

The Effect Of Contingency Variables On Management Accounting System Characteristics And Managerial Performance

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Abstract

A major strand of management accounting research has been the application of contingency theory to the analysis and design of management accounting systems. In particular, these studies have focused on the relationship between aspects of contingency variables on MAS characteristics and performance.

This study examines (1) the role of decentralization on the relationship between contingency variables (information technology, strategy, environmental uncertainty, organizational interdependence) and management accounting system characteristics (2) the role of management accounting system characteristics on the relationship between contingency variables (information technology, strategy, environmental uncertainty, organizational interdependence and decentralization) and managerial performance. Management accounting system characteristics was defined on the extent to which managers use broad scope, timeliness, aggregation and integration MAS information for managerial decision making. Hypotheses were generated for both direct and indirect effects of contingency variables. The responses of 110 managers, drawn from manufacturing companies in East Java, were analyzed by using a structural equation modeling (SEM).

The results indicate that (1) decentralization acts as a mediator in the relationship between information technology, organizational interdependence and management accounting system characteristics. However, the results also indicate that strategy and environmental uncertainty do not act as a mediator in the relationship. (2) management accounting system characteristics act as a mediator in the relationship between information technology, environmental uncertainty, organizational interdependence and

managerial performance. But, the results suggest that strategy does not act as a mediator in the relationship.

Keywords: information technology, strategy, environmental uncertainty, interdependence, decentralization, management accounting system characteristics, scope, timeliness, aggregation, integration, managerial performance

1. Introduction

The use of contingency theory to the analysis and design of management accounting systems (MAS) has generated a considerable amount of interest. The contingency approach is based on the premise that there is no universally appropriate MAS which applies equally to all organisations to all circumstances (Otley, 1980). In MAS research, contingency approach is needed to evaluate conditional factors that caused MAS become more effective.

The MAS in a an organisation has been traditionally viewed as having a narrow scope in the sense that the system has been expected to provide information which is generally financial, dealing with matters internal to the organisation, and ex-post or historical (i.e., focusing on what has already happened). Support for this view can be drawn from the numerous text books on cost and management accounting. However, this traditional view has been changing. Recent literature indicates that MAS in an organisation should also provide information which has been traditionally considered to be outside the domain of system. Chong and Chong (1997), and Bouwens and Abernethy (2000) are examples of recent studies which suggest that MAS in an organisation now incorporates both financial and non-financial information focusing on matters that are internal and external to the organisation and information having historical (ex post) as well as future (ex ante) orientation.

Chenhall and Morris (1986) identify and measure four information characteristics: broad scope, integration, timeliness and aggregation. Broad scope refers to information that is external, non-financial and future oriented (e.g. probabilistic) in nature. Timeliness refers to the frequency and speed of reporting. For example, a small business manager within a volatile environment would benefit from timely feed back on decision outcomes. Aggregation involves the use of analytical or decision models (e.g. discounted cash flow and inventory models) and combination of data over time periods and/or functional areas. Appropriate aggregation of data for input into decision models may be able to optimise decision making. Integration refers to the information that needs to be generated to reflect the impact of the interacting effects of the various functions in the organisation and the formulation of targets.

A number of studies have recently examined contingency relationships between contingency variables and MAS design on Performance. Gordon and Miller (1976) was among the first to encourage this line of contingency based inquiry when it posited that MAS are associated with environmental, organisational and decision making style factors. Subsequent researchers have investigated others contingency variables, such as strategy (Abernethy and Guthrie, 1996; Chong and Chong, 1997), Interdependence (Chenhall and Morris, 1996; Bouwens and Abernethy, 2000), organisation size (Elmore, 1990). This paper reports the results of study which investigated the effect of contingency variables (information technology, strategy, environmental uncertainty, interdependence and decentralization) on management accounting system characteristics and managerial performance. This research integrate and extend of previous research. The important things that differentiate this research with previous research are as follows:

1. The indirect effect of IT on MAS scope through decentralization has been investigated (Laksmana and Muslichah, 2002b). This study extended their research by studying the indirect effect of IT on MAS timeliness, aggregation, integration through decentralization
2. The direct and indirect effects interdependence on MAS characteristics have been examined (Chenhall dan Morris,1986; Bouwens dan Abernethy, 2000). Laksmana and Muslichah (2002a) have extended those research by relating the two variables (interdependence and MAS scope) to managerial performance. This study extended their research by including MAS integration as intervening variable
3. A study that examined the impact of decentralization on MAS characteristics and performance has been done by Chia (1995), but the study has included decentralization as moderating variables. This research investigated the relationship of the three variables where MAS act as intervening variables.
4. The indirect effect of strategy on managerial performance through MAS scope has been investigated by Chong and Chong (1997). This study examined The indirect effect of strategy on managerial performance through not only MAS scope but also MAS timeliness. Besides, The indirect effect of strategy on MAS scope through decentralization has been investigated by Laksmana and Muslichah (2002b). This study extended their research by studying the indirect effect of strategy on MAS timeliness through decentralization

2. Theoretical Development and Hypotheses Formulation

2.1 Linkages between IT, MAS Characteristics and Managerial Performance

IT constitute one of the technology which has a tremendous impact on organisation information systems, because with a computerised based information

systems, information can be provided on time and accurate. As stated by Hansen and Mowen (1997) that with the use of computer technology, most of information can be collected and reported to a managers, so that they can make decision making quickly.

Christiansen and Mouritsen (1995) note that IT is a challenge for management accountants for a number of reasons. First, computer technology is involved in mechanising parts of the accounting department's tasks, such as reporting, invoicing and data collection. IT in many different forms is integrated into production equipment, and data may be produced and stored automatically in the production process. This increases the productivity of the accounting department by speeding up the production of reports.

Second, computer technology makes available more complex financial databases than before. The extension of the number of 'dimensions' to accounting records is possible. So that accountants can provide information and possible analyses previously only dreamt about.

Third, computer technology facilitates the contingency plans. Simulations and what if scenarios enable a more thorough analysis possible consequences of decisions. The flexibility of modern computer technology to support the developments models in spreadsheet applications underscores this. Management accountant are able, through this technology, to make their own models quickly – modify them – without having consult computer specialists.

It can be concluded that computer technology with a variety of software and hardware, enable MAS to provide broad scope, timely, aggregated and integrated information, so that managerial performance can be improved.

Hypothesis 1: There is a positive indirect relation between IT and managerial performance, acting through MAS characteristics of (a) scope, (b) timeliness, (c) aggregation, (d) integration

2.2 Linkages between Information Technology, Decentralization and MAS Characteristics

Perrow (1967) argued that control and coordination methods should vary with technology type. Perrow classify production technology into two broad categories, these are routine and non-routine. Routine technologies characterized with higher bureaucracy, conversely non-routine technologies need higher structural flexibility. Grimes et al. (1973) support Perrow's findings that routine technologies are associated with a centralized structure, whereas the nonroutine technologies, which would rely more heavily on the knowledge of the specialist, would be characterized by delegated decision authority

Recently, some reseaches have considered information technology as primary organization determinants that influence organization design in the same way with organization size, production technology and environment (George and King, 1991). The studies that examined the impact of information technology to decentralization found inconsistent result. Nevertheless, most previous research findings support decentralization argument (Louis et al.,1995; Hit and Brynjolfson, 1997, Lee and Groover, 2000; Davis and Albright, 2000). Centralization supporters state that information technology results in authority centralization because information technology enables top management to get information. On the other hand, decentralization supporters state that computer system only takes over decision making at lower and middle level management, so that it increases management capacity at this level to conduct less routine decision, as a result delegation authority needs to be increased. Davis and Albright (2000) argue that the application of computerized information systems cause the decrement routine task done by accountant. Accountant tasks have been shifted from traditional recording function to analyst position, for examples: creating report, explaining changes, predicting future performance. Their studies also have found that the application of computerized systems have caused accounting managers get involved in decision making at corporate level.

O'Brien (1999) notes that an expert system enables everybody do a job of an expert. The availability of personal computer (PC) supported by a variety software which is easy to use enables managers to do more analysis and reduce interdependent to an expert or information system department. If a PC act as a terminal and connected to organization database, manager can access information quickly and provide more reports. This condition causes bigger delegation authority to managers. Remy Prud'homme (1991) argues that information technology make manager easier to operate from any location. These conditions cause activity decentralization and decision making. With higher autonomy level, managers need a broad scope, timely, aggregated and integrated information, so that managers can make better decision making

Hypothesis 2: There is a positive indirect relation between information technology and MAS characteristics of (a) scope (b) timeliness (c) aggregation (d) integration, acting through decentralization.

2.3 Linkages between Strategy, MAS Characteristics and Managerial Performance.

Miles and Snow (1978) classify strategy into four types: defenders, prospectors, analyzers, and reactors. We choose two strategy types which represent the opposite ends of the product change continuum: prospectors and defenders.

Prior research has indicated that defenders and prospectors require very different internal structures and administrative processes (Abernethy and Guthrie, 1994).

A firm following a prospector strategy frequently adds to and changes its products and services, consistently attempting to be first in the market, such a firm tends to stress innovation and flexibility in order to be able to respond quickly to changing market conditions. As a result, external, non financial and future oriented information would be appropriate for managers. Accordingly, broad scope MAS information would be perceived to be useful for a decision making.

Conversely, Defender strategy seek stability by producing only a limited set of products directed at a narrow segment of the total potential market, within this limited domain, defenders strive aggressively to prevent competitors from entering their domain. Defenders tend to ignore developments and trends outside their domains. There is little or no scanning of the environment to find new areas of opportunity, but there is intensive planning oriented toward cost and other efficiency issues. The stability of their market is congruous with a reliance on historical information. Their narrow product domain reduces the need for extensive monitoring of the external environment conditions. Accordingly, narrow scope MAS information would be appropriate for managers of defender strategy.

Hypothesis 3: There is a positive indirect relation between strategy and managerial performance, acting through MAS characteristics of (a) scope, (b) timeliness.

2.4 Linkages between Strategy, Decentralization and MAS Characteristics

A number of scientists argue that a strategic choice determines structure (Robbins, 1990). The general concept is that changing in market or product strategy offered will require modification of organization structure in order to accommodate new operation requirement. Furthermore, Robbins states that innovation strategy which emphasizing in the introduction of product and services will be appropriate with organic structures which characterized with low specialization, low formalization, and decentralization. The application decentralized structure encourages decision making authority to lower level in order to increase subordinate involvement.

Cost minimation strategy emphasizing tight cost control, avoid unnecessary innovation will be suitable for mechanistic structure which characterized with work specialization, high centralization and high formalization. Centralized structure with concentrated decision making ease coordination effort to achieve maximum cost control. The determination formal rules and procedures to handle routine activity can minimize risk and cost. Thus, principally, prospector type strategy, as innovation strategy, will be appropriate for decentralized

structure, while defender type strategy, as cost minimization strategy, is suitable for centralized structure

A decentralized structure also causes managers having a bigger role in making and implementing decision, more responsible to their work unit activity. Moreover, decentralization of authority makes managers require more and more complex information, and more relevant to support decision quality. As a consequence, they need broad scope and timely information in order to support the achievement of their goal.

Hypothesis 4: There is a positive indirect relation between strategy and MAS characteristics of (a) scope (b) timeliness, acting through decentralization.

2.5 Linkages between Perceived Environmental Uncertainty, MAS Characteristics and Managerial Performance

Perceived environmental uncertainty (PEU) refers to managers' perceptions of the factors that are external to their firms. These factors which include, for example, competitors, technology, consumers, suppliers and government have been identified as important variables that can affect the extent to which managers would require MAS information (Chenhall and Morris, 1986; Gul, 1991). When PEU is high, managers would require sophisticated MAS information to cope with the uncertainty and make decisions that are more appropriate (Galbraith, 1973; Tushman and Nadler, 1978). On the other hand, under low levels of PEU, traditional or less sophisticated information would be more appropriate. In fact, the use of sophisticated MAS under conditions of low PEU and the information overload may even be dysfunctional in terms of organizational performance.

PEU affect managerial performance through MAS characteristics of (a) scope (b) timeliness (c) aggregation, for a number of reasons: (1) MAS information characterized as broad in scope may facilitate evaluation of managerial performance in complex work environment. Furthermore, such MAS information would aid control in uncertain situations by focusing information on the sources of uncertainty (Hayes, 1977; Chenhall and Morris, 1986) (2) Managers facing uncertain situations require to respond quickly to unpredictable events or changes in environment. Amey (1979) notes that MAS information should be provided on time so that managers can effectively deal with uncertainty in their work environment. (3) Findings of the previous researchs showed that MAS information aggregated by period of time, responsibility centres, areas of interest, may be useful to managers who deal with an uncertain environment. These findings are consistent with Chenhall and Morris (1986) studies that the higher the level of PEU the more useful is aggregated MAS information.

Hypothesis 5: There is a positive indirect relation between PEU and managerial performance, acting through MAS characteristics of (a) scope (b) timeliness (c) aggregation.

2.6 Linkages between Environmental Uncertainty, Decentralization and MAS Characteristics

Burn and Stalker in Ford and Slocum (1977) state that organisation environment stability is important in determining organization structure. The evidence demonstrates that a dynamic environment has more influence on structure rather than on static environment does (Robbins, 1990). A Static environment will push an organization toward a mechanistic form characterized by higher centralization and formalization. Static environment will create minimum requirement to give quick response, and enable organization economize costs by standardizing activity.

On the other hand, dynamic environment will push a company to organic form characterized by low formalization and centralization. This condition can be understood because high PEU require quick response, so that it will not enable a company standardize activity. Beside this, under high PEU, management will face difficulties to understand very complex environment. Also, management information processing capacity becomes overload so that the decision need to be delegated.

Decentralization of authority causes managers have a bigger role in making and implementing decision, also more responsible to their work unit activity. Decentralization also cause manager require qualified and relevant information to support decision. As a consequence, they need reliable SAM characteristics to provide timely and relevant information for policy making and achieve stated goal. (Emmanuel et al., 1990; Gul and Chia, 1994). Thus, the difference decentralization level will cause the difference in information requirement. Galbraith (1973) notes that information constitute decentralization complement. Beside this, decentralization will influence how information to be collected, processed and communicated in an organization (Gerloff, 1985). Furthermore, Waterhouse and Tiessen (1978) state that decentralization is a appropriate response for dynamic environment dan broad scope, timely and aggregated information required in that condition.

Hypothesis 6: There is a positive indirect relation between PEU and MAS characteristics of (a) scope (b) timeliness (c) aggregation, acting through decentralization.

2.7 Linkages between Interdependence, MAS Characteristics and Managerial Performance

Interdependence appears to be the source of complexity in the manager's job. Galbraith (1977), for example, argues that interdependence lead to task complexity. This argument is based on the rationale that decisions/actions by a unit having a high task interdependence are more likely to affect operations of managers in other related units of the organization. Moreover, interdependence may also complicate the manager's task of coordination and control of his unit activities which are interrelated with those of the other units concerned. The effectiveness of coordination and control of such activities in one unit may be dependent on the effectiveness of coordination and control of those other related unit in the organization.

Previous research indicate that the greater the level of job complexity, the greater the usefulness of information for decision making (Galbraith, 1977). Broad scope information provides managers with a wider range of solutions to consider. This enables them to better understand the input/output relation (Chenhall and Morris, 1986; Abernethy and Guthrie, 1994). It also increases the probability that one of the alternatives considered will be consistent with the objectives of other interdependent departments.

When interdependent increase, the integrated dimension of MAS will also be increasingly important in providing information for coordination among interdependent units (Gordon and Miller, 1976; Galbraith, 1973). Integrated information reduces uncertainty relating to cause and effect relations within departments as it encourages learning and the generation of ideas. It enables departmental managers to learn how to adjust products and production methods to be compatible with other departments. It also enables managers to better understand the different objectives that exist within separate decision units (Atkinson et al., 1977). Thus, In an organization face high level interdependence, broad scope and integrated MAS information will result in high managerial performance.

Hypothesis 7: There is a positive indirect relation between interdependence and managerial performance, acting through MAS characteristics of (a) scope, (b) integration.

2.8 Linkages between Interdependence, Decentralization and MAS Characteristics

In an organization where the task completion of an organization unit depend on task completion of the other unit, interdependence among organization units will be created. When interdependence has been created, coordination is required to see whether tasks which have been given to that units fit with the organization goal.

Mitzberg (1979) notes that a way to coordinate task in an organization was done by grouping and giving enough authority to interdependence units. Scott (1992) argues that the more units interdependent to each other, the more they need information, because information required by the units relates not only with their own unit but also the other unit. Thus, in order to fulfill the lack of information, the delegation of authority is required. Moreover, Ensign (1998) states that interdependence requires cooperation and coordination among units. People involved directly in exchanging activities should get involved in planning process and be given enough authority in decision making, so that coordination can work effectively. Thus, by increasing the increase of authority, manager require broad scope, and integrated information, so that decision making could be improved.

Hypothesis 8: There is a positive indirect relation between interdependence and MAS characteristics of (a) scope, (b) integration, acting through decentralization.

The effect of the contingency factors (information technology, strategy, PEU, and interdependence) on MAS characteristics and managerial performance can be seen in figure 1.

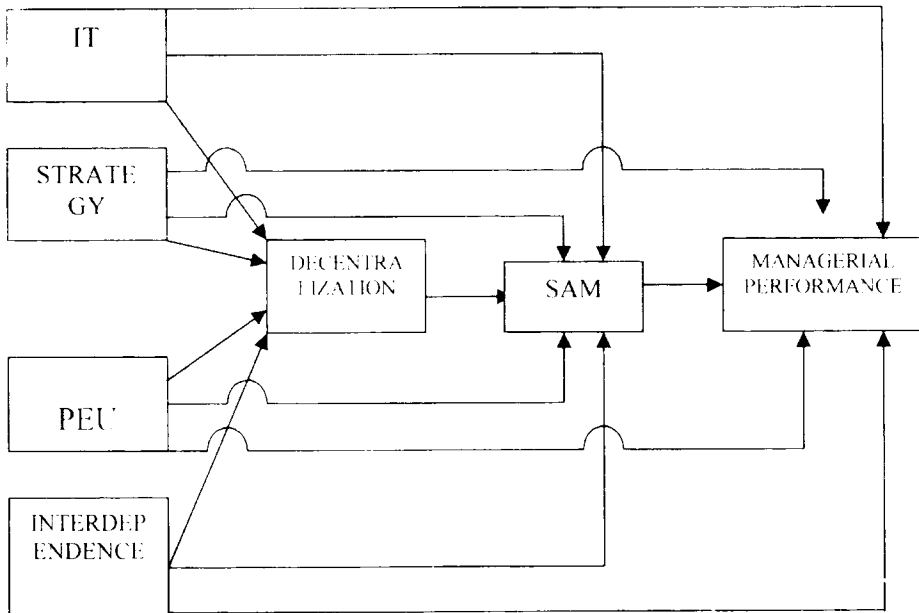


Figure 1 The Research Framework

3. Research Method

3.1 Sample

Samples of this study is marketing and production manager working in a big manufacturing industry that produce consumer products with more than 100 employees in East Java. Size was used as an indicator of the likelihood that the firms would possess formal and computerised accounting systems. These managers must have worked in that position at least for one year, this criteria is important in order to make sure that they understand company's MAS and strategy applied. A total 412 questionnaires were sent, and 118 were returned, making a response rate of 34,92 %. From the total questionnaires received eight were excluded from the study for incomplete responses. This left the study with 110 usable questionnaires for data analysis. Most The respondents (80,9 %) have held their current position for 1- 5 years and most of them (49,1 %) have 11 - 50 employees in their areas of responsibility.

3.2 Variable Measurement

Information Technology. Information Technology was measured by series of eight questions about the degree to which computers could help manager. to capture, manipulate, communicate, provide and use data. The use of the measure yielded a Cronbach alpha of 0.9031, which indicated very high internal reliability for the scale.

Decentralization. The instrument for measuring decentralization, was adapted from Gordon and Narayanan (1984). Five questions were used to measure the degree of decentralization of decision-making, namely, the development of new products or services, the hiring and firing of managerial personnel, selection of large investments, budget allocations and pricing decisions. For this study, the instrument achieved a Cronbach Alpha statistic of 0.8318

Strategy. Strategy was measured based on Miles and Snow's (1978) strategy typology. Managers were asked to select three questions about strategy which most closely matched their business units. The use of the measure yielded a Cronbach alpha of 0.6322 indicating that the items are a reasonable measure of the construct.

Managerial performance. Managerial performance was measured in terms of 9 item self rating scale which required managers to evaluate their performance on five point scale from 1 (very satisfying) to 5 (very dissatisfying) for eight managerial activities: planning, investigating, coordinating, evaluating, supervising, staffing, negotiating and representing and one overall performance rating (Mahoney et al., 1963). The Cronbach alpha statistic for this scale was 0.894

Interdependence. Interdependence was measured using the instrument developed by Van de Ven, Delbecq and Koenig (1976). Three questions representing each type of interdependence were provided and respondents were asked to indicate the amount of work that fitted into each category of interdependence, ranging from "almost none" to "almost all". The use of the measure resulted a Cronbach alpha of 0.6615

Management Accounting systems (MAS). MAS was measured using an adapted version of the Chenhall and Morris (1986) instrument. This instrument was designed to capture the importance of the dimensions of scope, integration, aggregation and timeliness for operational decision making. The Cronbach alpha of each dimension are 0,7620 (scope), 0,8306 (timeliness), 0,8501 (aggregation), 0,6782 (integration).

Perceived Environmental Uncertainty (PEU). The instrument for measuring PEU is modified version of Miles and Snow (1978). The measurement construct comprises the following items: competitor, consumer, economic condition, politic condition, technology, supplier, government and labour union action. The Cronbach alpha statistic for this scale was 0.8298

4. Results

A structural equation modeling (SEM) was used to test the hypothesised relationships. This technique allows examination of the direct and indirect effects. Tables 1 and 2 provide the results of indirect effect of contingency variables on MAS characteristics and performance.

Results of Indirect Effect Hypotheses 1, 3, 5 and 7

Table 1
Path coefficient and t values of the indirect effect Information technology (IT), strategy, Perceived Environmental Uncertainty, Interdependence, and Decentralization on Managerial Performance Through MAS Characteristics

Dependent Variables	Description	Independent Variables				
		IT	Strategy	PEU	Interdependence	Desentralization
Performance (through Scope)	coefficient	0,206* *	0,088	0,190 *	0,326*	0,327*
	t values	1,491	1,088	1,936	2,059	3,880
Performance (through timeliness)	coefficient	0,300* *	0,011	0,148 *	0,001	0,212*
	t values	2,756	0,180	1,741	0,013	3,236
Performance (through Aggregation)	coefficient	0,250* *	0,024	0,009	0,015	0,177*
	t values	2,677	0,538	0,171	0,328	2,845
Performance (through Integration)	coefficient	0,074* *	0,021	0,058	0,029	0,248*
	t values	1,525	0,599	1,272	0,785	3,725
$t_{2383}^{0,05} = 1,645$ $t_{2383}^{0,10} = 1,282$ Sign * is significant at $\alpha = 5 \%$ Sign ** is significant at $\alpha = 10 \%$						

As seen from table 1 that the indirectly influential variables on managerial performance are as follows (1) through scope are information technology, environmental uncertainty, interdependence and decentralization, (2) through timeliness are information technology, environmental uncertainty and decentralization, (3) through aggregation and integration are information technology and decentralization.

In other words, the results presented in table 1 reveal a positive and significant indirect relationships between information technology and managerial performance through MAS characteristics (scope, timeliness, aggregation and integration), thereby support H1 (a, b, c, d). However, the indirect relationship between strategy and managerial performance through the four types of MAS information is not significant. Thus H3 (a, b) could not be supported.

The results presented in table 1 also reveal that the indirect relationship between PEU and and broad scope and timely MAS information are positive and significant. Beside this, the results show that the indirect relationship between interdependence and broad scope MAS information was positive and significant. Therefore H5 (a,b) and H7 (a) are supported. However, the indirect relationship between (1) PEU and managerial performance through aggregated of MAS information (2) interdependence and managerial performance through integrated of MAS information is not significant. Thus, the results could not provide support for hypotheses H5c and H7b

Results of Indirect Effect Hypotheses 2, 4, 6 and 8

Table 2

Path coefficient and t values of the indirect effect Information technology (IT) strategy, Perceived Environmental Uncertainty, Interdependence on MAS Characteristics Through Decentralization

Dependent Variables	Description	Independent Variables			
		IT	Strategy	PEU	Interdependence
Scope	coefficient	0,191*	0,051	0,036	0,148*
	t values	1,946	0,907	0,550	1,770
Timeliness	coefficient	0,190*	0,051	0,036	0,148*
	t values	1,991	0,914	0,548	1,827
Aggregation	coefficient	0,114*	0,031	0,022	0,089**
	t values	1,662	0,864	0,536	1,505
Integration	coefficient	0,177*	0,048	0,033	0,138*
	t values	2,069	0,930	0,547	1,981
$t_{2383}^{0,05} = 1,645$ $t_{2383}^{0,10} = 1,282$ Sign * is significant at $\alpha = 5\%$ Sign ** is significant at $\alpha = 10\%$					

As reported in table 1, variables that influence indirectly to MAS characteristics (scope, timeliness, aggregation and integration) through decentralization are information technology and interdependence (t values > t table).

These mean the results presented in the table reveal a positive and significant indirect relationship between information technology, interdependence and broad in scope, timely available, aggregated, and integrated MAS information, providing support for hypotheses 2 (a, b, c, d) and 8 (a,b). However, hypotheses 4 (a,b) and 6 (a,b,c) are not supported by the results.

5. Discussion, Limitations, and Conclusions

The results of this study reveal the presence of a contingent relationship between (1) information technology, PEU, interdependence and managerial performance through MAS characteristics, (2) information technology, interdependence and MAS characteristics through decentralization. These mean that they provide support for the multivariate conceptualization of contingency theory .

However, the results found that strategy is not important when designing MAS. This mean that they could not support previous research (Abernethy and Guthrie, 1994; Chong and Chong, 1997). Two reasons were offered as possible explanations for failure to provide a significant positive results. Firstly, the managers use the analysis may not have been aware about strategy applied by the company, because they are not involved in the strategy formulation. Empirical findings show that the involvement managers in strategy formulation will increase their understanding in strategy used by a company and make strategy easier to be accepted as their own strategy (Erez and Earley, 1987; Wooldridge and Floyd, 1990; Bruce, 1997). Secondly, Strategy formulated as not the same as strategy conducted. Empirical studies show that 90 % strategy is not working as planned (Mitzberd et al., 1995)

The results also indicate that the relationship between PEU and MAS characteristics through decentralization was not significant. Robbins (1990) argue that not all uncertainty in the environment may have consequences for the organization. This notion is consistent with argument of Pfeffer (1978) that “mere change, or rate of change, is not guarantee that the situation is uncertain. Change, variation, and a dynamic environment may all be capable of being predicted, in which case, there is no uncertainty”.

Furthermore Downey and Slocum (1975) state that uncertainty relates not to the physical environment itself, but to the individual's knowledge and perceptions of the environment. To illustrate this distinction, consider for example a changing enviroment. It is often suggested that a changing enviroment is uncertain; however, change and uncertainty are not always synoymos. If the future state of the enviroment change is completely predictable, the enviroment itself is not uncertain; but, if the perceiving individual does not know what that future state will be, then the enviroment may be described as uncertain because the individuals knowledge about the enviroment is uncertain.

There are at least three limitations to this study which are wotrh noting. First, the instrument for assessing information technology is novel. Further study is necessary to test the validity of the instruments. Second, this study covers only privately owned organizations within manufacturing industries. Generalising this results to other industries (such as service industries) should be done cautiously. Third, this study focus only on four contingency variables (IT, strategy, PEU, Interdependence). There might be another contingency variables, such as

management style, organization size which could influence indirectly on MAS and managerial performance.

Notwithstanding the limitations above, the results of this study provide evidence that (1) IT, PEU and interdependence will certainly influence, via MAS characteristics, managerial performance. (2) IT and interdependence affect MAS characteristics through decentralization. Based on these results, I argue that modification or design and implementation of MAS in an organisation should take into account managers need of information. This study therefore makes some contribution to improve our understanding of the determinants of effective MAS design.

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