

Drivers of Choice of Management Accounting System Designs in Nigerian Manufacturing Companies

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ABSTRACT

This study explored the factors that influence the choice of management accounting system designs by manufacturing organizations in Nigeria. Factors, with potential to explain management accounting systems designs were identified from two theoretical perspectives. The study argued that factors from both institutional and contingency theory perspectives contribute to explaining the management accounting system (MAS) designs in manufacturing companies in Nigeria; and that technical factors as proposed in the contingency theory perspective should provide greater explanatory power. This is in contrast to the dominant institutional explanations of accounting systems in companies in the developing countries as presented in extant literature. Data from a survey of senior level managers of one hundred and forty four companies were subjected to t-tests and hierarchical regression analyses. The results provided support for the study's proposition suggesting the applicability of the contingency theory perspective to the study of MAS in the Nigerian companies. Based on this persuasion, future studies are needed to examine the relationship between MAS designs and performance of such companies and the interaction effects of identified factors on such relationship, in line with contingency theory propositions.

1. Introduction

There seems to be a consensus that the factors contributing to the economic problems of the developing countries include rapid population growth, resource limitations and inefficiency in resource use. Inefficiency in resource use is viewed in terms of using a nation's resources to make the wrong products, or poorly using the resources even in making the right products (Riahi-Belkaoui, 1994). The efficiency of the manufacturing companies, in utilizing resources at their disposal to make the right products is therefore considered important to solving some of the nations' economic problems.

There have been suggestions that the management accounting systems(MAS) are systems tailored to increasing organization's effectiveness by providing information that can assist managers in fulfilling the goals of the organizations (Horngren *et al*, 1994). Management accounting information is provided in organizations as a means of assisting them to adapt their activities so they can continue to achieve their objectives in the face of environmental changes. The success of many Asian manufacturing firms has been linked to their management control systems, a significant part of which are the MAS (Chow *et al*, 1991).A growing number of western researchers have also recommended the adoption of specific Japanese management and accounting techniques. In line with these suggestions, studies of MAS should be able to assist in efforts towards remedying the inefficiencies in resource utilisation noted as a major problem among Nigerian manufacturing companies (Soderbom & Teal, 2002).

However, studies have noted that the accounting practices in developing economies are generally assumed to adopt Western rules and procedures in order to portray traits of modernisation, irrespective of whether local circumstances necessitate them (Moll *et al*, 2006). Negandhi & Reinman (1972) reported arguments that socio-cultural factors exert significant influences on organizational practices(including accounting systems) of industrial enterprises in developing countries. Wallace (1987) in a study of accounting systems

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in Nigeria also noted that multinational corporations exert some degree of influence on countries where they have substantial investments and the accounting and auditing practices of such multinationals have often been imported from one country to another. In support of this argument, Ajibolade & Ogundele (2006) while investigating financial disclosure practices of Nigerian companies provided evidence suggesting that the organizational cultures of multinational-affiliated companies in Nigeria converged with those of their parent companies. These arguments suggesting significant influences of foreign multinationals on organizational practices (including accounting) of industrial enterprises in developing countries appear to support institutional theory explanations of accounting systems. However, the studies were of financial reporting practices and not specifically MAS studies. Empirical investigations are yet lacking in Nigeria on whether the MA practices are a result of pressures from the institutional environment including affiliations to multinationals, or that companies simply invest in management accounting systems (MAS) designs just to mimic others, or the choice of design is a response to local circumstances facing individual companies. This study is aimed at providing evidence on the extent to which institutional environment or the elements in the technical environment of the organization influences the choice of management accounting systems in the manufacturing companies in Nigeria.

The rest of the paper proceeds as follows: A review of relevant literature on factors driving the choice of MAS designs from two theoretical perspectives is presented in the next section. Section three presents the research method, section four details the results, the discussion and limitations of the findings are presented in section five and in the final section, the conclusion is presented.

2. Literature Review and Hypotheses development

The Management Accounting Systems (MAS) are part of an organization's Management Control Systems (MCS) whose function is to increase effectiveness by providing useful information for management planning and control decisions (Kaplan, 1983). The MAS provide a means of setting quantitative standards of performance, measuring actual performance and comparing performance with standards to form a basis for taking corrective actions (where actual performance deviates from standards). In the search for the means of making MAS more effective in performing their role in organizations, prior research has investigated the determinants of MAS/MCS designs and reported that the designs are contingent upon factors similar to those identified in organizational structure literature. Such research predominantly adopted the contingency theory in explaining the MAS designs. Insights from literature however, suggest a lack of consensus on determinants of MAS designs. Other perspectives have therefore emerged which provided views different from the contingency theory view regarding the factors that impact on the choice of MAS designs. The institutional theory perspective has dominated research which appears to hold opposing views to the contingency theory view.

2.1 Contingency Theory Approach

The contingency theory as applied to management accounting which took its root from the contingency theory of organizations is based on the premise that, "there is no universally appropriate accounting system, applying equally to all organizations in all circumstances, implying that as the specific circumstances of an organization alters, so should MAS adapt if they are to remain effective" (Emmanuel, Otley & Merchant, 1990, p. 57). The theory basically proposes that "MAS facilitate decision-making in organizations, they should therefore be designed to fit the organizational and environmental context in which they are used" (Gordon & Narayanan, 1984, p. 33). The organizational and environmental context examined in MAS studies have largely been factors earlier noted in organizational theory studies including technology, environment, structure, size and strategy.

One of the earliest contingency studies of MAS (Khandwalla,1972), which examined the effect of the competitive environment on the use of management accounting controls and found a significant positive relationship between competitive pressure (environmental context) and increasing sophistication in/use of MAS. Gordon & Narayanan (1984) using a different conceptualization of the external environment, investigated the relationship among perceived environmental uncertainty (PEU), organization structure and control systems and found that the relationship between organization structure and information systems were largely due to individuals' perception of uncertainty in the environment. Bruns & Waterhouse (1975) also found a relationship between MAS and structure. Gordon & Miller (1976) attempted to theorize the relationship between MAS and three variables, organizational environment; structure; and managerial decision-making style, but did not provide empirical evidence on the hypothesized relationships. Gul (1991)

did not only find a relationship between MAS and PEU, but also linked the relationship to managerial performance. The study found that under conditions of high PEU, higher sophistication in MAS design had a positive effect on managerial performance.

The basic assertion in these contingency theory studies, that choice of MAS designs, is a response to the need for effective decisions under different context facing the organization, has however been questioned by studies using the institutional theory perspective.

2.2 Institutional Theory Approach

The institutional theory approach consists of not just one theory, but multiple institutional theories. These, according to Covaleski *et al*, (1996) have as their general theme, the notion that an organization's survival requires it to conform to social norms of acceptable behavior, as much as to achieve high levels of production efficiency. These theories criticize a central idea in the rational actor models (including the contingency theory), that organizations are bounded, relatively autonomous, rational actors that exercise strategic choice in the design of MAS and other control systems. They argued that "the visible structures, control practices, and routines that make up organizations are the consequences of legitimated templates that are established (or institutionalized) within the larger environment" (Baxter & Chua, 2006, p. 52). These structures, procedures and practices are further argued to serve to demonstrate conformity with institutional rules, thereby legitimizing the organization and assisting it in gaining society's continued support (DiMaggio & Powell, 1983; Meyer & Rowan, 1977).

Applying this theoretical approach to the study of MAS implies that, rather than considering the systems as merely representing some notion of an objective reality, they may be viewed as serving a ceremonial means, for symbolically demonstrating an organization's commitment to a rational course of action (Covaleski *et al*, 1996). While the contingency models of environmental influences on organizations emphasized technical facets of the organizational environment, institutional theory studies called attention to a neglected facet of the environment: institutionalized beliefs, rules and roles – symbolic elements capable of affecting organizational forms, independent of resources flows and technical requirements (Scott, 1991). Institutional approach thus constitutes attempts at replacing the rational theories of technical contingency or strategic choice with alternative models, which the theorists suggested, are more consistent with organizational realities observed by researchers (DiMaggio & Powell, 1983).

A major strand of the institutional theories has stressed the concept of isomorphism as a source of structure and organizational practices. Isomorphism has been described as "a constraining process that forces one unit in a population to resemble other units that face the same set of environmental conditions" (Hawley, 1968, cited in DiMaggio & Powell, 1983, p. 149). DiMaggio & Powell identified three mechanisms of isomorphism, coercive, mimetic and normative isomorphism. Coercive isomorphism is argued to result from both formal and informal pressures exerted on organizations by other organizations, upon which they are dependent and by cultural expectations in the society within which organizations function. The state and its agencies, (Meyer & Rowan, 1977); other organizations, including multinational corporations (Jones, 1985; Van der Stede, 2003) have been suggested as sources of pressure to conform to ceremonial rules including accounting systems. Coser *et al* cited in DiMaggio & Powell, (1983) argued that these corporations are a source of coercive isomorphism, having a tendency to impose their more sophisticated accounting systems and organizational practices on companies affiliated to them. Jones (1985) provided evidence to suggest that subsidiaries and other affiliates of these MNCs are often pressured to adopt the accounting systems of their parent companies. Mimetic isomorphism was described as resulting from a process of emulation by organizations, of the internal structures and procedures adopted by other organizations (imitation). Normative isomorphism has been argued to occur when organization adopt the structures and procedures advocated by particular dominant professions, professional bodies and/or consultants. Normative isomorphism thus stems primarily from professionalization. Universities and professional training institutions, professional and trade associations have been mentioned as sources for the definition and spread of normative rules about organizational and professional behavior.

Several studies have provided empirical evidence of institutional theory propositions. Ansari & Euske (1987) investigated the use of accounting data by military repair facilities in the U.S.A and reported that there were situations in which accounting may have no technical role. Covaleski & Dirsmith (1988) also examined budgetary negotiations between a state university and its state government and concluded that "accounting may be more of a social invention complicit in the construction of social reality than a rational

reflection of a technical reality" (Covaleski & Dirsmith, 1988, p. 20). Both studies were in organizations in the public sector, where it may be argued that the institutionalized environment dominates. ; O'Connor, Chow & Wu(2004) attempted to investigate institutional influences on profit-oriented companies' MA practices. The study concluded that institutional variables of limited-term contracts, joint venture, stock exchange listing had a more significant influence than market competition (technical variable) over the practices. However, this study was in China's state owned enterprises, which although were profit-oriented, had substantial state interest in them. It could still be argued therefore that the dominance of institutional effects is not unexpected.

2.3 Relating Institutional and Contingency factors

Some studies have suggested the need to consider influences of both the technical and institutional environment on organizations' structures and practices. Scott (1991) suggested that all organizations are subject to both institutional and technical environments, albeit to different degrees, arguing that institutional influences should be less pronounced in such organizations as the profit-oriented manufacturing companies. He argued further that the presence of one set of elements should not preclude the presence of the other type and concluded that distinction between the two is better treated as dimensions along which environments vary, rather than as dichotomous states. Scott & Meyer (1991) proposed a schema of influences of the technical and institutional environment on organizations depending on their sector. They suggested that the sector within which an organization is located is an important aspect of the environment of the organization. For instance, service organizations like banks, were viewed as subject to highly developed technical and institutional pressures while in contrast most manufacturing concerns were viewed as primarily subject to strong technical requirements with weaker but varying degrees of institutionalized pressures. Baxter & Chua (2003) have also suggested that an organisation not only has a technical environment, but also various institutional environments, the complex interactions of which may be expected to influence MCS/MAS designs. Scott further argued that rather than positing institutional and technical environments as two extremes of a continuum, it may be useful to consider these as two separate, but occasionally interdependent, dimensions.

2.4 Hypotheses

Based on the earlier suggestions and prior research findings, this study located institutional and technical (contingency) variables that may impact on MAS designs in Nigerian manufacturing companies. It focused on three aspects of organizational context reported in contingency literature to be strongly related to MAS/MCS designs viz: technology, environment and structure. It also examined two major reported sources of institutional influences on business practices in institutional theory literature namely: multinational affiliation and Stock exchange listing (Firth, 1996, Hussain & Hoque, 2002; O'Connor, 2004). The study proposed that MAS designs are a response to influences from these two groups of variables. The Institutional variables are the multinational affiliation which represents a source of pressure exerted on companies to conform with parent company's MAS designs and the Stock exchange listing which represents pressure exerted by an agency of state with powers to impose or coerce organizations into adopting specific forms, practices or procedures (DiMaggio & Powell, 1983). The technical variables (circumstances of increased PEU, decentralization and technological complexity) denote sources of demand for more information placed on the companies' MAS for efficiency reasons. The study further proposed that the demand for efficiency based on the technical context of the organizations exert greater influence on the MAS designs in contrast to literature which suggests greater influence of institutional pressures on the accounting practices in developing economies (Moll *et al.*, 2006),

In line with these expectations, six null hypotheses were formulated. The first and second hypotheses concerned the relationships between MAS designs; and multinational affiliation and Stock exchange listing status of companies. The third, fourth and fifth hypotheses addressed the relationships between MAS and each of the three contingency variables under study while the sixth hypothesis concerned assessment of the explanatory power of the two groups of variables. The hypotheses stated in their null forms are as follows:

- H₀₁: There is no significant difference between MAS designs of companies based on their multinational affiliation.
- H₀₂: There is no significant difference between MAS designs of companies based on their Stock exchange listing status.
- H₀₃: There is no significant difference between MAS designs of companies based on their level of decentralization.
- H₀₄: There is no significant difference between MAS designs of companies based on complexity in technology adopted.

H₀₅: There is no significant difference between MAS designs of companies based on level of perceived environmental uncertainty facing them.

H₀₆: The technical variables do not have more significant relationship with MAS designs than the institutional variables.

3. Research Method

A cross sectional survey was used for this study to provide self-reported company information. The use of the method is justified by the lack of appropriate data from other sources as MA information is not usually publicly available.

3.1 Data Collection

Data were collected through a questionnaire administered on senior level managers of two hundred (200) manufacturing companies in Lagos state and its immediate environ. The companies were selected through a stratified random sampling procedure based on the expectation that companies in different industries are likely to differ on variables under study. The sample consisted of companies cutting across the following ten sub-sectors of manufacturing: Food, beverages and tobacco, chemicals and pharmaceuticals, domestic and industrial, plastic and rubber, basic metal, iron and steel and fabricated metal products, pulp, paper and paper products, printing and publishing, electrical and electronics, textile, wearing apparel and leather, wood and wood products including furniture, non-metallic mineral products and motor vehicles and miscellaneous assembly. One hundred and forty four (144) responses were received from managers of these companies.

3.2 Data Collection Instrument

The data collection instrument consisted of a carefully structured questionnaire, designed for completion by senior managerial staff of the sampled companies. The relevant sections of this questionnaire dealt with collection of data on companies' multinational affiliation, technology of production, decentralization, environmental uncertainty and MAS designs. The questionnaire was constructed using a five-point linear numeric scale.

3.3 Measurement of Variables

All variables in the study: five independent variables and one dependent variable were measured using scales adapted from prior studies.

3.3.1 Technology (TECH)

Technology was measured in terms of complexity deriving from the level of standardization of work. Measurement consisted of a series of three questions dealing with the extent of capital intensity and mass production orientation; automation; and usage of advanced technologies. The scale adapted from Khandwalla (1977), categorized production systems into five namely; customized production, small batch, large batch, mass production and continuous process representing increasing levels of capital intensity and standardization. These systems were scored on a scale of 1-5 from the simplest to the most complex respectively. The scores on these three items were summed up and averaged to determine an index of technological complexity. An index of above 3.0 was regarded as technologies high in complexity and scores less than or equal to 3.0 as low in complexity.

3.3.2 Decentralization (DEC)

Level of decentralization was measured using ten standard questions, dealing with the extent of delegation of authority to make certain decisions by the chief executive to other levels of management and individuals in the respondent's company. Respondents' ratings on all the ten questions on a five-point scale were summed up and averaged to obtain a decentralization index. This measure of decentralization was based on Khandwalla (1977) and has been used in MA studies (Gordon & Narayanan, 1984; Gul, 1991). An index of less than or equal to 3.0 was considered as low level of decentralization while an index of 3.0 and above was considered a high level decentralization.

3.3.3 Perceived Environmental Uncertainty (PEU)

The measure of PEU which was adapted from Khandwalla (1977) and has also been used widely (Gerdin, 2005; Gul, 1991) consisted of eleven items. The relevant section of the questionnaire sought the perception

of respondents regarding the intensity of uncertainties facing their companies in terms of eleven aspects of the external environment. The scores on these items on a five-point scale were summed up and averaged to determine an index of PEU, classified as high when the index is equal to or greater 3.0 and low when it is below 3.0.

3.3.4 Multinational affiliation

The affiliation of a company with a multinational organization was used as a proxy to measure the existence of institutional influence exerted through the multinational organizations on the MAS designs of the affiliated companies. Wallace (1987) provided evidence to suggest that MNCs exert significant influence over the accounting and auditing procedures adopted by their subsidiaries in Nigeria. This study therefore hypothesized that MAS designs are likely to differ with the existence or non-existence of multinational affiliation. Companies having such relationship will likely be pressured to adopt the more sophisticated MAS of their parent or associated MNCs. Multinational affiliation was therefore measured as a dichotomous variable, denoting the presence of affiliation as one (1) and absence of affiliation as zero (0). Respondents were requested to state whether or not their companies have some affiliation with a multinational organization.

3.3.5 Stock Exchange Listing

The Nigerian stock exchange listing status of a company was used as a proxy to measure the existence of institutional influence exerted by governmental agencies. Previous studies have included stock exchange listing as a source of institutional influences (Firth, 1996; Hussain & Hoque, 2002; O'Connor et al. 2004). Listing status was measured in terms of the presence (equated to 1) or absence (0) of listing on the Nigerian Stock Exchange.

3.3.6 Management Accounting Systems' (MAS) Designs

MAS designs were conceptualized in terms of their level of sophistication. Sophistication was measured by assessing two characteristics of information, level of detail and frequency of reporting which have been argued to vary with the context in which an organisation operates. The argument is that managers in some organizational context are likely to benefit from accounting information that is detailed and issued frequently whereas MAS information in other contexts tends to be general rather than detailed (Gerdin, 2005; Gul, 1991; Gul & Chua, 1994). Two major sub-systems of MAS, the product costing system and the budgetary control and performance measurement systems were considered in terms of their level of detail and frequency of reporting. The level of detail and frequency of reporting in product costing systems were assessed by asking a series of thirteen questions adapted from Pizzini (2006) and provided on a five-point scale. The level of detail and frequency of reporting in the budgetary/performance measurement systems were measured using responses from a series of twenty questions in the questionnaire adapted from Gerdin (2005) and provided on a five-point scale. The measure of the MAS design was constructed by summing up and averaging the scores on all these thirty-three items to determine an index of MAS design. An index below 4.0 was classified as low on MAS characteristics examined and labelled traditional MAS. An index of 4.0 and above was considered high in characteristics examined and labelled sophisticated MAS.

3.4 Procedures of Data Analysis

The mean, percentages and frequencies were employed in examining each of the variables in the study. Correlation analyses were used to examine the existence of relationships between the variables. Z-test (approximated with the independent sample t-test in the SPSS package) was used to test the each hypothesized relationship as stated in each of null hypotheses 1 to 4. This parametric test was considered appropriate because the data were collected on a rating scale which are often "presumed to be interval scales" (Emory & Cooper, 1991, p.176).

4. Results

Descriptive statistics and frequency tables were used to categorize companies in terms of the extent of sophistication in their MAS designs. As shown in Table 1, the companies could be grouped into three categories in terms of sophistication in their MAS designs. 3.5% of companies had MAS with little or none of the characteristics examined; 63% had the characteristics to a moderate extent while 33.3% had higher levels of the MAS characteristics examined. The percentage of companies falling into the category of companies with little or no characteristics was observed to be negligible at 3.5%, hence the companies were

more conveniently grouped into low sophistication (traditional) Mean < 4.0 and sophisticated MAS Mean ≥ 4.0.

Table 1: MEAN INDEXES OF THE MAS DESIGNS ADOPTED IN THE RESPONDENTS' COMPANIES

Statistics Types of MAS designs	N	%	Mean Index	Std. Deviation	Std. Error	95% Confidence interval for Mean		Minimum	Maximum
						Lower bound	Upper bound		
Rudimentary	5	3.47	1.667	.031	.018	1.591	1.743	1.64	1.70
Traditional	91	63.20	3.139	.593	.056	3.018	3.259	2.03	3.94
Sophisticated	48	33.33	4.355	.283	.041	4.272	4.437	4.00	4.82
Total	144	100	3.544	.769	.064	3.417	3.671	1.64	4.82

Tests of Hypotheses 1 - 5

The relationships between the MAS designs of companies and the five variables; technology, decentralization, perceived environmental uncertainty, multinational affiliation and stock exchange listing as proposed in hypotheses 1 – 5 were first examined using correlation analysis. Table 2 presents the results.

Table 2: CORRELATION MATRIX OF THE VARIABLES IN THE STUDY

	MAS	TECH	DEC	PEU	MNR	SEL
Management accounting systems index (MAS)	1	.512(**)	.297(**)	.620(**)	.298(**)	.245(**)
Technological complexity Index (TECH)		1	.500(**)	.549(**)	.410(**)	.347(**)
Decentralization index (DEC)			1	.415(**)	.233(**)	.198(*)
Perceived environmental uncertainty index (PEU)				1	.235(**)	.188(*)
Multinational Relationship (MNR)					1	.162
Nigerian Stock Exchange listing status (SEL)						1

Note. ** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

The results as shown in Table 2 revealed that the variables were each significantly positively correlated to MAS designs (at 0.01 level of significance). However, the institutional variables; MNR and SEL had weaker correlations with MAS designs, (correlation coefficients of 0.298 and .245 respectively) than PEU and technology (correlation coefficients of 0.620 and 0.508 respectively). Decentralization also showed a statistically significant but weak correlation with MAS design with a correlation coefficient of 0.297.

The hypotheses 1 -5 were further examined by subjecting the data to independent samples t-tests. All of the results, as shown in Table 3 were statistically significant

Table 3: TEST OF DIFFERENCES BETWEEN MEAN MAS INDEX BASED ON THE LEVELS OF THE STUDY'S VARIABLES

	Variables	Group A (Mean MAS index)	Group B (Mean MAS index)	Mean Difference	t-statistics	Sig.
H ₀₁	MNA	3.369	3.843	-.474	-3.720	0.000
H ₀₂	SEL	3.364	3.740	-.376	-3.009	0.003
H ₀₃	DEC	3.364	3.692	-.328	-2.60	0.010
H ₀₄	TECH	3.205	3.808	-.602	-5.046	0.000
H ₀₅	PEU	2.991	3.812	-.821	-6.923	0.000

Note: Group A – absence of multinational affiliation/absence of Stock exchange listing/low level of each of technological complexity, perceived environmental uncertainty and decentralisation.
 Group B – presence of MNR/SEL/high level of each of the other three variables.

The results revealed significant differences in the level of sophistication of MAS based on the companies' MNA and SEL status (H₀₁ and H₀₂). The Mean MAS indexes of companies with MNA and SEL status were found to be higher (3.843; 3.74 respectively) than the mean MAS indexes (3.369; 3.364 respectively) of those without MNA. The differences between the mean indexes were found to be statistically significant at p < 0.05. The null hypotheses 1 and 2 were therefore rejected.

The results also revealed that the mean MAS design indexes differ based on the levels of DEC, TECH and PEU. MAS design mean indexes of companies with high level of decentralization, technological complexity and perceived environmental uncertainty were found to be higher than those with low levels of the variables. The differences were found to be statistically significant at p < 0.05. The null hypotheses 3 -5 of no significant differences were therefore rejected.

The sixth null hypothesis (H₀₆) was examined using a hierarchical regression analysis(blockwise).The purpose was to determine which of the groups of variables have the greater explanatory power over the design of MAS adopted. The variables were entered into the model in two blocks. The first block consisted of the two institutional variables while the second block consisted of the three contingency variables. The result of this analysis is as presented in table 4.

Table 4: RESULTS OF HIERARCHICAL REGRESSION ANALYSIS TO DETERMINE THE SIGNIFICANCE OF VARIABLES

Model	Dependent Variables	Independent Variables	b ₀	b ₁	b ₂	b ₃	b ₄	b ₅	R ²	R ² Adjusted	P	F
1	MAS design	SEL, MNR	3.24	.310	.422	-	-	-	.129	.116	.000	10.479
2	MAS design	SEL, MNR, TECH, PEU, DEC	1.63	.159	.195	.198	.464	-.049	.447	.427	.000	22.297
	R² change								.318		.000	26.4

Notes: SEL - Stock Exchange Listing status (b1)
 MNR - Multinational Relationship (b2)
 TECH - Technological Complexity (b3)
 PEU - Perceived Environmental Uncertainty (b4)
 DEC - Decentralisation (b5)

As shown in the table, institutional variables were found to be statistically significant explanatory variables of MAS designs in the Nigerian companies with the model explaining 12.9% variation in designs. However, when the contingency variables were introduced into the regression model in the second block there was a

statistically significant change in R² of 31.8% at p < 0.05. The full regression model as defined in equation 1 achieved statistical significance and explained 44.7% variation in MAS design; however SEL and DEC did not retain statistical significance in the full model while the standardized beta of PEU (b₄) was found to be the highest.

$$\text{MAS design index} = 1.630 + .195(\text{MNA}) + .159(\text{SEL}) + .198(\text{TECH}) + .464(\text{PEU}) - .049(\text{DEC})$$

(equation 1)

5. Discussion of findings

The MAS contingency literature has suggested a relationship between MAS designs and variables in their technical environment including environmental uncertainty, technology and decentralization. The institutional theory literature on the other hand has suggested the dominant influence of the institutional environment including the influence of multinationals and the Stock Exchange. More specifically, accounting systems in developing countries have been argued to result from influences of parent multinational companies rather than the organizations' technical environment (Molls et al. 2006).

However, suggestions from literature on the possibility of the impact of the two facets of organizational environment on MAS designs (Scott, 1991) have led to the proposition in this study regarding the determinants of MAS designs in Nigerian manufacturing companies. The study was therefore designed to explore the existence of relationships between sophistication in the design of MAS and companies' multinational affiliation, Stock Exchange listing status, decentralization, technology and environmental uncertainty. The propositions were formulated into five null hypotheses of the relationship between the five variables and MAS designs. A sixth hypothesis was also formulated to determine the explanatory power of the contingency variables relative to the institutional variables.

The first and second null hypotheses (H₀₁, H₀₂) predicted that a statistically significant relationship exists between multinational affiliation and MAS designs and Stock exchange listing and MAS designs respectively. The results of the independent t-tests which were significant in the expected direction at p < 0.05 and the positive correlations (MNA_r = 0.298; SEL_r = 0.245; at p = 0.01) between MAS designs and MNA/SEL could be interpreted as evidence that multinational affiliation and Stock exchange listing are statistically significant influences on MAS designs. However, the low correlation coefficients indicate weak influence of these variables. The influence of the variables may be viewed as a form of coercive isomorphism, identified by DiMaggio & Powell (1983) as one of the three mechanisms of institutional isomorphism. The results which appear to give support to the institutional theory explanation for companies' adoption of particular MAS designs, are consistent with earlier findings. Van der Stede (2003) found significant influences of the parent companies on the MCS of foreign business units. Jones (1985) also noted the influence of dominant individuals or coalitions particularly in holding companies in enforcing conformity in MAS designs of acquired companies.

The third, fourth and fifth null hypotheses (H₀₃, H₀₄, H₀₅) were tested to determine whether variables suggested in the study as representing technical influences (DEC, TECH, PEU) have significant relationships with the types of MAS design employed by the sampled companies. The results of the independent t-tests for all three variables were significant in the expected direction at p < 0.05 and positive correlations were obtained between MAS designs and all three variables. These results could be interpreted as evidence that perceived environmental uncertainty, technology and decentralization are statistically significant influences on the MAS designs adopted by companies.

The influence of decentralization may however be interpreted to be as a weak one going by the low correlation coefficient of decentralization with MAS designs (r = 0.2). Decentralization and the MAS designs together have been recognized as constituting a significant part of the control package in an organization (Otley, 1980). Decentralization is therefore expected to be an important influence on the MAS designs. The result of this test, which gave only a weak support to this expectation, appears consistent with some prior findings. For instance, Chenhall & Morris (1986) found no significant direct effect of decentralization on broad scope MAS information. Gerdin (2005) even reported a relationship a significantly high proportion of traditional MAS (less sophisticated MAS) focusing more on financial measures among highly decentralized structures (lateral units) facing reciprocal interdependence suggesting a negative relationship between sophistication in MAS designs and decentralization.

The finding that technology has significant influence on MAS design corroborated the relative importance of this variable. The result conforms with suggestions in literature that the underlying production process used in a unit is somehow related to the type of cost systems used in the unit (Cooper, 1988). The basic assumption is that the complexity of the production process has an impact on the choice of the costing system. The more complex the production process, the more complex the costing systems, which models it. Complexity is said to be driven by level of automation, whether processes are mass, batch, single product or project producers, whether they make to order or to stock and whether they mainly make customized or standard products. Sophisticated MAS are therefore required in order to effectively measure the resources consumed in more complex production setting.

The observed statistically significant influence of PEU on MAS designs in the t-test and the high correlation coefficient (the highest among all the variables), suggest the strong influence of PEU on MAS designs. As argued in literature, environmental uncertainty influences the need for accurate MAS information. Industries operating in highly competitive environment, faced with increased environmental uncertainty would require more accurate cost information produced by more sophisticated systems, as mistakes made while relying on the wrong cost information are likely to be exploited by competitors immediately (Cooper, 1988, 1989; Gordon & Miller, 1976). Otley (1980) also opined that the major factors underlying control systems designs appear to be environmental unpredictability in its various guises. The findings of this study provided support for this expectation consistent with earlier empirical evidence. For instance, Khandwalla (1972) reported that the sophistication of an accounting information system was influenced by the intensity of competition faced by the manufacturing companies studied. Gordon & Narayanan (1984) also provided evidence suggesting the strong influence of environmental uncertainty on control systems designs.

The results obtained in this study are in a way consistent with Hussain & Hoque (2002), which noted that both institutional and organizational variables including competition, professional competence, strategy and corporate culture may influence the choice of MA practices. However, unlike Hussain & Hoque, the study went further to demonstrate the statistical importance of the technical variables over the institutional variables as explanatory variables for the MAS designs adopted in the companies as indicated in the results of the test of H_{06} . This additional evidence contrasts with O'Connor et al's (2004) findings, that competition was not a statistically significant determinant of the use of MA techniques and that adoption of MA practices in China's SOEs was significantly influenced by institutional variables of joint venture experience, stock exchange listing and limited term contracts. The evidence in this study however provides some advantages over the evidence in O'Connor et al. First, the larger size of the sample of the study provided for greater statistical power. Secondly, the study's sample consisted of private sector organizations unlike O'Connor et al.'s sample, which consisted of state owned organizations that had significant state influences, even though were profit oriented. It may be argued that institutional influences in such organizations would expectedly be significant. Thirdly, unlike O'Connor et al., this study went a step further to provide evidence of the limitation of the institutional theory alone, in explaining the MAS designs. It demonstrated that the two institutional variables accounted for a small magnitude (12%) of the variation in MAS designs. Further in contrast to Jones' study which concluded that the contingent (technical) variables were explicitly recognized to only a modest extent, this study using a hierarchical regression model in the test of H_{06} demonstrated that this group of variables are of greater statistical significance bringing about a 31.8% change in R^2 when introduced into the regression model.

6. Conclusion

This study was undertaken to fill a gap noted in literature concerning influences on accounting systems in Nigeria as in other developing countries. The study of the influences on MAS designs in selected manufacturing companies in Nigeria has yielded results that are compatible with research findings in the developed countries. The study has provided evidence supporting many of the hypothesized relationship among MAS designs, PEU, technology, decentralization, multinational relationship and stock exchange listing as suggested in extant contingency and institutional theory literature. Evidence obtained did not support the suggestion in literature of the relative importance of institutional influences over and above the technical influences on the MAS in developing countries. The results provided general support for the role of both sets of variables in the institutional and technical environment of the organizations but with the role of the technical variables predominating.

Any generalization of the results of this study, should however be done with caution bearing in mind the limitations of a survey study of this nature. The following recommendations for future research direction have therefore been offered:

First, the establishment of a stronger relationship between MAS and contingency variables than with institutional variables calls for a consideration of the effect of MAS designs on decision-making and performance in the organizations, in line with the rational choice arguments in the contingency theory.

Secondly, sophistication in MAS design has been examined in this study in terms of a continuum varying from traditional to sophisticated. Although, this measurement has been used in earlier studies (see Gul,1991), future research may consider examining effects of specific techniques regarded as sophisticated techniques (e.g. ABC, Balanced Scorecard) on companies' performance.

Finally, it is difficult for a survey, which took place at a single point in time to effectively examine institutional influences. Observing institutional influences would be better done over a period of time. A longitudinal study is therefore recommended for an in-depth study of institutional influences on MAS designs.

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