

THE INTERNATIONAL JOURNAL OF BUSINESS & MANAGEMENT

Analysis of the Use of Mediating and Moderating Variables in Management Accounting System (MAS): Evidence from the Literature Survey

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Abstract:

This study examined the nature of relationship between variables studied in the management accounting literature and the types of data analysis techniques used to analyse different types of moderation and mediation effects. To accomplish the stated objectives, the study first begins with the conceptualization of the nature of relationship between the research variables and clearly explained their differences. The study also reviewed 87 management accounting journal articles from 38 Journals that were published in between 2003 and 2015. The Journal articles were also categorized into four (4) groups, namely the ones that focused on management control, cost accounting, intellectual resource management and 'others' and they were analysed using the descriptive statistics (percentages). The findings revealed that majority of reviewed Journal articles focused on the direct relationship among the research variables. The relatively few studies extensively focused on the mediation effect and moderation effect among variables. In addition, the hierarchical regression analysis, SEM including PLS, multiple regression, and OLS are the widely data analysis techniques used in analyzing different types of mediation and moderation effects with little attention on the measurement error bias. Therefore, the study argues for the future management accounting literature to focus on the mediated-moderation effect and moderated-mediation effect while considering the measurement error bias.

Keywords: *Management accounting, mediation, moderation, moderated - mediation and mediated-moderation*

1. Introduction

Manufacturing firms play important role in the economy of the developing countries (Naude & Szirmai 2012; Tybout 2000). The developing countries are usually characterized by extreme poverty, unfavorable balance of trade and payments, and mass unemployment. In order to address the mentioned economic challenges, among others, the developing countries must make sure they expand and strengthen the manufacturing firms. One of the issues that may be used to strengthen the manufacturing firms is the management accounting practices such as the design of management accounting systems (MAS) (Ismail & Isa 2011; Williams & Seaman 2002). This is also supported by Xiao, *et al* (2015) who argued that a wide range of management accounting techniques (i.e. Budgeting, performance measurement and costing systems) have become the company's management practices. Therefore, management accounting plays a vital role in monitoring the strategic progress of a firm (Williams & Seaman 2002).

The influence of management accounting on firm performance and its practice may be influenced by several factors apart from the independent and dependent variables. This is supported by Mackinnon (2000) who argues that the relations between variables (MAS and firm performance) are often more complex than simple bivariate relations between the predictor (independent variable) and criterion (dependent variable). These relations may be modified by, informed by, the addition of third variable in the research design (ibid). The third variable may be known as moderating variable or mediating variable.

The moderating variable affects the strength and/or direction of the relation between the predictor and an outcome (Baron & Kenny 1986; Fairchild & Macknnon 2008). The mediation variable predicts the outcome or dependent variable (Xiao, *et al* 2015). In other words, it can be said to explain why and how the independent and dependent variables relate. There are several ways that a third variable may be related to the independent and dependent variables. According to Donaldson (2001), there are five categories of

effects, namely direct effect, mediation effect, moderation effect, mediated-moderation effect, and moderated-mediation effect. The first effect which is direct effect happens when the intermediate variable is not considered to affect an outcome or outcomes. In other words, the direct effect measures the extent to which the dependent variable changes when the independent variable changes by one unit.

The second category which is indirect effect measures the extent to which the dependent variable changes when the independent variable is held fixed and the mediator variable changes by the amount independent variable would have changed (Pearl 2001; Robins & Greenland 1992). In the case of moderation effect, mediated-moderation effect, and moderated-mediation effect, they are also considered to be the indirect effect. The mediated-moderation effect involves exploring mediating mechanisms to explain an overall interaction of the independent variable and the moderating variable in predicting the outcome. The moderated-mediation effect assesses whether the mediated relation exists across levels of a moderating variable. Several studies (i.e. Edward & Labert 2007; Mackinnon 2008; Preacher, *et al* 2007) developed simultaneous models to demonstrate how the mediation and moderation effects work together.

There are contradictory arguments on the use of variables as mediator or moderator and the type research methods to be used in management accounting literature. For instance, Xiao, *et al* (2015) argued that in examining the influence of management accounting controls (MACs) on firm performance, information computing technology (ICT) may be a mediator or moderator. Furthermore, in terms of research methods, Fairchild and Mackinnon (2008) argue that multiple regression as the quantitative research method is widely used and appropriate data analysis technique in examining the mediating effect or the moderating effect. However, other studies (such as Atkinson, *et al* 1997) argued qualitative research methods are important in management accounting literature.

With this fact, there is still a debate on the nature of relationship between variables and the type of research methods used management accounting literature. Despite the presence of that debate, there are little empirical studies on examining the trend of management accounting literature in terms of the nature of relationship studied and the type of data analysis techniques used to analyse the studied relationship. Therefore, it was important to conduct this study in order to examine the nature of relationship among the variables used and the type of data analysis techniques used to analyse the relationship among variables. The findings of this study may improve an understanding of the researchers, investors, partners, competitors and even customers on the future direction of management accounting literature.

2. Research Methods and Materials

The study reviewed 87 Journal Articles that were published between 2003 and 2015. There are several studies (Hesford *et al* 2007; Lindquist & Smith 2009, Selto & Widener 2000) that assessed the direction of the management accounting literature. The study by Hesford, *et al* (2007) reviewed the studies on management accounting for the period of 20 years from 1981- 2000. The study by Linguist and Smith (2009) also reviewed studies on management accounting from 1989 to 2008. Moreover, the study by Selto and Widener (2000) reviewed the management accounting studies that were published from 1986 to 2000.

Another study by Harris and Durden (n.d.) reviewed the management accounting studies from 2008 to 2010. With this fact, there was scanty knowledge on the assessment of the trend of management accounting literature after 2010. However, the study analyzes the Management Accounting Journal Articles that were published from 2003 to 2015. The reason of including journal articles that were published in 2003 to 2015 was due to the fact the previous studies on the direction of management accounting research did not focus on the nature of relationship between variables. Moreover, from 2003, the management accounting literature started to focus much on the direction of management accounting literature and therefore it was important to examine the current trend of management accounting literature.

The journal articles were categorized into four (4) groups, namely management control journal articles, cost accounting journal articles intellectual resource management journal articles, and 'others'. The management accounting journal articles that were categorized as 'others' included the ones that focused on research methodology/methods, risk management and strategic management accounting. The following Table 1 presents more information: -

S/N	Category	Focus
1.	Management control	Budgeting
		Organizational Control
		Inter-organisational Control
		Performance Measurement and Evaluation.
2	Cost accounting	Activity- Based Costing
		Capital Budgeting and Investment Decisions
		Inter Organization Cost Management
3.	Intellectual Resource Management	Management Accounting System
		Knowledge Management
		Organizational Learning
4.	Others	Research Methodology/Methods
		Risk Management
		Strategic Management Accounting

Table 1: Classification of the Reviewed Journal Articles

Source: Atkinson, *et al* (2012); Bt Fadzil & Rababah (2012); Harris and Durden (n.d); Lindquist and Smith (2009); Lunkes, Feliu and da Rosa (2012); Shield (1997)

Articles were accessed from several Journals on management accounting. Majority of management accounting journal articles were collected from the leading Journals on management accounting, namely Management Accounting Research (MAR), and Accounting, Organizations and Society (Harris & Durden n.d.). The following is the list of Journals that their published management accounting articles were used in this study: -

- i. Management Accounting Research
- ii. Accounting, Organizations and Society
- iii. International Journal of Business and Social Science
- iv. Advances in Management Accounting
- v. Annaels Universistatis Apulensis Series Oeconomica
- vi. International Journal of Business
- vii. International Journals of Academic Research in Accounting, Finance and Management Science
- viii. Journals of Accounting and Auditing: Research and Practice
- ix. Scientific Research
- x. The British Accounting Review
- xi. Journal of Modern Accounting and Auditing
- xii. Innovar Journal
- xiii. International Journal of Finance and Accounting
- xiv. German Academic Association of Business Research
- xv. Spanish Accounting Review
- xvi. Procedia Economics and Finance
- xvii. African Journal of Business Management
- xviii. Emerald- Journal of Accounting and Organization Change
- xix. Accounting and Business Research
- xx. Procedia Social and Behavioral Sciences
- xxi. International Research Journal of Applied and Basic Sciences
- xxii. Emerald- Qualitative Research in Accounting and Management
- xxiii. European Journal of Business Management
- xxiv. British Journal of Arts and Social Science
- xxv. International Journal of Economics, Commerce and Management
- xxvi. International Journal of Digital Accounting Research
- xxvii. Advanced Research in Scientific Areas
- xxviii. Asian Journal of Finance and Accounting
- xxix. Australian Journal of Basic and Applied Sciences
- xxx. Emerald-Industrial Management and Data System
- xxxii. Emerald- Journal of Knowledge Management
- xxxiii. Problems and Perspectives in Management
- xxxiv. The Business and Management Review
- xxxv. World Journal of Management
- xxxvi. Asia-Pacific Journal of Accounting and Economics
- xxxvii. Review of Integrative Business and Economic Research
- xxxviii. Academy of Management Journal
- xxxviii. Sustainability

As it has been mentioned earlier, on the classification of the reviewed journal articles, the following is the list of the reviewed journal articles basing on their categories: -

S/N	Category	Journal Articles
1	Management control	Alleyne and Marshall (2011); Breuer, Frumusanu and Manciu (2013); Cheffi and Beldi (2012); Budde (2009); Cardinaels and van Veen- Dirks (2010); Askarany (2012); Deville (2009); Donzello (2014); Ferreira and Otley (2009); Hall (2010); Hartmann and Slapnicar (2009); Homburg and Stebel (2009); Broadbent and Laughlin (2009); King, Clarkson and Wallace (2010); Lidia (2014); Sandalgaard and Bukh (2012); Van Veen- Dirks (2010); Robalo (2014); Seal and Mattimoe (2014); Berland and Chiapello (2009); Moilanen (2008); Rasit and Isa (2014); Wiersma (2009); Coenders, Bisbe, Saris & Batista-Foguet (2003); Ajibolade (2003); Schulz, Wu & Chow (2010); Hammad, Jusoh & Oon, (2010); Lata & Ussahawanitchakit (2015); Ismail & Isa (2011).
2.	Cost Accounting	Bt Fadzil and Rababah (2012); Atik (2012); Banker, Bardhan and Chen (2008); Kallunki and Silvola (2008); Rossing and Rohde (2010); Agndal and Nilsson (2009).
3.	Intellectual Resource- Management	Van Herden, Aardema, ter Bogt and Groot (2010); Henri and Journeault, (2010); Malmi and Brown (2008); Maiga, Nilsson and Jacobs (2013); Mauroun (2012); Mundy (2010); Sarraf, Razavi and Mohammadi (2013); Alcouffe, Berland and Levant (2008) Cardinaels (2008); Carassus (2009); Ferraira and Otley (2009); Perez-Mendez and Machado- Cabezas (2015); Bontis, & Serenko (2007); Novas, Sousa & Alves (2012).

4.	Others	Selto and Widener (2014); Ahrens (2008); Berry, <i>et al</i> (2009); Legaspi (2014); Cadez and Guilding (2008); Caglio and Ditillo, (2008); Coad and Herbert (2009); Silva- Domingo (2014); Fjell and Foros (2008); Gobel, Vogel and Webber (2013); Gulamhussen and Guerreiro (2009); Wahlstorm (2009); Johansson and Siverbo (2009); Langfield- Smith (2008); Malmi (2010); Woods (2009); Merchant (2010); Mikes (2009); Chanegrih (2008); Vaivio (2008); Vasselmann and van der Meer- Kooistra (2009); Xiao, Duh (2008); Jorgensen and Messener (2010); Al-Mawali (2015); Saltson (2015); Naranjo-Gil (2004); Wang, & Huynh (2014); Waweru & Uliana (2008); Isa (2009); Iswari (2013); Lin, Chang & Dang (2015); Barrick, Bradley & Colbert (2007).
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Table 2: The List of the Reviewed Journal Articles basing on their Categories
Source: The Reviewed Literature (2015)

3. Research Findings and Discussion

The study included 30 (34%) journal articles from the 'Journal on Management Accounting Research', 18 (21%) journal articles from the Journal named as 'Accounting, Organizations and Society' and the remaining 39 (45%) were accessed from other Journals. The majority of journal articles were accessed from the two Journals, namely 'Management Accounting Research' and 'Accounting, Organizations and Society' since they are considered as the leading journals in management accounting.

Furthermore, the reviewed journal articles were categorized into four (4) groups, namely the ones dealing with management control, cost accounting, Intellectual resource management and 'others'. 32 (37%) journal articles focused on Management Control, 7(8%), journal articles focused on Cost Accounting, 14 (16%) journal articles focused on Intellectual Management and, the remaining 34 (39%) journal Articles were categorized as 'Others'. Therefore, most of the reviewed management accounting journal articles were categorized as management control journal articles and 'Others'.

The findings are in line with that of Harris and Durden (n.d.) who presented that majority of the reviewed Journal Articles were those dealing with management control and the ones that were categorized as 'others'. Lindquist and Smith (2009) also argued the same that the relatively greater number of management accounting journal articles focused on management control, while the ones that dealing with cost accounting and 'others' were at the same level. However, Linguist and Smith (2009) did not include management journal articles that were published in 2010 and above. On the other hand, Harris and Durden (n.d.) included journal articles that were published from 2008 up to 2010. Table 3 presents an analysis on the list of accessed Journal Articles.

S/N	Journal	Number	Percent
1	Management Accounting Research	30	35
2.	Accounting, Organizations and Society	18	21
3.	Others	39	44
4.	Total	87	100

Table 3: The Analysis on the List of Accessed Journals
Source: The Reviewed Literature (2015)

3.1. The Theoretical Differences among Management Accounting Literature

In this case the study assessed the studied relationship among the variables included in the reviewed management accounting literature. The relationship was categorized into two groups, namely the direct and indirect relationship among variables. The indirect relationship was further categorized into five groups, namely the mediated relationship, moderated relationship, mediated- moderation relationship, and the moderated- mediation relationship. The study further analysed the use of both mediating and moderating variables in one model. Out of the 87 reviewed Journal Articles on Management Accounting, only 17(20%) studied the indirect relationship among variables, while 70 (80%) journal articles focused on the direct relationship.

Specifically, 4(24%); 10(59%); 0(0%), and 1(5%) of the Journal articles focused on the mediating effect; moderating effect; mediated-moderation effect and moderated-mediation respectively. Moreover, 2(12%) of the reviewed journal articles focused on both mediation and moderation effects on the dependent variable. Thus, the findings revealed that most of the journal articles that studied indirect relationship focused on moderation effect and mediation effect. The following Table presents more information: -

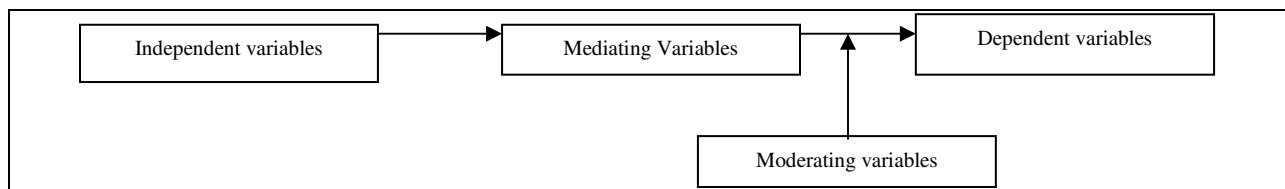
S/N	Category of Journal Articles	Moderation Effect	Mediation Effect	Both Moderation and Mediation Effects	Moderated-Mediation Effect	Mediated-Moderation Effect
1	Management control	4	1	1	0	0
2	Cost Accounting	0	0	0	0	0
3	Intellectual Resource-Management	1	1	0	0	0
4	Others	5	2	1	1	0
5	Total	10(59%)	4(24%)	2(12%)	1(5%)	0(0%)

Table 4: Nature of Indirect Relationship
Source: The Reviewed Literature (2015)

It was further revealed that a variable can be considered to be both mediating and moderating variable in a model. For instance, Saltson (2015), and Wang and Huynh (2014) considered motivation and corporate governance respectively as both moderating and mediating variable in their models. Furthermore, the findings revealed that a variable can either be moderating or mediating depending on the nature of the study. The findings are supported by Xiao, *et al* (2015) who argue that a variable can either be the moderator or mediator depending on the requirements of the study. However, Xiao, *et al* (2015) did not focus on the other sort of relationship i.e. moderated-mediation and mediated-moderation.

In addition, the management Accounting Journal Articles that focused on research methods (such as Luka & Model 2010; Lukka 2010; Malmi 2010; Selto & Widener 2004) did not focus on examining the nature of relationship among variables used in the management accounting literature. They mainly focused on the topics covered such as management areas priority; Design of management accounting systems such as Activity- Based Costing; Management accounting techniques, etc. The articles also focused on the research methodology/methods used and included issues of paradigms, the management accounting concepts, and the applied theories.

This meant that the management accounting studies on the moderated relationship, moderated- mediation relationship and mediated-moderation relationship were scanty. The implication behind this finding is that the management accounting studies may not be able to significantly contribute to the body of knowledge when the relationship among variables is complex (i.e. it involves at least three categories of variables). This may also have some limitations on the development of management accounting systems that accommodate more than three categories of variables as indicated in the following figures: -



Figures 1: The Moderated-Mediation Relationship among Variables.

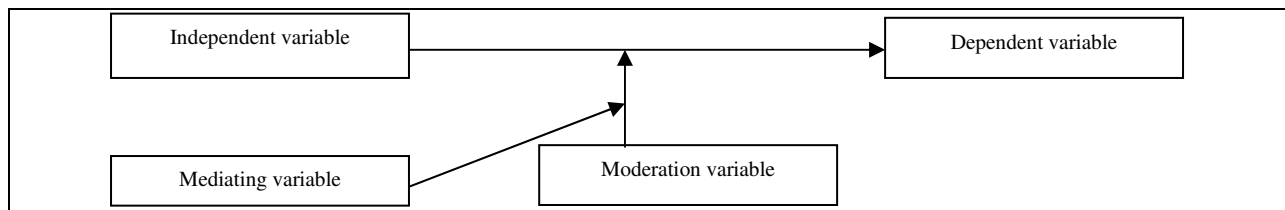


Figure 2: The Mediated-Moderation Relationship among Variables

3.2. Data Analysis Techniques, and the Moderation and Mediation Effects

3.2.1. Types of Data Analysis Techniques Used

From the reviewed management accounting literature, the number of data analysis techniques was used to examine the different types of moderation and mediation relationship among the variables and the parametric tests were extensively used. These techniques included the hierarchical regression analysis; Ordinary Least Square (OLS) regression analysis; Sobel test; Structural Equation Modelling (SEM) including Partial Least Square; Multiple regression analysis; Directed Acyclic Graph (DAG); Literature survey; Path analysis; and the Correlational method/ Fisher Z-transformation. From the reviewed literature, the hierarchical regression analysis, OLS regression, SEM and Multiple Regression were the widely-used data analysis techniques in examining different types of moderation and mediation effects. The following Table presents more information and detailed information are presented in appendix 1: -

S/N	Data Analysis Technique	Frequency	% of Use
1	Hierarchical regression analysis	6	32
2	OLS regression	2	11
3	Sobel Test	1	5
4	SEM	4	21
5	Multiple regression analysis	2	11
6	DAG	1	5
7	Literature survey	1	5
8	Path analysis	1	5
9	The correlational method/ Fisher Z- Transformation	1	5
10	Total	19	100

Table 5: Data Analysis Technique and its Frequency of Use

Source: The Reviewed Literature (2015)

3.2.2. Reasons for Using the Selected Data Analysis Techniques

There are number of reasons that were mentioned by various reviewed studies in management accounting. However, the reasons vary depending on the study which is carried out. The following Table 6 presents the summary of the reasons for using the selected data analysis techniques in analyzing different types of moderation and mediation effects: -

S/N	Data Analysis Technique	Reason
1	Hierarchical regression analysis	<ul style="list-style-type: none"> It is used to assess the effect of each targeted variable on the dependent variable and the interaction effect of the moderated or mediated variable It is suitable to test the significance of the interaction effects between sophisticated AIS and prospector strategy
2	OLS regression	<ul style="list-style-type: none"> The analysis is very simple because one can use an OLS regression in which the summated rating scale (SRS) is used as variables The ordinary least squares regression (OLS) used to test hypotheses which all variables are categorical and interval data.
3	Sobel Test	<ul style="list-style-type: none"> The Sobel test was used to determine whether a mediator variable significantly carries the influence of an independent variable to a dependent variable.
4	SEM including Partial Least Square (PLS)	<ul style="list-style-type: none"> SEM enhances the possibility of acquiring a body of knowledge concerning to the variables that compose the final model SEM can examine multiple relationships simultaneously in one model at the same time PLS is a common structural equation modeling data analysis technique that is commonly used in business research including various knowledge-based studies in the fields of Knowledge Management and Intellectual Capital. PLS was chosen over covariance-based techniques (e.g., LISREL) because it places fewer restrictions on data distribution and normality PLS provides a composite reliability score (equivalent to Cronbach alpha) for assessing the convergent validity of each construct.
5	Multiple regression analysis	<ul style="list-style-type: none"> It enables the hypothesis testing to be done by separate sub-samples on each moderating variable.
6	DAG	<ul style="list-style-type: none"> To assess the robustness of the results obtained from the regression analyses, To explore the causal relationships among variables under study with the control variables.
7	Literature survey	<ul style="list-style-type: none"> It is used when the study is the conceptual paper
8	Path analysis	<ul style="list-style-type: none"> To test whether the relationship is significant or not and the way the variables are related (i.e. Positive or negative relationship)
9	The correlational method/ Fisher Z- Transformation	<ul style="list-style-type: none"> It is one of most commonly used methods when the moderator variable can be categorized into two distinct.

Table 6: Reasons for Using the Selected Data Analysis Techniques
Source: The Reviewed Literature (2015)

3.2.3. Assessment of the Data Analysis Techniques

The findings indicated that hierarchical regression analysis, SEM including PLS, multiple regression, and OLS to be the widely data analysis techniques used to analyse different types of moderating and mediating effects. The finding is in line with the argument by Coenders, et al. (2003). However, the key challenge in the application of the mentioned data analysis techniques is on the elimination of the measurement error bias particularly when the sample size is small.

In most cases, the units of analysis of the management accounting literature are firms, particularly manufacturing firms. In this case, the sample size is expected to be relatively smaller which raises the need for the elimination of measurement error bias. It is argued that the use of hierarchical regression analysis, SEM including PLS, multiple regression, and OLS to eliminate the measurement error bias in a small sample is still controversial (ibid). Despite the fact that elimination of measurement error bias is crucial in assessing different types of mediation and moderation effects, only 2 (12%) reviewed journal articles considered the need to eliminate the measurement error bias. This indicated that majority of the reviewed journal articles that studied the indirect relationship among variables (i.e. 88%) did not consider the presence of measurement error bias. This may negatively affect the reliability of their findings in explaining the moderation and mediation effects.

4. Conclusion

The study was intended to examine the nature of relationship among the variables studied in management accounting literature and the types of data analysis used. The findings revealed that most of the reviewed studies focused on the direct relationship among variables, and the remaining extensively focusing on moderation and mediation effect. This implies that there is scanty management accounting literature that focusing on the mediated-moderation effect and moderated-mediation effect. Moreover, majority of the reviewed studies that focused on indirect relationship among variables widely applied hierarchical regression analysis, SEM including PLS, multiple

regression, and OLS as the data analysis techniques despite of their limitations in eliminating the measurement error bias. The measurement error bias is not considered by the majority of the management accounting literature and this may negatively affect the reliability of the findings on the indirect relationship among variables.

5. Direction of the Future Research

Since there is scanty literature on management accounting that focused on the complex relationship between the research variables, there is a need of management accounting studies to focus on the mediated-moderation effect and moderated-mediation effect between variables under study. This is because the relationship of variables in management accounting such as the designing of MAS is more complex than merely the direct relationship or the moderation and mediation effect. Moreover, it is important for the management accounting literature to recognise the effect of measurement error bias in their findings including the ways of eliminating it since the sample sizes are relatively small.

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Appendix 1: Journal Articles that focused on Indirect Relationship among Variables

Author	Journal Title	Mediating Variable	Moderating Variable	Measurement	Objective	Data Analysis Technique	Reason
Al-Mawali (2015).	European Journal of Business Management		Perceived Environmental Uncertainty (PEU)	The respondents requested to indicate their perception about the predictability regarding their organization's factors (including; customers, suppliers, government, competitors, and technologies) on a seven-point numerical scale anchored at (1) Highly predictable and (7) Highly unpredictable.	To investigate the level of Strategic Management Accounting (SMA) usage, and its effect on the organizational performance, under different levels of environmental uncertainty.	The hierarchical regression analysis was performed to test the moderating effects of perceived environmental uncertainty on the relationship between SMA usage and organizational performance.	It is used to assess the effect of each targeted variable on the dependent variable and the interaction effect of the moderated or mediated variable.
Coenders (2003).	Other Source of Publication		Management Control System (MCS).	Type of Budgets was used as the specific MCS and measured as: (a) Degree to which information from the control system is discussed face-to-face merely on an exception basis. (b) Extent to which it demands frequent and regular attention from the top manager. (c) Extent to which it demands frequent and regular attention from operating managers at all levels of the organisation.		Ordinary least squares (OLS) regression	The analysis is very simple because one can use an OLS regression in which the summated rating scale (SRS) is used as variables.
Ajibolade (2013).	British Journal of Arts and Social Science		Company context	Perceived environmental uncertainty, technology and decentralization	Investigated the relationships between the Management accounting systems (MAS) design, company's context and company performance.	Moderated regression analyses/ The hierarchical regressions analysis	It is used to assess the effect of each targeted variable on the dependent variable and the interaction effect of the moderated or mediated variable.

Author	Journal Title	Mediating Variable	Moderating Variable	Measurement	Objective	Data Analysis Technique	Reason
Saltson (2015).	International Journal of Economics, Commerce and Management	Motivation	Motivation	<p>Category: Intrinsic and extrinsic motivation. The former is the driving force that comes from within, in a form of awareness about the relevance of the work one is performing.</p> <p>Contrary to this, the latter is the driving force that emanates from outside, in a form of condition that propelled him/her to carry out the work to a higher level, e.g. through high salaries, praise, punishment and others</p>	Investigated the mediating and moderating effect of motivation.	The hierarchical regressions analysis and the Sobel Test	<p>The hierarchical regressions analysis was used to assess the interaction effect and significance of the mediating variable</p> <p>The Sobel test was used to determine whether a mediator variable significantly carries the influence of an independent variable to a dependent variable.</p>
Naranjo-Gil (2004).	International Journal of Digital Accounting Research		Accounting Information System (AIS)	Scope, timeliness, level of aggregation, and integration of Accounting Information System.	To examine the interaction of sophisticated AIS on the relationship between prospector strategy and organizational performance.	The hierarchical regressions / Moderated regression analysis	It is suitable to test the significance of the interaction effects between sophisticated AIS and prospector strategy
Nouvas, Sousa & Alves (2012).	Advanced Research in Scientific Areas	Management Accounting System		Scope, timeliness, aggregation and Integration of the	Examines the mediating effect of MAS on performance through their positive direct effect on Intellectual Capital.	The Structural Equation Modeling (SEM).	SEM enhances the possibility of acquiring a body of knowledge concerning to the variables that compose the final model.

Author	Journal Title	Mediating Variable	Moderating Variable	Measurement	Objective	Data Analysis Technique	Reason
Wang & Huynh (2014).	Asian Journal of Finance and Accounting	Corporate Governance	Corporate Governance	Corporate Governance Structure (CGS) and it is referred to as the majority of outside directors (CGS1) and outside supervisors (CGS2)	Examines the mediating and moderating effect of corporate governance on the relationship between MAS and Firm performance	Multiple Regression analysis. Directed acyclic graph (DAG)	To assess the robustness of the results obtained from the regression analyses, authors carried out the directed acyclic graph (DAG) model to explore the causal relationships among corporate governance structure, the adoption of management accounting systems and firm's performance with the control variables "environmental uncertainty" and "firm characteristics".
Ismail & Isa (2011).	Australian Journal of Basic and Applied Sciences	Management Accounting System (MAS).		Scope	examines the role of MAS information in the relationship between Advanced Manufacturing Technology (AMT) and performance	Partial Least Square (PLS), which is a type of Structural Equation Modelling (SEM)	One of the advantages of SEM is that it can examine multiple relationships simultaneously in one model at the same time

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Hammad, Ruzita & Oon (2010).	Emerald-Industrial Management and Data System	Management Accounting System (MAS).		Scope, timeliness, aggregate, and integration of MAS	the mediating role of MAS on the impact of managerial performance is examined through the extent to which managers use the four information characteristics associated with the design of MAS	Literature survey	It is the conceptual paper
Bontis & Serenko (2007).	Emerald- Journal of Knowledge Management		Human Capital Management	Knowledge management (KM) and intellectual capital (IC)	To suggest and empirically test a model that explains employee capabilities from the knowledge-based perspective which is moderated by human capital development	The partial least squares (PLS) structural equation modeling technique	PLS is a common structural equation modeling data analysis technique that is commonly used in business research including various knowledge-based studies in the fields of Knowledge Management and Intellectual Capital. PLS was chosen over covariance-based techniques (e.g., LISREL) because it places fewer restrictions on data distribution and normality (Gefen et al., 2000; Chin, 1998)

Author	Journal Title	Mediating Variable	Moderating Variable	Measurement	Objective	Data Analysis Technique	Reason
Waweru & Uliana (2008).	Problems and Perspectives in Management	Organisation structure		<p>Organisation structure: Decentralization, Centralization and Horizontal</p> <p>MAS: Cost, control, Directing, decision making</p>	To examine the mediating effect of organisational structure and MAS on the relationship between business environmental factors and management accounting change	Path analysis (based on correlation of coefficient)	To test whether the relationship is significant or not and the way the variables are related (i.e. Positive or negative relationship)
Lata and Ussahawanchakit (2015).	The Business and Management Review	Management Accounting System Effectiveness	Environmental Pressure	<p>Environmental pressure: technology, the supported Government, the customer relationship, laws, and regulations.</p> <p>MAS: Scope, timeliness, aggregated, and integrated</p>	To examine the moderating variable role of environmental pressure on the relationship between all antecedence variables and each dimension of MAS effectiveness.	The ordinary least squares regression (OLS)	The ordinary least squares regression (OLS) used to test hypotheses which all variables are categorical and interval data.
Isa (2009).	World Journal of Management		Firm ownership	Firm ownership was categorized into local and foreign based on firm ownership structure stated by the respondents	To investigate whether firm ownership moderates the relationships between the independent variables and MACS change.	The correlational method/Fisher z'-transformation	The correlational method/Fisher z'-transformation was used to test the moderating effects of firm ownership as it is one of most commonly used methods when the moderator variable can be categorized into two distinct.

Author	Journal Title	Mediating Variable	Moderating Variable	Measurement	Objective	Data Analysis Technique	Reason
Schulz, Wu and Chow (2010)	Asia-Pacific Journal of Accounting and Economics	Performance-Based Pay		<p>People's compensation contracts clearly specify how their compensation is based on their performance</p> <p>People's compensation increase as their performance increases</p> <p>People whose performance ranks in the top 25% receive higher compensation than people who rank in the bottom 25%</p> <p>Compensation is directly tied to individual performance.</p>	To examine whether Performance-based pay mediates the relationship between comprehensive performance measures and employee effort.	The partial least squares (PLS) structural equation modeling technique	PLS provides a composite reliability score (equivalent to Cronbach alpha) for assessing the convergent validity of each construct.
Iswari (2013).	Review of Integrative Business and Economic Research.		Auditors' Characteristics	Personality type, gender, and locus of control	To examine and to obtain empirical evident on effects of organizational-professional conflict toward professional judgment taken by auditor by using personality type, gender, and locus of control as moderating variable.	Multiple regression	Hypothesis testing is done by separate sub-samples on each moderating variable.
Barrick, Bradley and Colbert (2007).	Academy of Management Journal		Top Management Interdependence	Measurement focused on the extent to which tasks performed by members were interrelated within a team and whether member goals, rewards, and feedback were related to the team's objectives and success.	Examination of the moderating effect for team interdependence within TMTs on both team and firm performance.	Moderated/hierarchical regression analysis.	It is used to assess the effect of each targeted variable on the dependent variable and the interaction effect of the moderated or mediated variable.

Author	Journal Title	Mediating Variable	Moderating Variable	Measurement	Objective	Data Analysis Technique	Reason
Lin, Chang & Dang (2015).	Sustainability	Intellectual capital	Industry type	Intellectual capital: value added to the company Industry type: environmentally sensitive and non-sensitive industries.	It intended to propose an integrated model to explain the influence of CSR on financial performance with intellectual capital as a mediator and industry type as a moderator.	The hierarchical regression analysis	It is used to assess the effect of each targeted variable on the dependent variable and the interaction effect of the moderated or mediated variable.