounting were more likely to reduce their financial performance by receiving more frequent cost information.

The results of this study suggest that among the four functionalities of cost accounting systems, detailed cost ascertainment and reporting frequency may affect organizational performance through interactions with the ability of business managers. We could not confirm the expected interaction between cost classification and variance analysis. A promising research direction is to accumulate additional evidence through new studies (using case studies, questionnaires and archival data) to test the effects of managerial competencies observed in this study.

This paper makes two contributions. First, it introduces a new perspective on considering the ability of business managers from the perspective of upper management theory in a series of studies on the relationship between the functionality of cost accounting systems and the financial performance of organizations. Although the analysis is based on social welfare organizations' data, it can be said to be an initial study on the influence of business managers on the relationship between the functionality of cost accounting systems and financial performance.

The second contribution concerns practical and policy implications. According to the analysis of this study's findings, when the goal is to improve an organization's financial performance, it is not enough to create a cost system and supplement it with information that can be used to make decisions. According to the interaction term analysis's findings, company managers with years of experience and formal training in business management may not always be able to boost organisational performance through precise cost categorization and in-depth variance analysis. The four cost accounting system functional improvements and the employment of qualified management do not guarantee enhanced performance. A more focused approach is needed to improve the performance of the organization by establishing a cost accounting system that enables detailed cost understanding and having business managers receive business management training. In addition, it would be beneficial to provide cost information more frequently and to have competent company managers. However, when providing cost information to managers who have obtained business management education, care should be taken to prevent a loss in decision-making quality.

This study has several limitations. First, the data used in this study do not allow for rigorous verification of the causal relationship between the functionality of the cost accounting system, the financial performance of the organizations and the ability of the business managers. In the future, it will be necessary to adopt a research methodology that allows for a rigorous examination of causal relationships.

Second, this study did not explicitly consider how business managers specifically use cost information in decision-making as a variable in the analysis. If the specific use of cost information in decision-making were included as a variable, clearer results might have been obtained. It may also be possible to clarify why the interaction between years of education and frequency of reporting showed an inverse relationship to the hypothesis.

Third, this study used years of experience and years of education as proxy variables for the abilities of business managers. However, it has been pointed out that it is not always the case that years of business management education and years of experience are appropriate proxy variables for business management competence (Bonner, 2008). For the measurement of competence, it is first necessary to incorporate a device in the questionnaire that limits the respondents to substantive business managers (and management-level managers). Then, more precise measurement methods should be considered. Another limitation of this study is that it did not examine the entire management. Therefore, when developing a new instrument, we should not only focus on a single manager but also consider measuring the characteristics of the entire management (Hambrick, 2007).

Despite these limitations, this study can be positioned as a first step in examining the effects of the interaction between the functionality of cost accounting systems and the abilities of business managers on the financial performance of organizations. Further investigation of the interrelationships among the three variables using this study will be highly significant from both academic and practical perspectives.

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Appendix 1. Questionnaire (Partial).

Please provide the name of your firm, the title and years of experience of the respondent, and the size of the firm.

Name of your company	
Respondent's position	
Years of experience in business management (Section manager, facility manager, office manager, etc.)	Year
Number of years of post-high school education in management (High school, college,)	Year
Total revenue of the organization as a whole (Total sales)	Thousand rupees

Q1. Please select the type of facility or business operated by your organization (Multiple selections allowed).

(1) Special Nursing Home for the Elderly	(11) Outpatient rehabilitation
(2) Nursing and healthcare facilities for the elderly	(12) Outpatient care for dementia
	(13) Small-scale multifunctional in-home care
(3) Nursing care for residents of specified facilities	(14) Group Home
(4) Home-visit nursing care	(15) Residential Care Support Center
(5) Home-visit Bathing Care	(16) Regional Comprehensive Support Center
(6) Home-visit nursing	(17) Other nursing care businesses
(7) Home-visit rehabilitation	(18) Businesses related to the physically handicapped
(8) Short-term inpatient medical care	(19) Businesses related to the intellectually disabled
(9) Short-term residential nursing care	(20) Businesses related to the mentally disabled
(10) Day service (Daycare)	(21) Other Businesses

Q5. How does your organization analyze the difference between the budget and the previous month's results and the current month's results?

1	Income	(1) No comparison	(2) Simple comparison of current performance with budget and past performance	(3) Based on a single factor (4) Analyzed by breaking it down into multiple factors (e.g., average compensation per unit and occupancy rate)
2	Expenses	(1) No comparison	(2) Simple comparison of current performance with budget and past performance	(3) Based on a single factor (4) Analyzed by breaking it down into multiple factors (e.g., average wage rate and working hours)

Q6. To what extent is your organization able to produce information that allows you to analyze costs in the following units?
(1 = Not at all, 7 = Completely possible)

1	Costs by facility and business (e.g., costs per special care, elderly care, day service, and community comprehensive support center)
2	Costs by department within the facility/project (e.g., costs by department, section, or floor within a special care facility)
3	Costs by nursing and medical field staff (e.g., Costs incurred by the activities of nursing staff)
4	Cost by User
5	Cost per service (e.g., cost per bath, cost per meal, cost per transportation)

Q7. How often does your organization report cost information in writing for each of the following positions?
(1 = Daily, 2 = weekly, 3 = monthly, 4 = quarterly, 5 = six months, 6 = one year, 7 = no report)

1	Top management (president, facility director, office manager)
2	Middle management (facility directors, division heads, and section managers other than top management)
3	Field director (chief nurse, caretaker, registered dietician, etc.)
4	On-site caregivers and nurses

Q8. To what extent is your organization able to distinguish costs based on the following cost categories?
(1 = Not distinguishable at all, 7 = Completely distinguishable)

1	Costs that increase with changes in occupancy rates and number of residents (variable costs) and costs that do not change (fixed costs)
2	Costs directly associated with facilities, projects, and services (direct costs) and costs allocated using some standard (indirect costs)
3	Costs that can be controlled by the efforts of the person in charge of the facility, project, or floor (controllable costs) and costs that cannot be controlled by the person in charge (uncontrollable costs)

Q9. To what extent is your organization's balance of payments (profit) affected by the following two policies (strategies)? Please answer so that the total is 100%.

1	Lower costs than other providers; vigorously pursue cost reductions; provide standard, common services (Cost leadership strategy)	%
2	Provide services that users and their families consider distinctive. Care to enhance the quality of services and the image and reputation of the organization (Differentiation strategy).	%

Q13. Overall, how satisfied are you with the accounting information provided by your firm for business management?
(1 = Not satisfied at all, 7 = Completely satisfied)

1	Satisfaction with accounting information for business management