



Importance of performance information in managerial work

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Abstract

Purpose – The purpose of this study is to analyse the connection between managerial job and importance of job-relevant performance information.

Design/methodology/approach – Two hypotheses on the relationship of the nature of job to the job-relevant information are tested by survey data gathered in spring 2008. The data include responses from 76 Finnish CEOs in manufacturing industry. Managerial job, information, and information gap types are extracted by the factor analysis. The hypotheses are tested by the regression analysis.

Findings – Evidence shows that the type of job strongly influences the importance of different information types in managerial work. However, information gap does not depend on the type of work but on contextual variables.

Research limitations/implications – The results limited by the small sample size and industry. Larger data, advanced statistical methods, and different constructs to measure managerial job and contextual variables should be used in further studies.

Practical implications – Contingency factors are important in affecting the nature of managerial job. Managerial job largely determines the importance of information but the gap of information depends on contextual environment. It is important to take account of the nature of managerial job in designing information systems.

Originality/value – This study shows that managerial job mediates the effect of contingency factors on the importance of information. However, these factors have a direct effect on the gap of information.

Keywords Performance management, Chief executives, Managers, Finland, Information facilities

Paper type Research paper

1. Introduction

Managerial work is supported by information delivered by management information systems. The purpose of these systems is to provide information that is useful in managerial planning, decision-making, and evaluation (Merchant and Otley, 2006). Contingency-based research shows that the usefulness of information differs in firms that are different with respect to contingency factors (Chenhall, 2003). In this line of research, the influence of context variables (environment, technology, organizational structure, size, and strategy) on the design of information systems has been investigated. Thus, contingency research implies that the importance of information is largely determined by context. The argument of the present study is however that context does not sufficiently explain the importance of information for managers.

Contingency-based research largely neglects the potential effect of managerial work on the importance of information. Managers are assumed to do their traditional tasks in a similar way. It is expected that the manager plans, makes decisions, and evaluates

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in a rational and systematic way. Especially, management accounting research has followed these normative assumptions as to the nature of managerial work (Hall, 2006). However, studies of managerial work show that these assumptions are far from the reality (Noordegraaf and Stewart, 2000; Tengblad, 2002). Managerial work includes activities like negotiating, recruiting, training, innovating, and contacting special to individual managers. These tasks are not carried out in an ordered and systematic way. Managerial tasks are characterized by great variety, brevity, fragmentation in time and space, numerous interruptions, and encounters with others. Each task has its own information needs. Thus, it is expected that the importance of information is strongly affected by the nature of managerial job.

Traditional management accounting systems fail in providing managers with relevant and useful information (Johnson and Kaplan, 1987). Especially, financial measures are perceived as too limited and narrow for performance measurement (PM). Therefore, firms have implemented integrated performance measurement systems (IPMS) that supplement conventional financial measures with non-financial measures focused on perspectives such as customers, internal processes, and learning and innovation. The purpose of IPMS is to provide a powerful means to managers to translate the vision and strategy into a tool that effectively communicates strategic intent and motivates performance against established strategic goals (Ittner and Larcker, 1998). The founding idea of IPMS is that the performance measures linked to the system provide the management with a quick but comprehensive view of the business (Kaplan and Norton, 1992).

The purpose of this study is to analyze the effect of managerial job on the importance of PM information. The results are extracted from a survey responded by 76 managers (CEO) in Finnish manufacturing firms. Managerial job is described by three types extracted from the ten Mintzberg (1973) roles by the factor analysis. Four information types are drawn from a set of 27 information items in IPMS presented by Laitinen (2002). The influence of managerial work and contextual variables on the importance and gap of information is analyzed by the regression analysis. The results are important because the choice of performance information is one of the most critical challenges faced by organizations (Ittner and Larcker, 1998). The study will increase understanding in managerial job and its relation to the importance of information. This kind of understanding is essential when developing information systems for managers.

2. Development of hypotheses

2.1 Managerial job and information

This study concentrates on the work of CEO and the use of job-relevant PM information. Mintzberg (1973) pointed out that managerial work of CEO is characterized by variety, fragmentation, and brevity. He found that all activities in managerial work are involved by one or more of three basic behaviors:

- (1) interpersonal contact;
- (2) the processing of information; and
- (3) the making of decisions.

These basic characteristics (intrinsic conditions) of managerial job have been found in several further studies (Noordegraaf and Stewart, 2000; Tengblad, 2002).

Information plays a central role in managerial work (McKinnon and Bruns, 1992; Tengblad, 2002). In general, getting information is the most common managerial activity. The major sources of information are interpersonal communications and distributed reports. Tengblad (2002) has shown that CEOs spend on average 23 percent of total working time in getting information. Together, with informing and reviewing information, the information-handling occupies on an average 51 percent of the total working day. However, CEOs can still act strategically. This is important, because the workload is demanding, job is challenging, and the work is primarily conducted through personal meetings, which are devoted to sense-making processes (Tengblad, 2002).

Making sense of the environment and making sense of what the company should be doing is a central task for the CEO. Managers use information to identify problems and opportunities and to build mental models of the business (Mintzberg, 1975). Therefore, IPMS can be an efficient tool in these tasks to improve managerial performance. It is important for a CEO that IPMS gives a quick but comprehensive view of the business (Kaplan and Norton, 1992). Managerial information seldom appears in a clear-cut and unambiguous way. IPMS helps the manager to make sense of this fragmented information and give a snapshot of business. Therefore, it influences managerial performance through motivation and cognition (Hall, 2008).

The complexities of actual managerial work affect the way in which managers acquire and use information. Environments with different complexities lead to different job characteristics. Managers who are engaged in a variety of tasks on complex social and organizational contexts need likely more diverse and a wider range of information than others (Hall, 2006). Thus, different contextual environments lead to different managerial work and different use of information (Pfeffer and Salancik, 1978). However, differences in these environments do not entirely explain all variation in the managerial work and the use of information. Environmental or organizational context variables can provide explanations of managerial behavior based on observable events but consideration of individual managers can improve predictions as they bring unique interpretation to the situation (Chenhall, 2003).

Stewart (1982) emphasized that the opportunities for individual managers to do what they believe to be most important for the job, the organization, or their own purposes exist in all management jobs. The focus of attention of managers in similar jobs differs from each other. This leads to differences in the work done. Stewart and Fondas (1992) argued that management jobs are more flexible now than in the past. This creates extra responsibilities but also freedom to interpret the job in a personal way. Different managers end up emphasizing different things in different ways. Values, experience, knowledge, competences, and mental models greatly determine how any manager approaches a given job (Mintzberg, 1994).

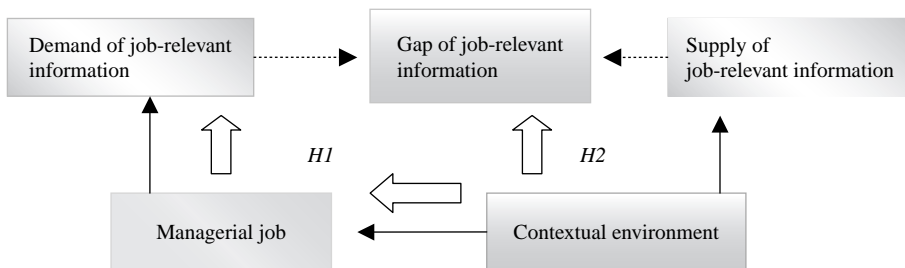
Managers seek information from every source available to them. Informal sources of information (face-to-face meetings, observation, telephone calls, and informal reports) dominate other sources for day-to-day needs but remain important for longer term (strategic) needs. Therefore, many managers develop their own personal systems for getting the information they want or believe they need (Mintzberg, 1971; Bruns and McKinnon, 1993). Useful information is always related directly to managerial tasks of the managers receiving it. Thus, the need for information is largely based on the characteristics of managerial work.

The supply of information is associated with contextual environment. Contingency factor (organizational size, structure, technology, and strategy) are important determinants of information systems (Chenhall, 2003; Rom and Rohde, 2007). They are important in creating physical facilities to provide information. The challenge of information systems is to improve the information environment in which managers do their work, while understanding that much of it will always be managed by managers themselves (Bruns and McKinnon, 1993). Therefore, information gap in managerial work depends on the lack of person-environmental fit. In this context, person-environmental fit measures the extent to which individual managers' demand for information fits with the supply of information from the organization (Chenhall, 2003).

2.2 Research hypotheses

Figure 1 shows the theoretical framework based on the discussion above. It is assumed that contextual environment affects causally the characteristics of job. However, it does not affect directly the demand for job-relevant information. Thus, managerial job is an intervening variable. The demand for information may however correlate with contextual environment as is shown in cross-level contingency-based research (Chenhall, 2003). This is because the effect of contextual environment occurs according to the intervening-variable model on the condition that it affects managerial job and managerial job in turn affects the importance of information. Figure 1 shows that the latter effect (the main or direct effect of managerial job on the importance of information) is assumed significant (H1).

The gap of information is the difference between the demand and supply of information. The supply of information depends on the ability of contextual environment to fulfill the individual demands of managers for job-relevant information. If this ability is low in a relation to demand, the information gap is large. Contextual environment may also affect the demand of information through managerial job as an intervening variable. Therefore, contextual environment is connected to both the demand and supply, and thus to the gap. However, managerial job is only connected to the demand of information. This means that the gap of information mainly depends on



- Legend:
- = hypothesized relation
 - = assumed causal relation
 - = (partly) logical relation

Figure 1. Framework for the analysis of job-relevant information

contextual environment (*H2*). Controlling for the main effect of contextual environment, managerial job is not expected to have a significant correlation with information gap.

This framework leads to the following research hypotheses (*H1* and *H2*):

- H1.* Contextual environment has a significant direct effect on the characteristics of managerial job. The characteristics of managerial job have a significant main (direct) effect on the importance of job-relevant information. Controlling for this effect, contextual environment has not a significant direct effect on job-relevant information. (Managerial job is an intervening variable.)
- H2.* Contextual environment has a significant direct effect on the gap of job-relevant information. Controlling for this effect, the characteristics of managerial job have not a significant direct effect on the gap of job-relevant information.

3. Empirical sample and statistical methods

3.1 Sample of firms

The sample of 300 firms was randomly selected from the manufacturing firms in Finland. The firms with less than 25 employees were excluded from the sample. The questionnaire was organized in the internet in spring 2008 and a request to response was sent by email to the CEO of the firm. In all, only 291 CEOs were contacted by the email due to a change in organization or in email address. A response period of one week was applied. However, after this period a follow-up email was sent to increase the rate of response. Until the closing date, 76 responses were obtained making a response rate of 26.5 percent. However, due to missing variables, the multivariate analyses include only 71 responses. The sample of the responded firms is consistent with the population.

The average size of the responded firms is 903 employees while the median is only 150. The smallest firm in the sample employs only 28 employees whereas the largest one has 17,000 employees. The sample includes a number of firms from metal industry (23 percent), machine industry (18 percent), paper industry (13 percent), and food industry (13 percent). In addition, 81 percent of the respondents are CEOs of the whole firm, about 3 percent are vice CEOs, 4 percent CEOs of a business unit, and 8 percent CEOs of a functional area of the firm. However, all respondents are at the top (CEO) of the hierarchy in their organization. Thus, they have similar intrinsic conditions of managerial job and comparable needs for job-relevant information.

3.2 Constructs and variables

3.2.1 Managerial job. Managerial work of CEOs is measured by the perceived importance of the Mintzberg (1973) roles. This classification of roles is the best-known and widely tested construct to describe managerial work. Mintzberg (1973) defines the major dimensions of managerial work as consisting of ten main roles, grouped into three categories:

- (1) Interpersonal roles (Figurehead; Leader; Liaison).
- (2) Informational roles (Monitor; Disseminator; Spokesperson).
- (3) Decisional roles (Entrepreneur; Disturbance Handler; Resource Allocator; Negotiator).

The importance of the ten roles was assessed by CEOs on a five-point scale from no significance to very high significance. These roles are described in the questionnaire following Mintzberg (1973) (Appendix). To diminish the number of roles and the effect of ambiguity, the factor analysis with Varimax rotation in SPSS is applied to the initial ratings. The extracted factor scores are used to measure managerial job role types.

3.2.2 Information use and gap. The scope of information items assessed by CEOs must be broad due to the characteristics of managerial work. Therefore, a broad IPMS presented by Laitinen (2002) will be adopted to represent the information set. The IPMS has previously been adopted as a tool to survey the importance of information for PM. The present version of the IPMS includes 27 information items (performance dimensions) classified into eight classes following the logic of a business activity:

- (1) elementary cost allocation;
- (2) production factors;
- (3) efficiency of activities;
- (4) properties of products;
- (5) product and customer profitability;
- (6) competitiveness;
- (7) financial performance; and
- (8) environmental effects.

The importance of the information items to managerial work is assessed on a five-point scale from no significance to very high significance. This importance is mapped by two separate questions:

- (1) It is assumed that the information is available to the CEO. The importance is assessed by asking how important information potentially is to CEO work (Foster and Gupta, 1994).
- (2) The CEOs are asked to assess the importance of information in their work in reality, when the availability of information is limited by existing information systems.

The first part of the question maps the demand for information and the second part the supply of information. The difference between these two is the information gap. The factor analysis with Varimax rotation is applied to the first ratings and to the information gaps. The extracted factor scores are used to measure, respectively, the importance of information and the information gap.

3.2.3 Contextual variables. Five factors are used to measure contextual environment:

- (1) organizational size;
- (2) industry;
- (3) competition;
- (4) strategy; and
- (5) perceived environmental uncertainty.

The influence of these factors on MCS is discussed in Chenhall (2003). First, the size of organization is measured by the logarithm of the number of employees. It is related to

the organization structure (Mintzberg, 1989). Second, the industry of the firm is measured by industry dummy variables set for food, paper, metal, and machinery industries. Industry is related to technology and to production systems (Abernethy and Lillis, 1995). Third, the level of perceived competition is assessed on a five-point scale from no competition at all to very much competition. In general, competition is said to make firms continuously to revise information systems as responses to strategic threats and opportunities in the competitive environment (Mia and Clarke, 1999).

Fourth, strategy is measured by asking the CEO to classify the firm as one of the three main strategic types presented by Miles and Snow (1978). For this classification, a short description of the types (prospecter, defender, and analyzer) was presented. For two of the three types, a dummy variable is constructed. Fifth, perceived environmental uncertainty (PEU) is assessed on a five-point scale from no uncertainty to very much uncertainty. PEU is here defined as such an external factor that affects the ability of the firm to make accurate predictions of future. Information systems are regarded as a response to PEU to construct a buffer against the uncertainty (Chenhall, 2003).

3.2.4 Control variables. Four control variables will be included into the regression analyses:

- (1) In order to control the effect of CEO position, a managing director (CEO) dummy variable will be added. This variable equals unity, when the respondent is the CEO of the whole firm, and zero otherwise.
- (2) The level of education is controlled by a Master of Science dummy that equals unity only when the CEO has at least academic Master of Science degree. The subject area of education is controlled by two dummy variables.
- (3) The accounting education dummy is unity only if the main subject of the CEO is accounting.
- (4) The technological education dummy refers to technology as the main subject.

3.3 Statistical testing of the hypotheses

The research hypotheses *H1* and *H2* will be tested by the multiple regression analysis. The first hypothesis (*H1*) assumes that the managerial job acts as an intervening variable (mediator) between contextual environment (initial variable) and the potential importance of job-relevant information (outcome). Baron and Kenny (1986) have shown that if the mediation model is correctly specified, the mediation can be tested by the multiple regression analysis in four steps. These steps can be expressed as follows:

- *Step 1.* Importance of information is explained by contextual environment.
- *Step 2.* Managerial job is explained by contextual environment.
- *Step 3.* Importance of information is explained by managerial job and contextual variables (and control variables).
- *Step 4.* Effect of contextual environment on importance of information controlling for managerial job should be zero.

The effects in Steps 3 and 4 are estimated in the same regression equation.

If we denote the importance of information as Y , managerial job as M , contextual environment as X , and control variables as C , the steps are based on the following regression equations:

- Step 1. $Y = \alpha_1 + \beta_1 X$.
- Step 2. $M = \alpha_2 + \beta_2 X$.
- Step 3 and 4. $Y = \alpha_3 + \beta_{31} X + \beta_{32} M + \beta_{33} C$.

Thus, for a complete mediation $\beta_1 \neq 0$, $\beta_2 \neq 0$, $\beta_{32} \neq 0$, and $\beta_{31} = 0$. However, if only partial mediation is assumed, can $\beta_{31} \neq 0$. In addition, it is not always required that $\beta_1 \neq 0$ (Step 1). The present research hypothesis $H1$ does not include this assumption. However, in the present form it requires that β_{31} is not statistically significant.

The second research hypothesis ($H2$) does not include any mediation. It only assumes that contextual environment (X) has a statistically significant direct effect on the gap of job-relevant information (G). Additionally, controlling for this effect, managerial job (M) does not have a significant effect. The testing of this hypothesis is thus based on the following regression equation, when using also control variables:

$$(C) : G = \alpha_4 + \beta_{41} X + \beta_{42} M + \beta_{43} C$$

The research hypothesis assumes that statistically $\beta_{41} \neq 0$ whereas $\beta_{42} = 0$. The goodness of fit of the models is assessed by F -statistics and the significance of the regression coefficients is tested by t -statistics. VIF statistics showed multicollinearity for none of the regression equations.

4. Empirical results

4.1 Descriptive statistics and factorization

4.1.1 Mintzberg roles. Table I shows descriptive statistics of the Mintzberg role variables for the CEOs. The most important role is the leader role. The leader establishes the work atmosphere and motivates subordinates to act. In addition, the entrepreneur role and the resource allocator roles have obtained ratings that refer at least to a relatively high significance. The entrepreneur role means that the manager initiates controlled change in the organization to adapt to the changing environment while the resource allocator

Role	Mean	SD
1. Figurehead	3.2500	1.1676
2. Leader	4.6447	0.6871
3. Liaison	3.8026	0.8330
4. Monitor	3.2368	0.8774
5. Disseminator	3.7632	0.8774
6. Spokesman	3.4342	0.9428
7. Entrepreneur	4.3026	0.8330
8. Disturbance handler	3.9079	0.7862
9. Resource allocator	4.0000	0.8485
10. Negotiator	3.4605	0.9992

Notes: Scale for role importance in the CEO work: 1, of no significance at all; 2, of a little significance; 3, of an average significance; 4, of a relatively high significance; 5, of a very high significance

Table I.
Descriptive statistics of
Mintzberg work role
variables

makes decisions on the use of organizational resources. The informational roles (Monitor, Disseminator, and Spokesman) have however got quite low ratings.

The factor analysis showed there are three important role dimensions (not presented here). The three-factor solution was therefore chosen for the further analyses. This solution accounted for 55.2 percent of the total variation of the original variables. The Monitor and Disseminator roles (informational roles) had the highest loadings on the first factor. Therefore, this role (factor) dimension can be called "Monitor-Disseminator". In the same way, the second role (factor) dimension can be entitled as "Entrepreneur-Leader" and the third one as "Liaison-Figurehead".

4.1.2 Importance of information. Table II shows descriptive statistics of the importance of 27 different information items. The most important items deal with product profitability, company profitability, cost of activities, and customer profitability. Thus, financial information and especially profitability information is highly appreciated by the CEOs. In addition to these financial measures of performance, many non-financial information items are highly appreciated as job-relevant information. Customer satisfaction with standard and special products, motivation of employees, and quality of activities showed a high perceived relevance to the CEO work.

The factor analysis led to a four-factor solution (not presented here). This solution accounted for 57.1 percent of the total variation. The first factor is entitled as "Conventional non-financial information". The highest loadings were found on reliability of supplier delivery, quality of activities, motivation of employees, quality of materials, and customer satisfaction. The second factor is called "Financial & accounting information". Product and company profitability, liquidity, cost of activities, and customer profitability got high loadings on this factor. Environmental effects, resources spent on new product development, behavior of competitors, change in market size, and the number of new products or variations got the highest loadings on the third factor ("New product & market information"). The fourth factor ("Space & machinery information") is closely associated with measures as condition and capacity utilization of space and machinery.

4.1.3 Gap of information. Table II also shows descriptive statistics of information gap that is calculated for each information item as the difference between the ratings of the (potential) importance and the importance of information. The largest gaps are associated with environmental effect of the use of products, capacity utilization of space, motivation of employees, resources spent on new product development, and customer satisfaction with special products.

The factor analysis extracted a three-factor solution for the gap (not presented here). This solution accounted for 43.7 percent of the total variation. The first factor is called "Activity, space & machinery information gap", since quality and time of activities and condition of space and machinery had the highest loadings. The second factor ("Product, employee & customer information gap") obtained the highest loadings by product profitability, motivation of employees, and customer satisfaction. Environmental effects of production and the use of products got the highest loadings on the third factor ("Environmental effects & new product information gap"). There are also high loadings for new product information.

4.1.4 Contextual and control variables. Table III presents descriptive statistics of the contextual and control variables. Most of them are binary dummy variables. The average values of the dummy variables show the percent of the target characteristics in

Information item	Potential information importance ^a		Information gap ^b	
	Mean	SD	Mean	SD
<i>Elementary cost allocation</i>				
1. Cost structure of production factors	4.2703	0.8805	1.0685	1.2509
<i>Production factors</i>				
2. Capacity utilization of space	2.6000	1.0134	1.3243	0.9524
3. Capacity utilization of machinery	3.6933	1.1387	1.1351	1.0112
4. Capacity utilization of manpower	4.1467	0.8806	0.8784	1.2381
5. Condition of space	2.6133	0.9849	1.1081	1.0279
6. Condition of machinery	3.3108	1.0058	0.9167	1.0175
7. Motivation of employees	4.3467	0.7968	1.3014	1.3913
8. Resources spent on personnel development	3.6533	0.8462	1.1757	1.2315
9. Quality of materials	3.9733	1.0523	0.9589	1.2184
10. Reliability of supplier delivery	4.0933	1.0157	0.9324	1.0113
<i>Efficiency of activities</i>				
11. Time of activities	3.8133	1.0487	1.0405	1.1871
12. Cost of activities	4.5467	0.7221	0.7703	1.0277
13. Quality of activities	4.2933	0.8506	1.2055	1.3224
<i>Properties of products</i>				
14. Customer satisfaction with normal products	4.4189	0.7939	1.0000	1.1055
15. Customer satisfaction with special products	4.3867	0.9284	1.2568	1.2720
16. Resources spent on new product development	3.8133	0.8169	1.2973	1.1070
17. Number of new products or variations	3.3067	1.0651	1.0676	1.2088
<i>Product and customer profitability</i>				
18. Product profitability	4.8267	0.5544	0.7162	1.0666
19. Customer profitability	4.4800	0.9058	0.9865	1.3897
<i>Competitiveness</i>				
20. Growth of revenues	4.1333	0.7941	0.0405	0.8827
21. Change in market share	3.8133	0.9822	0.7838	1.4550
22. Behavior of competitors	4.0000	0.9153	1.0405	1.2653
<i>Financial performance</i>				
23. Company profitability	4.8267	0.4757	0.2297	0.5863
24. Liquidity	4.1733	0.8443	0.6351	0.8692
25. Capital structure (indebtedness)	3.8533	0.8806	0.6892	0.8747
<i>Environmental effects</i>				
26. Environmental effect of production	3.5270	0.9824	1.1781	1.4370
27. Environmental effect of the use of products	3.4054	1.0326	1.3699	1.2857

Notes: ^aScale for importance of information (potential and in reality) in the CEO work: 1, of no significance at all; 2, of a little significance; 3, of an average significance; 4, of a relatively high significance; 5, of a very high significance. ^bGap = Potential importance – Importance in reality

Table II.
Descriptive statistics of
importance and gap of
information items

the sample. For example, 24.7 percent of the firms are prospectors while the percent for defenders is 19.5 percent. Thus, the rest of the firms are analyzers (55.8 percent). The average level of perceived competition is relatively high, whereas the mean of PEU only refers to the middle of scale. The last four variables are control variables referring to the characteristics of the CEO. More than a half of the CEOs have at least a Master of Science degree (58.4 percent). In the same way, most CEOs have technological education (50.7 percent) while less than a quarter (23.4 percent) has education in accounting.

Variable	Mean	SD
<i>1. Contextual variables</i>		
Logarithmic number of employees	5.3388	1.3077
Food industry dummy	0.1299	0.3384
Paper industry dummy	0.1299	0.3384
Metal industry dummy	0.2338	0.4260
Machine industry dummy	0.1818	0.3882
Prospector strategy dummy	0.2468	0.4339
Defender strategy dummy	0.1948	0.3986
Level of competition ^a	4.1053	0.8519
Perceived environmental uncertainty ^b	3.1711	0.7502
<i>2. Control variables</i>		
Managing director (CEO) dummy	0.8052	0.3986
Master of Science dummy	0.5844	0.4961
Accounting education dummy	0.2338	0.4260
Technological education dummy	0.5065	0.5032

Table III.
Descriptive statistics of
contextual and control
variables

Notes: ^aScale for the level of competition: 1, no competition at all; 2, only a little competition; 3, average level of competition; 4, relatively much competition; 5, very much competition. ^bScale for the perceived environmental uncertainty: 1, no uncertainty at all; 2, only low uncertainty; 3, average level of uncertainty; 4, relatively high uncertainty; 5, very high uncertainty

4.2 Explaining the importance of information

The potential intervening effect of managerial work (*HI*) will be analyzed in four steps. First, the three factor scores of importance of information are explained by the nine contextual variables (Step 1). The results of this step are presented in Panel 1 of Table IV. The direct effect of contextual environment on importance of information is statistically weak for each type of information. The four regression equations include only two statistically significant effects:

- (1) the positive effect of size on importance of new product and market information (factor 3 score); and
- (2) the positive effect of food industry dummy on importance of space and machinery information (factor 4 score).

Second, the three factor scores of managerial job are explained by the contextual variables to test if the initial variable is correlated with the mediator (Step 2). Panel 2 of Table IV shows that the Monitor-Disseminator role (factor 1 score) is heavily affected by contextual variables. This informational role of CEO that is associated both collecting and giving information, is more important in smaller firms, in food industry but less important in machine industry. However, the leadership role (factor 2 score), that is based on the Mintzberg (1975) Entrepreneur and Leader roles, is more important in larger firms and in firms perceiving more uncertainty in environment (PEU). The interpersonal role (factor 3 score) reflecting the Liaison and Figurehead roles is not influenced by the contextual variables.

Third, the importance of information is explained by managerial job variables, contextual variables, and control variables to test if the mediator affects the outcome variable (Steps 3 and 4). Panel 3 shows that the importance of information is significantly affected by the CEO roles. The Monitor-Disseminator role has a strong and positive effect on

Panel 1. Explaining importance of information (Y) by contextual variables (X) (Step 1: $Y = \alpha_1 + \beta_1 X$)

Variable	Non-financial		Financial		New product and market		Space and machinery	
	β	p-value	β	p-value	β	p-value	β	p-value
Constant	0.0000	0.2133	0.0000	0.8618	0.0000	0.0756	0.0000	0.2793
Contextual variables (X)								
Logarithmic number of employees	0.1523	0.2482	-0.0113	0.9275	0.3577	0.0052	-0.1586	0.2106
Food industry dummy	0.1017	0.4834	-0.0720	0.5996	0.0543	0.6914	0.3337	0.0189
Paper industry dummy	-0.0754	0.5927	-0.0563	0.6733	-0.0701	0.5986	0.1354	0.3187
Metal industry dummy	0.0608	0.6810	0.1304	0.3533	-0.0293	0.8341	0.0148	0.9167
Machine industry dummy	0.0493	0.7433	-0.2185	0.1285	0.0553	0.6971	-0.0917	0.5260
Prospector strategy dummy	-0.0789	0.5693	-0.1498	0.2566	0.0286	0.8269	0.0153	0.9085
Defender strategy dummy	0.0272	0.8430	-0.1950	0.1373	-0.0054	0.9669	0.0424	0.7480
Level of competition	0.1082	0.4503	-0.0839	0.5361	-0.0879	0.5157	-0.0646	0.6384
Perceived environmental uncertainty	0.0209	0.8825	0.1284	0.3387	0.1672	0.2131	-0.0631	0.6418
R^2	0.0627		0.1599		0.1644		0.1366	
Adjusted R^2	-0.0756		0.0359		0.0412		0.0092	
F-statistic	0.4533		1.2897		1.3338		1.0724	
p-value	0.8998		0.2611		0.2387		0.3959	

Panel 2. Explaining job role variables (M) by contextual variables (X) (Step 2: $M = \alpha_2 + \beta_2 X$)

Variable	Monitor-disseminator		Entrepreneur-leader		Liaison-figurehead	
	β	p-value	β	p-value	β	p-value
Constant	0.0000	0.1987	0.0000	0.0381	0.0000	0.5147
Contextual variables (X)						
Logarithmic number of employees	-0.3950	0.0005	0.3101	0.0096	0.0624	0.6146
Food industry dummy	0.2581	0.0326	0.0351	0.7837	-0.1251	0.3573
Paper industry dummy	0.0034	0.9765	0.0794	0.5289	-0.1877	0.1628
Metal industry dummy	0.0203	0.8699	-0.1132	0.3976	-0.0566	0.6895
Machine industry dummy	-0.2229	0.0751	-0.0872	0.5129	-0.1910	0.1790
Prospector strategy dummy	0.0112	0.9225	-0.0603	0.6252	0.1710	0.1941
Defender strategy dummy	-0.0716	0.5260	0.1078	0.3750	-0.0230	0.8577
Level of competition	0.1632	0.1764	-0.0937	0.4685	-0.1713	0.2132
Perceived environmental uncertainty	-0.0450	0.7000	0.2544	0.0460	0.0262	0.8443
R^2	0.2976		0.1875		0.0856	
Adjusted R^2	0.2018		0.0767		-0.0391	
F-statistic	3.1068		1.6926		0.6864	
p-value	0.0036		0.1084		0.7185	

(continued)

Table IV. Regression analysis results for the hypothesis H1

Table IV.

Panel 3. Explaining importance of information (Y) by job role variables (M), contextual variables (X), and control variables (C) (Steps 3 and 4: $Y = \alpha_3 + \beta_{31}X + \beta_{32}M + \beta_{33}C$)

Variable	Conventional non-financial		Financial and accounting		Information type (Y)		New product and market		Space and machinery	
	β	p-value	β	p-value	β	p-value	β	p-value	β	p-value
Constant	0.0000	0.1880	0.0000	0.5780	0.0000	0.1568	0.0000	0.0000	0.0000	0.1696
Monitor-disseminator (factor 1 score)	0.3053	0.0367	0.3210	0.0215	-0.0333	0.8140	0.2680	0.0620	0.2680	0.0620
Entrepreneur-leader (factor 2 score)	0.4133	0.0033	0.2150	0.0684	0.3413	0.0130	0.0699	0.6018	0.0699	0.6018
Liaison-figurehead (factor 3 score)	-0.0639	0.6354	0.2581	0.0479	0.2094	0.1199	0.0856	0.5219	0.0856	0.5219
Logarithmic number of employees	0.2227	0.1664	0.0049	0.9740	0.2424	0.1285	-0.0484	0.7597	-0.0484	0.7597
Food industry dummy	0.0255	0.8610	-0.1753	0.2086	0.0955	0.5075	0.2057	0.1573	0.2057	0.1573
Paper industry dummy	-0.1041	0.4571	-0.0359	0.7873	-0.0304	0.8257	0.1250	0.3681	0.1250	0.3681
Metal industry dummy	0.0610	0.6788	0.2225	0.1162	0.0153	0.9164	0.0049	0.9730	0.0049	0.9730
Machine industry dummy	0.1172	0.4305	-0.0453	0.7480	-0.0017	0.9907	0.0355	0.8090	0.0355	0.8090
Prospector strategy dummy	-0.0629	0.6389	-0.1208	0.3469	0.0139	0.9167	0.0751	0.5731	0.0751	0.5731
Defender strategy dummy	0.0012	0.9926	-0.1969	0.1168	-0.0344	0.7900	0.0862	0.5058	0.0862	0.5058
Level of competition	0.1005	0.4704	-0.0557	0.6736	0.0012	0.9929	-0.0897	0.5150	-0.0897	0.5150
Perceived environmental uncertainty	-0.0575	0.6777	0.0667	0.6122	0.0760	0.5785	-0.0534	0.6966	-0.0534	0.6966
Managing director (CEO) dummy	0.1571	0.3145	-0.0740	0.6174	0.0721	0.6395	-0.1770	0.2535	-0.1770	0.2535
Master of Science dummy	-0.1046	0.4567	-0.0179	0.8932	-0.0232	0.8671	-0.2640	0.0615	-0.2640	0.0615
Accounting education dummy	0.1440	0.4046	-0.1829	0.2669	0.1676	0.3271	-0.1943	0.2574	-0.1943	0.2574
Technological education dummy	0.0923	0.5747	-0.1888	0.2300	0.0784	0.6298	-0.1328	0.4159	-0.1328	0.4159
R^2	0.2845	0.3523	0.1604	0.2977	0.3001	0.0927	0.0886	0.2977	0.0886	0.2977
Adjusted R^2	0.0725	0.1604	0.1604	0.0927	0.0927	0.0927	0.0886	0.0927	0.0886	0.0927
F-statistic	1.3421	1.8356	1.8356	1.4472	1.4472	1.4472	1.4307	1.4307	1.4307	1.4307
p-value	0.2070	0.0498	0.0498	0.1555	0.1555	0.1555	0.1628	0.1628	0.1628	0.1628

the importance of conventional non-financial, financial and accounting, and space and machinery information. The Entrepreneur-Leader role emphasizes conventional non-financial information but also new product and market and financial and accounting information. The Liaison-Figurehead role is only associated with the importance of financial and accounting information. In these regressions, the contextual variables do not have statistically significant effect on importance of any of the information types.

4.3 Explaining the information gap

The second research hypothesis (H2) assumes that contextual environment has a statistically significant direct effect on the gap of information. The regression analysis results to test this hypothesis are presented in Table V. The managerial job variables do not have statistically significant effects on the gap of activity, space and machinery information (gap factor 1). However, this gap is significantly less in food and metal industries than in other industries. In addition, PEU is positively associated with this gap. The gap of product, employee and customer information (gap factor 2) is significantly lower in paper, metal, and machine industries than in other industries. In addition, the interpersonal role (Liaison-Figurehead) is negatively associated with this gap. The gap of environmental effects and new product information (gap factor 3) is

Variable	Information gap type (G)					
	Activity, space and machinery		Product, employee and customer		Environmental effects and new product	
	β	p-value	β	p-value	β	p-value
Constant	0.0000	0.8575	0.0000	0.4856	0.0000	0.1742
<i>1. Job role variables (M)</i>						
Monitor-disseminator (factor 1 score)	0.1406	0.3550	-0.2196	0.1476	-0.0721	0.6345
Entrepreneur-leader (factor 2 score)	-0.0005	0.9973	-0.1021	0.4657	0.2060	0.1480
Liaison-figurehead (factor 3 score)	-0.1508	0.2911	-0.2961	0.0397	-0.1765	0.2179
<i>2. Contextual variables (X)</i>						
Logarithmic number of employees	-0.0800	0.6483	-0.0989	0.5698	0.0760	0.6652
Food industry dummy	-0.3570	0.0234	-0.2293	0.1360	0.0552	0.7194
Paper industry dummy	-0.1215	0.4046	-0.3430	0.0205	-0.0374	0.7972
Metal industry dummy	-0.3026	0.0534	-0.3464	0.0266	-0.1981	0.2013
Machine industry dummy	-0.1390	0.3777	-0.3365	0.0345	0.1328	0.3993
Prospector strategy dummy	-0.1707	0.2361	0.0811	0.5682	-0.2519	0.0830
Defender strategy dummy	-0.0881	0.5177	0.1771	0.1925	0.1704	0.2137
Level of competition	-0.1847	0.2174	-0.0308	0.8347	0.1528	0.3066
Perceived environmental uncertainty	0.2690	0.0706	0.0104	0.9427	0.1981	0.1801
<i>3. Control variables (C)</i>						
Managing director (CEO) dummy	0.2198	0.1745	-0.0595	0.7084	0.0816	0.6114
Master of Science dummy	0.1878	0.1940	-0.0172	0.9037	-0.3538	0.0166
Accounting education dummy	0.2339	0.1922	0.2623	0.1411	0.0532	0.7651
Technological education dummy	0.0108	0.9483	0.1064	0.5190	0.0673	0.6856
R ²	0.3139		0.3257		0.3133	
Adjusted R ²	0.0899		0.1056		0.0891	
F-statistic	1.4014		1.4794		1.3974	
p-value	0.1806		0.1463		0.1825	

Note: $G = \alpha_4 + \beta_{41}X + \beta_{42}M + \beta_{43}C$

Table V.
Explaining gap of
information (G) by job
role variables (M),
contextual variables (X),
and control variables (C)

strongly negatively affected by the prospector strategy dummy. It is also affected negatively by the Master of Science dummy.

5. Conclusions

5.1 Managerial roles

The study shows that interpersonal and decisional roles are of special importance to the work of a CEO. The informational roles are of minor importance. This result does not refer to a minor role of information in managerial work which would be inconsistent with previous evidence (Mintzberg, 1973; Bruns and McKinnon, 1993; Tengblad, 2002). The informational roles include tasks as collecting (Monitor), disseminating (Disseminator), and transmitting (Spokesman) information. However, all CEOs need and use information in their managerial tasks irrespective of the role they perceive to have. Since each CEO may pursue a combination of several roles, the factor analysis was used to extract the most important combined roles. Three combined roles were extracted:

- (1) informational role (Monitor-Disseminator);
- (2) leadership role (Entrepreneur-Leader); and
- (3) interpersonal role (Liaison-Figurehead).

5.2 Importance of information

The most important performance information is associated with product profitability, company profitability, cost of activities, and customer profitability. However, also non-financial information (for example, customer satisfaction and motivation of employees) is regarded as important. The high relevance of financial information was expected because CEOs are heavily concentrated on strategic perspective that is typically described in financial terms. This result is consistent with earlier evidence from IPMS implementations (Ittner and Larcker, 1998; Gomes *et al.*, 2004b). Four important information factors were extracted by the factor analysis:

- (1) Conventional non-financial information.
- (2) Financial and accounting information.
- (3) New product and market information.
- (4) Space and machinery information.

These factors are not consistent with the four dimensions of BSC (Kaplan and Norton, 1992). Financial and accounting information can however obviously be identified as the financial dimension of BSC.

5.3 Information gap

The largest gaps are found in environmental effect of the use of products, capacity utilization of space, motivation of employees, resources spent on new product development, and customer satisfaction with special products. Three relevant factors of information gap were found:

- (1) Activity, space and machinery information.
- (2) Product, employee and customer information.
- (3) Environmental effects and new product information gaps.

These gaps show that CEOs get usually sufficient financial information so that the main gaps are associated with non-financial information. The gaps include conventional non-financial information (such as product, employee and customer information) but also information that is difficult to measure. For example, there is an obvious gap of information for new products, space, machinery, and environmental effects.

5.4 First research hypothesis

The direct effect of contextual environment on importance of information is weak for each type of information. However, contextual variables affect strongly managerial roles conforming to previous evidence (Bruns and McKinnon, 1993; Stewart and Fondas, 1992; Tengblad, 2002). In particular, the Monitor-Disseminator role is significantly affected by contextual variables. This informational role is more important in smaller firms and in food industry but less important in machine industry. The Entrepreneur-Leader role is more important in larger firms and in firms with high PEU. Both roles are dependent on organizational size but industry acts as a trigger for the informational role while PEU triggers emphasis for the leadership role. The Liaison-Figurehead role is a general symbolic role and independent of the contextual variables.

The importance of information is closely associated with job roles. This is consistent with prior evidence (Mintzberg, 1973; Bruns and McKinnon, 1993; Tengblad, 2002). In particular, the importance of financial and accounting information and conventional non-financial information is strongly affected by informational and leadership roles. However, the interpersonal role that is independent of contextual variables, is only associated with the importance of the former type of information. In conclusion, managerial work seems to mediate the effect of contextual variables on the importance of information. This supports the first research hypothesis. Figure 2 demonstrates the relationships between contextual variables, managerial work, and importance of information.

5.5 Second research hypothesis

Information gaps are closely associated with contextual variables but not with managerial work. The gap of activity, space and machinery information is less in food and metal industries than in other industries. It is also increasing in PEU. The gap of product, employee and customer information is less in paper, metal, and machine industries than in other industries. This gap is also decreasing in the importance of the interpersonal role. The gap of environmental effects and new product information is less in prospector firms than in other firms. In conclusion, the results support the second research hypothesis that contextual variables affect significantly the gap of information and that the effect of managerial roles is relatively weak. Thus, contextual environment is an important determinant of information gaps. This is consistent with previous research (Chenhall, 2003; Rom and Rohde, 2007). Figure 3 illustrates the statistically significant effects on information gaps.

5.6 Implications

This study shows that the importance of information does not directly depend significantly on contextual variables (organizational size, industry, strategy, competition, and environmental uncertainty). However, the characteristics of managerial work are strongly affected by these variables. Additionally, the importance of information is largely determined by the work characteristics. Therefore, managerial work acts as an

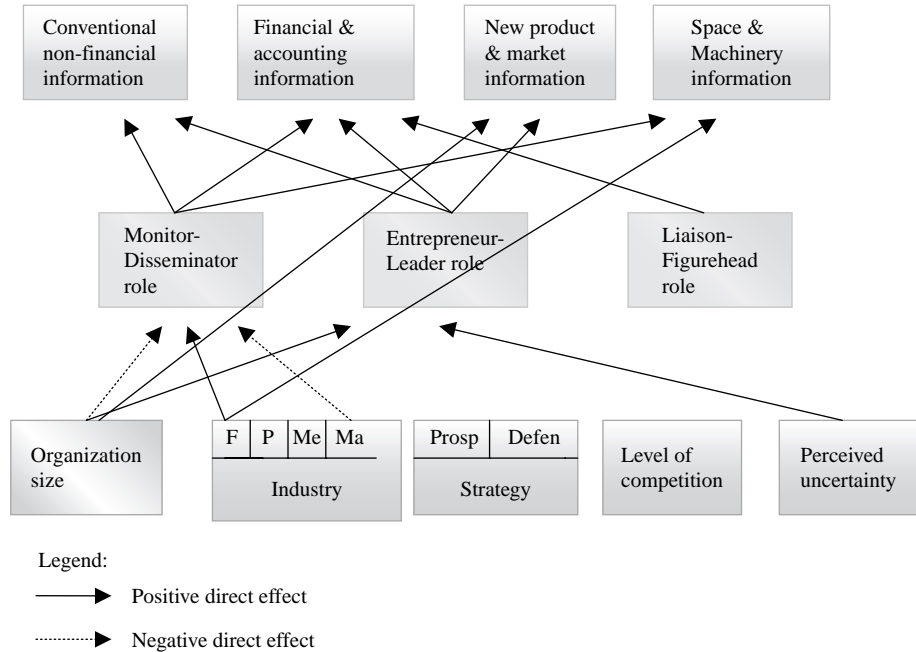


Figure 2. Summary of the statistically significant effects on the managerial role and on the importance of information

intervening variable that mediates the effect of contextual variables on information. Thus, it seems that when designing information systems for CEOs, it is more important to pay attention to the managerial roles taken by the CEO, than to the context. Therefore, it would be useful to develop information systems for different managerial roles to fulfill information requirements.

The study also shows that the information gap for CEOs does not depend on the managerial roles but on the contextual variables such as industry, strategy and PEU. Therefore, the efforts in designing information systems should be flexible to contextual variables to improve the supply of information in different contexts in order to fulfill the information gaps.

5.7 Limitations and future research directions

This study is exposed to several restrictions. First, it is limited to manufacturing firms which has reduced variation in the input and output diversity and in the complexity of value chain. Second, it is restricted to CEOs. The position of the manager may affect the characteristics of work and job-relevant information. Third, the study is based on a survey send to work-loaded CEOs that does not enable to use as advanced constructs to measure work, environment, and information. Fourth, the final sample size is only 71 CEOs, which does not enable to test complicated models.

Future research should be directed to overcome these limitations. First, surveys for other industries than manufacturing should be carried out. Second, the use of information for other managers than CEO should also be surveyed. Third, more advanced methods to extract roles and the use of information should be applied.

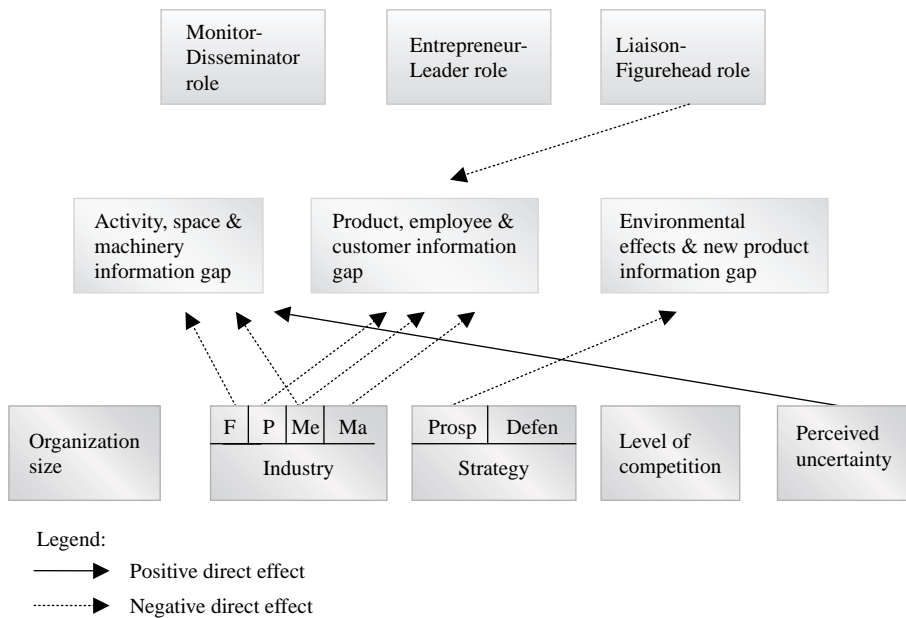


Figure 3. Summary of the statistically significant effects on the gap of information

Fourth, larger samples should be used to make it possible to use such methods as the SEM. However, case studies are also welcome to get a deeper insight of the relationship between work and the use of information.

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Appendix. Description of the managerial work roles (Mintzberg, 1973)

(1) *Interpersonal roles:*

- The figurehead role where the manager performs symbolic duties as head of the organization.
- The leader role where he/she establishes the work atmosphere and motivates subordinates to act.
- The liaison role where the manager develops and maintains webs of contacts outside the organization.

(2) *Informational roles:*

- The monitor role where the manager collects all types of information relevant and useful to the organization.
- The disseminator role where the manager gives other people the information they need to make decisions.
- The spokesman role where the manager transmits information to the outside world.

(3) *Decisional roles:*

- The entrepreneur role where the manager initiates controlled change in the organization to adapt to the changing environment.
- The disturbance handler where the manager deals with the unexpected changes.
- The resource allocator role where the manager makes decisions on the use of organizational resources.
- The negotiator role where the manager deals with other organizations and individuals.

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