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Management Accounting Practices and Sustainability Performance of Manufacturing Firms in Ghana

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Abstract

This study assessed the connection between Management Accounting Practices (MAPs) and sustainability performance (SsP) of manufacturing institutions in Ghana. MAPs comprise the following sub constructs: Costing System (CS), Budgeting System (BS), Performance Management System (PMS), Decision Support System (DSS) and Strategic Management Accounting Practices (SMAP). SsP comprises the following sub indicators: Financial Performance (FP), Social Performance (SP) and Environmental Performance (EP). This research is a quantitative study that applied the cross-sessional survey design to obtain data from managers of manufacturing institutions in Ghana. This was done through the administration of structured questionnaire. Data from 266 respondents were processed using Smart PLS (version 4) and analysed using the Structural Equation Modelling. The paper found significant positive relationships between CS and FP, DSS and EP, DSS and SP, PMS and EP, PMS and SP, as well as SMAP and EP. All other direct relationships were not significant. The research contributes to the literature on MAPs by empirically linking SMAP to SsP of Ghanaian manufacturing firms. These findings extend the literature on MAPs by encouraging manufacturing firms in Ghana to constantly review the activities of competitors before taking decisions since this will help to boost their SsP. The study recommends that leadership of manufacturing firms in Ghana should implement CS (like job costing, process costing and variable costing), DSS (like customer profitability analysis and net present value analysis), PMS (like ratio analysis and keeping records of why employees leave the firm or absent themselves from work) as well as SMAP (like constantly observing what competitors are doing before taking decisions) in order to enhance their sustainability performance (SsP).

Keywords

Management Accounting Practices, Sustainability Performance, Contingency Theory

1. Introduction

The Sustainable Development Goals (SDGs) are seventeen (17) worldwide targets that were set by the United Nations in 2015 as a universal call to eradicate poverty, illness, and discrimination, protect the environment, and ensure that by the year 2030, all people on the earth will live in peace and prosperity. Some of these objectives have to do with social, economic, and environmental performance. Goal 8 is one such example that relates to economic performance because it calls on national leaders to promote sustainable economic growth, gainful employment, and dignified labour for everyone. Goals 1, 2, 3, and 4 are related to social performance because they urge world leaders to put measures in place to help lessen poverty and enhance well-being and high-quality education. Goals 13 and 15 on the other hand are related to environmental performance as they urge world leaders to implement concrete measures that will help to minimise the adverse implications of climate change and safeguard the environment.

The manufacturing sector in every economy can help in achieving some of the SDGs. For example, the moment manufacturing firms in countries start doing well, many jobs will be available for the youth and people's standard of living as advocated by SDG 1 and 2 will be impacted positively. Again, a vibrant manufacturing sector helps to rake in a lot of tax revenues that can be used to provide many social and economic facilities like education as advocated by SDG 3.

According to Erin et al. (2022), manufacturing institutions have a role to play in the realisation of the SDGs. These authors argue that, most of the SDGs can be achieved if leadership of manufacturing firms shows more commitment towards the daily operations of their firms. García et al. (2022) also believe that management of manufacturing firms can help in realizing the SDGs if they engage reputable audit firms to examine their annual reports regularly and make constructive suggestions towards improving their state of affairs. These firms have well qualified and experienced auditors who can contribute to the success of these firms. According to Sinha et al. (2022) policy makers like leadership of manufacturing institutions should implement relevant MAPs in order to fast track the achievement of the SDGs.

Though the manufacturing sector is tagged as the engine of growth due to its ability of boost all aspects of the economy (Adu-Gyamfi & Chipwere, 2020), manufacturing institutions worldwide are not performing well due to a lot of obstacles including; competition from business competitors, weak management practices, inappropriate technology, and capital limitations (Fasesin et al., 2015; Messner, 2016). In Ghana, manufacturing concerns are not performing to ex-

pectation due to weak management practices, inadequate risk capital, astronomical borrowing costs, competition from imported substitutes, poor relationship with customers and suppliers as well as unfriendly legal and regulatory framework (Addo, 2017; Alhassan et al., 2021).

It is therefore, not amazing that the contribution of Ghanaian manufacturing concerns to Ghana's GDP has not been encouraging and consistent over the years as shown in **Table 1** below.

Alvarez et al. (2021) however, proposes that firms in general have the capacity to grow and be profitable if appropriate MAPs are deployed. According to the institutional theory, poor performance of firms could be due to poor implementation of MAPs (Meyer & Rowan, 1977; Burns & Scapens, 2000). The implication of this theory is that, appropriate implementation of MAPs can help to boost the sustainability performance of manufacturing firms as well as increase the contribution the sector brings on board towards the nation's GDP.

Table 1. Contribution of Ghana's manufacturing sector to GDP.

Year	Percentage (%) to GDP
2000	9
2001	9
2002	9
2003	8.9
2004	8.7
2005	8.6
2006	9.7
2007	8.5
2008	7.5
2009	6.7
2010	6.3
2011	6.4
2012	5.6
2013	13.5
2014	11
2015	11
2016	10
2017	10
2018	10
2019	10
2020	10.9
2021	10.7

Source: World Development Indicators (2000 to 2021).

Notwithstanding the fact that many academic scholars have conducted various researches to look at the implications of MAPs on the success of firms (Senftlechner & Hiebl, 2015; Mbawuni & Anerte, 2014; Shahzadi et al., 2018; Adu-Gyamfi & Chipwere, 2020), their studies did not cover strategic management accounting practices (SMAP) as suggested by Ma et al. (2022). Ma et al. (2022) suggests that, contemporary studies on the implication of MAPs on the success of firms should focus on SMAP, which has to do with a firm analysing what its competitors are doing before taking decisions. This is the lacuna that this particular thesis is positioned to deal with. Apart from this lacuna, the above scholars focused their attention mainly on financial success of organisations. This paper has expanded the scope of performance, by looking at sustainability performance (SsP) which incorporates financial, social and environmental performance of firms.

The research questions that this paper sought to find answers to are: Do management accounting practices (MAPs) have any significant relationship with financial performance? Do MAPs have any significant relationship with environmental performance? And do MAPs have any significant relationship with environmental performance? This research paper is categorized into eight sections. These are: Introduction, Literature review and hypotheses development, Methodology, Results and findings, Discussion of findings, Conclusion, Limitations of the study as Suggestions for future research.

2. Literature Review and Hypotheses Development

2.1. Definition of Management Accounting Practices

Management accounting (MA) is the practice where leadership of firms analyse financial and non-financial issues in the economy and use them as important guidelines in taking quality decisions (Petera & Šoljaková, 2020; Pires et al., 2023). These include analysing the budgeting techniques and selling prices of competitors before taking decisions. MA provides leaders with management accounting information and techniques to help minimise costs and improve the firm's profits. In summary, MA provides relevant planning, control, and decision-making information to boost quality decision making.

2.2. Theoretical Review

The ***institutional theory*** explains how institutions are impacted by their social, economic, and environmental surroundings (Meyer & Rowan, 1977). The theory suggests that institutions like manufacturing firms must adopt appropriate MAPs to enhance their performance (Burns & Scapens, 2000). The implication of this theory is that, there is a direct link between MAPs and success of business institutions. Thus, the implementation of relevant MAPs by institutions can boost their performance. This will go a long way to increase the nation's GDP.

Though the institutional theory has been successfully used by many scholars

to show how management accounting practices (MAPs) influence performance of firms (Ahmad et al., 2018; Ahinful & Touringana, 2019; Amir et al., 2020; Adu-Gyamfi & Chipwere, 2020; Afifa & Salah, 2022; Ogundajo & Nyikyaa, 2021), most of these studies focused their attention mainly on traditional MAPs like costing system (CS) and budgeting system (BS), to the neglect of strategic management accounting practices (SMAP). According to Ma et al. (2022), studies on MAPs must include SMAP where firms must continuously monitor activities of competitors and use them as guide in taking decisions. This is one of the gaps that this research purports to fill.

2.3. Management Accounting Practices and Performance of Firms

The connection between MAPs and success of businesses has been examined by many scholars. For instance, Vărzaru et al. (2022) found out that Romanian companies that focused more on innovative MAPs performed better than their counterparts that practised traditional costing systems. The reason is that, the innovative practices make more information available for decision making than the traditional practices. This study however, obtained data from only accountants. It must be noted that, management accounting issues are best understood by top management employees irrespective of their backgrounds. Since most accountants occupy middle level positions in organizations, the focus of management accounting study should target top management members of firms. The study also looked at financial performance of firms from different industries without focusing on only the manufacturing sector which is considered as the engine for rapid economic development. Another gap is that, the innovative MAPs that were examined include the balanced scorecard and economic value added without incorporating strategic management accounting practices (SMAP) as suggested by Ma et al. (2022).

In another study by Nimtrakoon and Tayles (2015), the authors divided MAPs into two categories: traditional MAPs and contemporary MAPs. The earlier ones focused more on analysis of historical data from annual reports of firms. The contemporary practices rely more on analysis of non-financial and forward-looking data. Here, more emphasis is placed on events outside the business, such as information about clients, suppliers, competitors and local communities. The study recommends the use of both traditional and contemporary MAPs by firms to performance.

In a related work by Gyamera et al. (2023) the authors established a significant positive connection between the MAPs of SMEs that are registered with the registrar of companies in Ghana and their financial performance. This study focused on combination of firms that are into trading, services and manufacturing. Since the manufacturing industry is generally regarded as the engine that propels economic development, there is the need for a study that will focus solely on this sector. Another gap is the focus on only financial performance without looking at social and environmental performance. Again, strate-

gic management accounting practices (SMAP) which is suggested by Ma et al. (2022) was not looked at.

Another study by Adu-Gyamfi and Chipwere (2020) found significant positive relationship between MAPs performance of businesses in Ghana. This study has some methodological flaws. Though data was obtained from two hundred (200) managers of manufacturing firms, the unit of analysis, population, sample size and sampling procedure were not specified. Secondly, performance was looked at in terms of sales and profits without considering social and environmental performance. Another lacuna is that, attention was not given to strategic management accounting practices (SMAP) as recommended by Ma et al. (2022). The study also did not provide details concerning the validity and reliability procedures. With these phenomenal loopholes, it may be difficult to replicate the study as well as rely on the reported findings.

Based on the literature reviewed and gaps established, five dimensions of MAPs have been identified namely: strategic management accounting practices (SMAP), performance management systems (PMS), decision support systems (DSS), budgeting systems (BS), and costing systems (CS). The gaps identified above helped the authors of this paper to come out with the following hypotheses which were tested accordingly:

H_1: *Management accounting practices* (*MAPs*) *have significant impact on the sustainability performance* (*SsP*) *of manufacturing firms in Ghana.*

H_{1a}: *Budgeting system* (*BS*) *has a significant impact on the financial performance* (*FP*) *of manufacturing firms in Ghana.*

H_{1b}: *Budgeting system* (*BS*) *has a significant impact on the environmental performance* (*EP*) *of manufacturing firms in Ghana.*

H_{1c}: *Budgeting system* (*BS*) *has a significant impact on the social performance* (*SP*) *of manufacturing firms in Ghana.*

H_{1d}: *Costing system* (*CS*) *has a significant impact on the financial performance* (*FP*) *of manufacturing firms in Ghana.*

H_{1e}: *Costing system* (*CS*) *has a significant impact on the environmental performance* (*EP*) *of manufacturing firms in Ghana.*

H_{1f}: *Costing system* (*CS*) *has a significant impact on the social performance* (*SP*) *of manufacturing firms in Ghana.*

H_{1g}: *Decision support system* (*DSS*) *has a significant impact on the financial performance* (*FP*) *of manufacturing firms in Ghana.*

H_{1h}: *Decision support system* (*DSS*) *has a significant impact on the environmental performance* (*EP*) *of manufacturing firms in Ghana.*

H_{1i}: *Decision support system* (*DSS*) *has a significant impact on the social performance* (*SP*) *of manufacturing firms in Ghana.*

H_{1j}: *Performance management system* (*PMS*) *has a significant impact on the financial performance* (*FP*) *of manufacturing firms in Ghana.*

H_{1k}: *Performance management system* (*PMS*) *has a significant impact on the environmental performance* (*EP*) *of manufacturing firms in Ghana.*

H_{1j}: Performance management system (PMS) has a significant impact on the social performance (SP) of manufacturing firms in Ghana.

H_{1m}: Strategic management accounting practices (SMAP) has a significant impact on the financial performance of manufacturing firms in Ghana.

H_{1n}: Strategic management accounting practices (SMAP) has a significant impact on the environmental performance (EP) of manufacturing firms in Ghana.

H_{1o}: Strategic management accounting practices (SMAP) have significant impact on the social performance (SP) of manufacturing firms in Ghana.

2.4. Conceptual Framework

Figure 1 below shows the conceptual framework of the hypotheses to be tested.

3. Methodology

3.1. Population and Sample Size

This is a cross-sessional survey design that used 634 manufacturing firms that are registered with the Association of Ghana Industries (AGI) as at 2022 as the target population. These firms were categorized in relation to what they produce.

The study relied on the Krejcie and Morgan (1970) formula below to determine the minimum sample size.

$$S = \frac{X^2 NP(1-P)}{d^2(N-1) + X^2 P(1-P)}$$

where:

S = the minimum sample size.

X^2 = the table value of chi-square for 1 degree of freedom at the desired confidence level (3.841).

N = the population size.

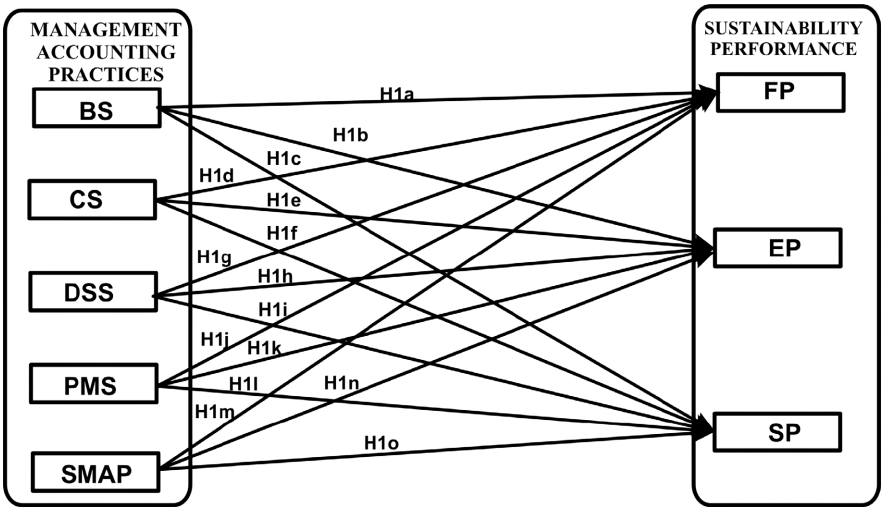

Figure 1. Detailed conceptual framework on the independent and dependent variables. Source: Field Survey (2023).

P = the population proportion assumed to be 0.5 since this would provide a maximum sample size.

d = the degree of accuracy expressed as a proportion (0.05).

$$S = \frac{3.841^2 * 634 * 0.5(1-0.5)}{0.05^2(634-1)+3.841^2(1-0.5)}$$
$$= 261$$

Based on this formula, with a target population of 634, the minimum sample size required at 95% confidence level is 261.

In order to meet this target, 269 questionnaires in Google forms were shared on pro-rata basis via the stratified and simple random sampling techniques and 266 were retrieved representing a response rate of 98.8%. A manager from each company completed one questionnaire. Table 2 below shows details of the sample used for the analysis.

3.2. Instrument and Variable Measurement

The study made use of the following five-point Likert scale to tap responses from the respondents who are managers of manufacturing firms in Ghana: [1 = Not at all; 2 = Least agree; 3 = Agree; 4 = Strongly agree and 5 = Very strongly agree]. The questionnaire for management accounting practices (MAPs) has five (5) dimensions, namely: costing systems (CS), budgeting systems (BS), performance management systems (PMS), decision support systems (DSS) and strategic management accounting practices (SMAP). This scale was adapted from an instrument developed by Burritt et al. (2010), who improved upon an earlier one by Jasch and Savage (2008). Sustainability performance (SsP) of firms is looked at from three (3) dimensions namely: financial performance (FP), environmental

Table 2. Sample size.

Manufacturing Industry	Number of Respondents	Percentage
Furniture producing firms	26	9.8%
Food and beverage-producing firms	48	18%
Drugs and pharmaceutical-producing firms	22	8.3%
Chemicals producing firms	14	5.3%
Building and construction firms	40	15%
Clothing and textiles-producing firms	9	3.4%
Toiletries and cosmetics-producing firms	30	11.3%
Electrical and electronic firms	38	14.3%
Energy producing firms	6	2.3%
Printing and packaging firms	20	7.5%
Other manufacturing firms	13	4.8%
TOTAL	266	100%

Source: Field Survey (2023).

performance (EP) and social performance (SP). The FP and SP scales have been adapted from Kohli and Jaworski (1990) while that of EP was adapted from Sharma and Vredenburg (1998).

3.3. Pre-Testing of Research Instrument

The questionnaires were pre-tested using Smart PLS-SEM (version 4) to ensure that the questions were valid and reliable (Geisen & Murphy, 2020). According to Perneger et al. (2015) a minimum sample of 32 is adequate for pre-testing survey data because it helps to resolve at least 80% problems associated with the questions. Stratified and simple random sampling techniques were used to select and distribute the questionnaires to managers of fifty manufacturing firms within the target population. This was done on pro-rata basis based on the type of products they produce. Each manufacturing firm filled one set of questionnaire. Thirty-six (36) of the questionnaires were retrieved for the pre-testing, representing a response rate of 72%. **Table 3** below shows the sample retrieved for the pre-testing.

3.3.1. Internal Consistency Reliability during Pre-Testing

Cronbach's alpha and composite reliability of the variables were analysed to check the internal consistency reliability of the instrument. According to Hair Jr. et al. (2021), a Cronbach's alpha and composite reliability threshold of 0.7 is acceptable. From **Table 4** below, the internal consistency reliability of the instrument is adequate.

3.3.2. Convergent Validity during Pre-Testing

This criteria helps to assess how well the new scale correlates with existing variables and alternative measures of the same construct (Hair Jr. et al., 2021). The

Table 3. Sample size for pre-testing.

Manufacturing Industry	Number of respondents	Percentage
Furniture producing firms	4	9.8%
Food and beverage-producing firms	6	18%
Drugs and pharmaceutical-producing firms	3	8.3%
Chemicals producing firms	2	5.3%
Building and construction firms	5	15%
Clothing and textiles-producing firms	1	3.4%
Toiletries and cosmetics-producing firms	4	11.3%
Electrical and electronic firms	5	14.3%
Energy producing firms	1	2.3%
Printing and packaging firms	3	7.5%
Other manufacturing firms	2	4.8%
TOTAL	36	100%

Source: Field Survey (2023).

Table 4. Internal consistency reliability during pre-testing.

Items	Cronbach's Alpha	Composite reliability
BS	0.869	0.878
CS	0.797	0.895
DSS	0.842	0.843
EP	0.840	0.859
FP	0.938	0.942
PMS	0.786	0.784
SMAP	0.882	0.906
SP	0.922	0.931

Source: Field Survey (2023).

average variance extracted (AVE) should be greater than 0.5 to establish adequate convergent validity (Hair Jr. et al., 2021; Sarstedt et al., 2020). From **Table 5** below, this criterion is sufficient.

3.3.3. Discriminant Validity during Pre-Testing

Discriminant validity tests are conducted to ensure that constructs that should have no relationship do, in fact, not have any relationship. According to Henseler et al. (2015) Heterotrait-Monotrait (HTMT) ratio must be less than 0.90 at a confidence level of 95% to suggest adequate discriminant validity. From **Table 6** below, discriminant validity is adequate.

3.4. Data Analyses

Smart Partial Least Square-Structural Equation Modeling (PLS-SEM) version 4 was used to analyse the data. Structural equation modeling (SEM) is a multivariate data analysis technique for examining intricate interactions among indicators. Researchers typically use two methods to estimate structural equation models: covariance-based SEM (CB-SEM) and partial least squares SEM (PLS-SEM). While the CB-SEM is primarily used for validation purposes, PLS-SEM is a second generation technique of multivariate method that can be used to test the hypotheses of existing theories and concepts. The Smart PLS-SEM focuses on the predictive ability of the model by explaining the variance in the independent variables. The Smart PLS-SEM technique was used because it has several benefits over other statistical packages like Statistical Package for the Social Sciences (SPSS) and Stata (Hair Jr. et al., 2019). For instance, it is appropriate to use this technique to predict target constructs when the structured model is complex. It can also be used even when the research data is non-normally distributed. It also favours model parsimony because it is very simple to use and understand (Hair Jr. et al., 2019). It also provides the output in nice graphs which appeal to the eyes and this enhances quick understanding. Besides, this technique makes it easy to copy and paste tables in the research paper. It must be noted that, most of the published accounting and finance papers that were sighted used Stata for the analysis.

Table 5. Average variance extracted (AVE) during pre-testing.

Items	AVE
BS	0.604
CS	0.704
DSS	0.762
EP	0.757
FP	0.844
PMS	0.703
SMAP	0.741
SP	0.810

Source: Field Survey (2023).

Table 6. Heterotrait-Monotrait (HTMT) Ratio during pre-testing.

	BS	CS	DSS	EP	FP	PMS	SMAP	SP
BS								
CS	0.461							
DSS	0.726	0.513						
EP	0.590	0.688	0.709					
FP	0.787	0.563	0.851	0.735				
PMS	0.701	0.395	0.819	0.522	0.672			
SMAP	0.800	0.606	0.836	0.604	0.785	0.735		
SP	0.436	0.640	0.614	0.810	0.581	0.599	0.445	

Source: Field Survey (2023).

Stata does not produce nice graphs and this affects quick understanding of readers. Again, the use of Stata does not permit the researcher to copy and paste tables and graphs. The researcher has to create the tables himself.

4. Results and Findings

4.1. General Information about Respondents

In all, 266 valid responses were used for the analysis. Out of this number, males were 61.3% (n = 163), while 38.7% (n = 103) were females. This shows that males were more than females. The study relied on the age classifications recommended by Yarlagadda et al. (2015). The age of the respondents are presented in **Table 7** below.

This implies that 21% (n = 56) were young adults, 70% (n = 186) were middle-aged adults, and 9% (n = 24) were senior adults. Thus, middle-aged managers constitute a chunk of the respondents. It can be argued that these respondents are matured and experienced and, for that matter, are in a good position to provide relevant information on their management accounting practices (MAPs).

Table 7. General information about respondents.

Details	Classes	Frequency	Percentage
Sex	Male	163	61.3%
	Female	103	38.7%
Age	<30 years	56	21%
	31 and 50 years	186	70%
	>50 years	24	9%
Position	Chief Executive Officer	29	10.9%
	Senior Manager	145	54.5%
	Board Member	14	5.3%
	Shareholder	5	1.9%
	Middle level Manager	73	27.4%

Source: Field Survey (2023).

In terms of the positions held by the respondents, 10.9% (n = 29) were Chief Executive Officers (CEOs), 54.5% (n = 145) were senior managers, 5.3% (n = 14) were board members, 1.9% (n = 5) were shareholders while 27.4% (n = 73) were middle-level managers. This implies that senior managers and CEOs combined constitute 65.4% (n = 174) of the respondents. These are top-level employees with huge experience and can therefore provide quality responses on their MAPs. Niesen et al. (2018) explained that employees who have worked in organisation for a considerable period are more likely to exhibit better work-related behaviours than those who are not.

4.2. Evaluation of the Structural Model

Indicators that met the required benchmark of 0.7 were used for the evaluation (Hair Jr. et al., 2019; Hair Jr. et al., 2020). These are captured in **Figure 2** below.

4.3. Internal Consistency and Convergent Validity

The researchers assessed the internal consistency reliability of the survey through Cronbach's alpha and composite reliability analysis to check the consistency of the scores. These values must be at least 0.7 (Hair Jr. et al., 2021). From **Table 8** below, the internal consistency is adequate.

Convergent validity was assessed to ensure that the new scale correlates well with the variables. The concept should have a positive correlation with similar variables and a negative correlation with unrelated ones (Gignac, 2021). From **Table 8** above, the AVE values are greater than 0.5, proving that convergent validity is sufficient (Hair Jr. et al., 2021).

4.4. Discriminant Validity

Scholars engage in discriminant validity assessment to satisfy themselves that constructs that should have no connections do, in fact, not have any connections. According to Henseler et al. (2015) the Heterotrait-Monotrait (HTMT) ratio should be below 0.90 for this to be met. From **Table 9** below, the HTMT is adequate.

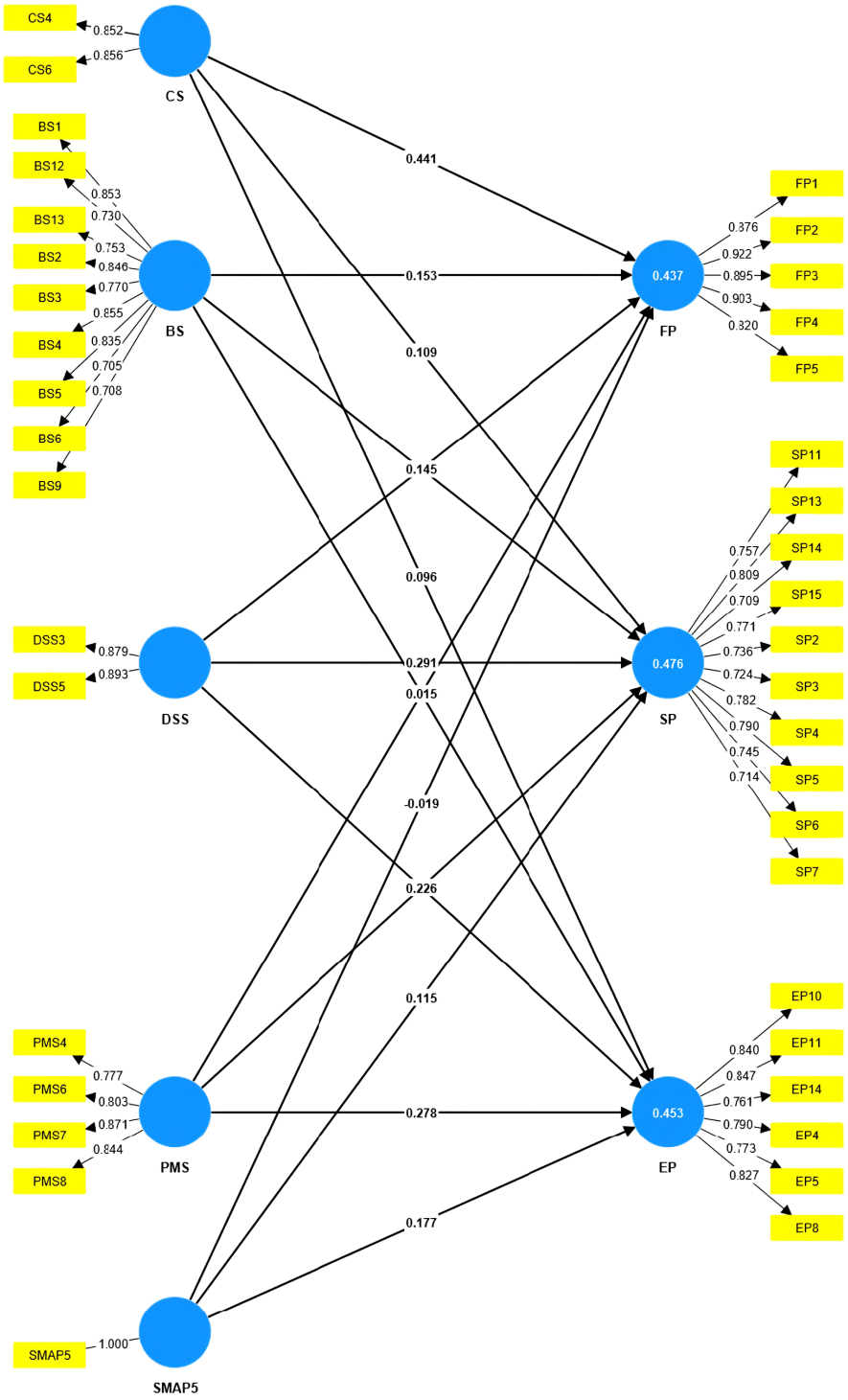

Figure 2. Structural model. Source: Field Survey (2023).

4.5. Test for Robustness

Scholars can test for robustness by engaging in test for nonlinearity, assessing endogeneity and assessing the unobserved heterogeneity in PLS path models (Sarstedt et al., 2020). To test for nonlinearities, the study assessed the quadratic effect (QE). From Table 10 below, the results of bootstrapping with 5000 samples

Table 8. Internal consistency and convergent validity.

Items	Composite Reliability (rho-a)	Chronbach's Alpha	Composite Reliability (rho-c)	Average Variance Extracted (AVE)
BS	0.929	0.922	0.935	0.618
CS	0.822	0.819	0.892	0.733
DSS	0.727	0.725	0.879	0.784
EP	0.895	0.893	0.918	0.651
FP	0.931	0.930	0.947	0.781
PMS	0.845	0.842	0.894	0.680
SP	0.920	0.916	0.929	0.569

Source: Field Survey (2023).

Table 9. Heterotrait-monotrait ratio (HTMT).

	BS	CS	DSS	EP	FP	PMS	SMAP	SP
BS								
CS	0.897							
DSS	0.860	0.868						
EP	0.613	0.614	0.732					
FP	0.621	0.730	0.648	0.585				
PMS	0.821	0.736	0.897	0.698	0.522			
SMAP	0.712	0.683	0.737	0.589	0.461	0.697		
SP	0.623	0.629	0.767	0.888	0.722	0.679	0.566	

Source: Field Survey (2023).

Table 10. Assessment of nonlinear effect.

	Original sample (O)	Standard deviation (STDEV)	*P*values	Decision
QE (CS) -> EP	−0.024	0.071	0.736	Not Significant
QE (CS) -> FP	0.132	0.059	0.024	Significant
QE (CS) -> SP	−0.064	0.063	0.311	Not significant
QE (BS) -> EP	−0.065	0.070	0.355	Not significant
QE (BS) -> FP	−0.170	0.053	0.001	Significant
QE (BS) -> SP	−0.063	0.059	0.285	Not significant
QE (DSS) -> FP	−0.063	0.054	0.242	Not significant
QE (DSS) -> SP	0.048	0.062	0.436	Not significant
QE (PMS) -> EP	0.128	0.055	0.021	Significant
QE (PMS) -> SP	−0.007	0.053	0.896	Not significant
QE (SMAP5) -> EP	0.015	0.074	0.836	Not significant
QE (SMAP5) -> SP	0.033	0.056	0.548	Not significant

Source: Field Survey (2023).

indicate that except for the relationship between CS and FP; BS and FP; as well as PMS and EP, all other quadratic effects were insignificant. Hence the model is largely robust.

To test for endogeneity, the study adopted the Gaussian copula (GC) approach. From **Table 11** below, the results showed that except for the relationship between BS and FP; as well as PMS and EP, none of the Gaussian copulas were significant. Hence endogeneity is largely not present which supports the robustness of the structural model (Sarstedt et al., 2020).

To assess the unobserved heterogeneity in PLS path models, the FIMIX-PLS procedure was used. To determine the maximum number of segments, the least sample size needed to estimate each segment was computed (Sarstedt et al., 2020). An effect size of 0.15 and a power level of 80% suggest that the minimum sample size requirement is 85 which allows for extracting a minimum of three segments. FIMIX-PLS was run for one to three segments. From **Table 12** below, AIC3 and CAIC indicate the same number of segments, therefore the results likely point to the appropriate number of segments Moreover, AIC4 and BIC point to a one segment solution. However, the minimum description length factor 5 (MDL5) points to a one segment solution. Jointly, the analysis does not unambiguously point to a specific segment solution because AIC3 and CAIC points to a three segment solution and MDL5 also point to a different segment solution. We therefore conclude that unobserved heterogeneity is not at a critical level, which supports the results of the entire data set's analysis (Sarstedt et al., 2020). The segments' fuzziness has also been expressed by the high values above 0.5 in the normed entropy statistics (EN). Based on the robustness checks, it can be concluded that the model is considered robust.

Table 11. Assessment of endogeneity.

	Original sample (O)	Standard deviation (STDEV)	*P* values	Decision
GC (CS) -> EP	−0.006	0.064	0.926	Not significant
GC (CS) -> FP	0.034	0.068	0.619	Not significant
GC (CS) -> SP	−0.099	0.067	0.137	Not significant
GC (BS) -> EP	−0.067	0.062	0.284	Not significant
GC (BS) -> FP	−0.233	0.059	0.000	Significant
GC (BS) -> SP	0.016	0.075	0.828	Not significant
GC (DSS) -> EP	0.017	0.114	0.881	Not significant
GC (DSS) -> FP	−0.175	0.104	0.094	Not significant
GC (DSS) -> SP	0.077	0.110	0.482	Not significant
GC (PMS) -> EP	0.208	0.082	0.012	Significant
GC (PMS) -> SP	−0.060	0.083	0.470	Not significant
GC (SMAP5) -> EP	0.002	0.127	0.986	Not significant
GC (SMAP5) -> SP	−0.022	0.115	0.848	Not significant

Source: Field Survey (2023).

Table 12. Assessment of unobserved heterogeneity.

	Segment 1	Segment 2	Segment 3
AIC (Akaike's information criterion)	1829.501	1645.877	**1329.102**
AIC3 (modified AIC with Factor 3)	1847.501	1682.877	**1385.102**
AIC4 (modified AIC with Factor 4)	1865.501	1719.877	**1441.102**
BIC (Bayesian information criterion)	1894.004	1778.466	**1529.778**
CAIC (consistent AIC)	1912.004	1815.466	**1585.778**
MDL5 (minimum description length with factor 5)	**2296.016**	2604.824	2780.481
EN (normed entropy statistic)	0.000	**0.633**	**0.737**

Source: Field Survey (2023).

4.6. Multicollinearity

Multicollinearity arises when two or more explanatory variables in a model are highly correlated. When this happens, the independent variables may lead to misleading findings (Hair Jr. et al., 2011). This problem exists if the Variance Inflation Factor (VIF) is above 5 (Hair Jr. et al., 2011; Wong, 2013). From **Table 13** below, the VIF figures are below 5, hence there is no multicollinearity issue.

4.7. Significance of the Path Coefficients

Path coefficient (PC) represents the strength of the connection between the indicators. According to Hair Jr. et al. (2011) a PC that is almost one indicates a powerful positive connection while a PC that is almost negative one shows a powerful negative connection. However, a PC that is almost zero shows feeble connection. From **Table 14** below, there is a positive but weak relationships between BS and EP, BS and SP as well as CS and EP. There is negative but weak connection between PMS and FP as well as SMAP and FP. There is an average positive connection between PMS and EP as well as PMS and SP.

At a significant level of 1% and 5%, the p values should fall below 0.01 and 0.05 respectively for a connection to be significant (Hair Jr. et al., 2011). From **Table 14** below, the path coefficients between CS and FP ($\beta = 0.441$, $t = 6.025$, $p < 0.01$), DSS and EP ($\beta = 0.211$, $t = 2.167$, $p < 0.05$), DSS and SP ($\beta = 0.291$, $t = 3.085$, $p < 0.01$), PMS and EP ($\beta = 0.278$, $t = 2.744$, $p < 0.01$), PMS and SP ($\beta = 0.226$, $t = 2.574$, $p < 0.05$) as well as SMAP and EP ($\beta = 0.177$, $t = 2.164$, $p < 0.05$) are positively significant.

From **Table 14** below, the path coefficients between BS and EP ($\beta = 0.015$, $t = 0.131$, $p = 0.895$), BS and FP ($\beta = 0.153$, $t = 1.554$, $p = 0.120$), BS and SP ($\beta = 0.053$, $t = 0.452$, $p = 0.651$), CS and EP ($\beta = 0.096$, $t = 0.823$, $p = 0.411$), CS and SP ($\beta = 0.109$, $t = 1.084$, $p = 0.278$), DSS and FP ($\beta = 0.145$, $t = 1.429$, $p = 0.153$), PMS and FP ($\beta = -0.007$, $t = 0.067$, $p = 0.947$), SMAP and FP ($\beta = -0.019$, $t = 0.227$, $p = 0.821$) as well as SMAP and SP ($\beta = 0.115$, $t = 1.386$, $p = 0.166$) are not significant.

Table 13. Multicollinearity assessment (Inner VIF).

	EP	FP	SP
BS	3.682	3.682	3.682
CS	2.791	2.791	2.791
DSS	2.561	2.561	2.561
PMS	2.590	2.590	2.590
SMAP	2.159	2.159	2.159

Source: Field Survey (2023).

Table 14. Significance of the path coefficients of the relationship between MAPs and SsP.

Hypotheses	Path in Sem	Original Sample (O)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	*P* Values	Comment
H1b	BS -> EP	0.015	0.114	0.131	0.895	Not significant
H1a	BS -> FP	0.153	0.098	1.554	0.120	Not significant
H1c	BS -> SP	0.053	0.116	0.452	0.651	Not significant
H1e	CS -> EP	0.096	0.116	0.823	0.411	Not significant
H1d	CS -> FP	0.441	0.073	6.025	0.000**	Significant
H1f	CS -> SP	0.109	0.101	1.084	0.278	Not significant
H1h	DSS -> EP	0.211	0.097	2.167	0.030*	Significant
H1g	DSS -> FP	0.145	0.101	1.429	0.153	Not significant
H1i	DSS -> SP	0.291	0.094	3.085	0.002**	Significant
H1k	PMS -> EP	0.278	0.101	2.744	0.006**	Significant
H1j	PMS -> FP	−0.007	0.104	0.067	0.947	Not significant
H1l	PMS -> SP	0.226	0.088	2.574	0.010**	Significant
H1n	SMAP -> EP	0.177	0.082	2.164	0.031*	Significant
H1m	SMAP -> FP	−0.019	0.082	0.227	0.821	Not significant
H1o	SMAP -> SP	0.115	0.083	1.386	0.166	Not significant

Source: Field Survey (2023). Note: Two stars imply 1% significant level while a star implies 5% significant level.

4.8. Coefficient of Determination

This is the percentage of the dependent variable's variation that the model predicts. Values of 0.67, 0.33, and 0.19 are considerate, moderate, and weak respectively (Chin, 1998). From **Table 15** below, 45.3% variation in EP is predicted by the model representing moderate predicting accuracy. Secondly, 43.7% variation in FP is predicted by the model representing moderate predicting accuracy. Finally, 47.6% variation in SP is predicted by the model representing moderate predicting accuracy.

4.9. Effect Size

Effect size (f^2) helps researchers to see the impact of an explanatory variable on a

Table 15. Coefficient of determination (R^2).

Constructs	R Square	R Square Adjusted
EP	0.453	0.442
FP	0.437	0.427
SP	0.476	0.466

Source: Field Survey (2023).

dependent variable. According to Cohen (1992), f^2 values of 0.02, 0.15 and 0.35 represent small effect, medium effect and large effect respectively. A value that is less than 0.02 indicates no effect of the independent variable on the dependent variable. From Table 16 below, if BS (f^2 = 0.000, 0.011, 0.001) is omitted from EP, FP and SP respectively, it will have no effect. If CS (f^2 = 0.006, 0.008) is omitted from EP and SP respectively, it will have no effect. If CS (f^2 = 0.124) is omitted from FP, it will have a small effect. If DSS (f^2 = 0.032, 0.063) is omitted from EP and SP respectively, it will have a small effect. If DSS (f^2 = 0.015) is omitted from FP, it will have no effect. If PMS (f^2 = 0.055, 0.038) is omitted from EP and SP respectively, it will have a small effect. If DSS (f^2 = 0.000) is omitted from FP, it will have no effect. If SMAP (f^2 = 0.0000, 0.012) is omitted from FP and SP respectively, it will have no effect. If SMAP (f^2 = 0.027) is omitted from EP, it will have a small effect.

4.10. Predictive Relevance

This is used to assess the predictive power of a model. A figure above zero indicates an acceptable predictive power of the model but a value of zero or below shows a weak predictive power (Geisser, 1975; Stone, 1974). From Table 17 below, the predictive power of the model is adequate.

4.11. Goodness-of-Fit Test

According to Hair Jr. et al. (2016), the Standardized Root Mean square Residual (SRMR) and Normal Fit Index (NFI) should have a threshold of between 0 and 1 to suggest an adequate model fit. The closer they are to 1, the better the model fit. From Table 18 below, the SRMR and the NFI results show that the model is fit.

4.12. Common Method Bias

According to Hair Jr. et al. (2021), this is the variance that can be attributed more to the measurement technique than to the concept that the measures are intended to reflect. Kock (2020) wants scholars to rely on Harman's 1976 single factor score when doing CMB assessment. When this score is below 50%, it is an indication that CMB has not adversely affected the findings. This study used Statistical Package for the Social Sciences (SPSS) version 24 to assess possible CMB in the research instrument and this produced Herman's single factor score of 39.656%. Since this is below 50%, there is a very low probability that CMB will affect the results of the study (Tehseen et al., 2017).

Table 16. Effect size.

	EP	FP	SP
BS	0.000	0.011	0.001
CS	0.006	0.124	0.008
DSS	0.032	0.015	0.063
PMS	0.055	0.000	0.038
SMAP	0.027	0.000	0.012

Source: Field Survey (2023).

Table 17. Predictive relevance.

	Q^2 Predict
EP	0.401
FP	0.402
SP	0.433

Source: Field Survey (2023).

Table 18. Goodness-of-fit.

	SATURATED MODEL	ESTIMATED MODEL
SRMR	0.063	0.096
d ULS	3.252	7.571
d G	1.757	1.963
Chi-Square	2402.671	2578.614
NFI	0.735	0.715

Source: Field Survey (2023).

5. Discussion of Findings

From Table 14, the path coefficients between CS and FP, DSS and EP, DSS and SP, PMS and EP, PMS and SP as well as SMAP and EP were found to be positive, consistent with expectation and the *p*-values of these relationships were found to be positively significant, supporting the institutional theory, which argues that MAPs of firms have impact on their performance.

Firstly, the costing systems (CS) in place at the manufacturing firms caused their financial performance (FP) to improve. This means the firms continuously engage in job costing, process costing and variable costing which help them to minimise their operating costs, hence improve upon their sales, profits and cash flows. This result is consistent with Adu-Gyamfi and Chipwere (2020), where costing systems of firms had significant positive relationship with financial performance. Similarly, this finding agreed with Maiga et al. (2014), where the costing systems of manufacturing firms interact with information technology to boost financial performance. The finding also supports Hardan and Shatnawi

(2013) which found positive relationship between costing system and financial performance of telecom companies in Jordan. However, Pokorná (2016) found that improved financial performance of firms does not depend on costing systems (CS) alone. This implies that other factors contribute to performance apart from CS (Diavastis et al., 2016).

Secondly, the decision support systems (DSS) in place at the manufacturing firms caused their environmental performance (EP) to improve. The intuition here is that Ghanaian manufacturing firms regularly engage in customer profitability and net present value (NPV) analysis. For instance, they classify their customers according to the profit each brings to the firm. These firms also use NPV as a capital budgeting tool to decide on the most profitable projects to invest in. These measures help them to make more profit. Some of this profit is used to keep the environment neat and safe for residents. For instance, some of the profit they make is used to implement policies that help to minimise the waste they generate that pollute the environment. Though this study is partially in line with literature, most scholars use financial performance as a measure of performance. This finding supports the call by Nartey and van der Poll (2021) for more studies to be done on MAPs and EP of firms. The novel finding from this study is that, DSS can also help to improve EP, not only FP. Thus, this study on the positive link between DSS and EP should guide manufacturing firms to know more about their customers as well as use NPV analysis in investment decision making to boost their EP.

Thirdly, the decision support systems (DSS) in place at the manufacturing firms caused their social performance (SP) to improve. This implies that Ghanaian manufacturing firms regularly engage in DSS like net present value analysis and customer profitability analysis. These measures help to improve their social performance. For instance, by engaging in customer profitability analysis, these firms were able produce quality goods to attract more customers and this helped them to employ more school leavers, retain their experienced staff as well as provide free social amenities for the communities in which they are located. Again, by engaging NPV analysis to invest in profitable projects, these manufacturing firms are able to record bigger profits that help them to expand their operations to employ more people from the localities in which they operate. Though this study is partially in line with literature, most scholars use financial performance as a measure of performance. Though Nartey and van der Poll (2021) advised scholars to research on the impact of Innovative Management Accounting Practices (IMAP) like DSS on SP of firms, much has not yet been done to look at the impact of DSS on SP of firms. For instance, Adu-Gyamfi and Chipwere (2020) and Maziriri (2017), found a significant connection between DSS and FP of listed firms in Ghana and South Africa respectively. The novel finding from this study is that, DSS can also help to improve SP, not only FP. Thus, this study on the positive link between DSS and SP should guide manufacturing firms to know their customers more as well as use NPV analysis in in-

vestment decision making to boost their SP.

Fourthly, the performance management systems (PMS) in place at the manufacturing firms caused their environmental performance (EP) to improve. The performance management measures include engaging in ratio analysis and keeping records of reasons why employees leave the firm or absent themselves from work. For instance, it is possible that these firms keep records of the proportion of their yearly profits that is spent on keeping the environment safe. These records can serve as a guide to continuously encourage management of the firms to allocate higher budgets for tree planting and other environmental safety measures. Again, knowing the reasons why employees leave the firms or absent themselves from work, help management of these manufacturing firms to implement motivational packages to retain their experienced employees, who stay and work hard to improve the profit levels of the firms. Again, portions of this profit can be used to keep the environment safe.

Though this finding is partially in support of many scholarly studies that established significant connection between Environmental Management Accounting Practices and EP (Gunarathne & Lee, 2015; Solovida & Latan, 2017; Fuzi et al., 2019; Susanto, 2019; Sari et al., 2021; Christine et al., 2019; Zandi & Lee, 2019), studies on direct relationship between PMS and EP have not been sighted. Though, Adu-Gyamfi and Chipwere (2020) and Maziriri (2017), established a connection between PMS and FP, their study did not cover EP. This finding, which is in response to the advice given by Nartey and van der Poll (2021) that scholars should conduct more studies on the impact of PMS on EP of firms, should guide leadership of firms to use ratio analysis and motivation of employees to boost their EP.

Furthermore, the performance management systems (PMS) in place at the manufacturing firms caused their social performance (SP) to improve. This implies that, as these manufacturing firms use ratio analysis and record of why their employees leave their firms or absent themselves from work, their social performance (SP) improves. The performance management measures include engaging in ratio analysis and keeping records of reasons why employees leave the firm or absent themselves from work. For instance, it is possible that these firms keep records of the proportion of their yearly profits that is spent on improving the lives of people living in the communities in which they operate, in terms of production of quality products and job creation for the locals.

These records can serve as guide to continuously encourage management of the firms to allocate higher budgets to improve quality of products, expand operations as well as do more clean-up campaigns. Again, knowing the reasons why employees leave the firms or absent themselves from work, help management of these manufacturing firms to implement motivational packages to retain their experienced employees, who stay and work hard to improve the profit levels of the firms. Again, portions of this profit can be used to expand operations in order to create more jobs for the local people.

Though this finding is partially in support of many scholarly studies that established significant positive connection between Management Accounting Practices and EP (Gunarathne & Lee, 2015; Solovida & Latan, 2017; Fuzi et al., 2019; Susanto, 2019; Sari et al., 2021; Christine et al., 2019; Zandi & Lee, 2019), studies on direct relationship between PMS and SP have not been sighted. Though, Adu-Gyamfi and Chipwere (2020) and Maziriri (2017), established a significant positive connection between PMS and FP, their study did not cover SP. This finding, which is in response to the advice given by Nartey and van der Poll (2021) that scholars should conduct more studies on the impact of PMS on SP of firms, should guide leadership of firms to use ratio analysis and motivation of employees to boost their SP. This finding is also slightly at variance with that of Adu-Gyamfi and Chipwere (2020) and Maziriri (2017) who established a significant connection between PMS and FP. These studies, however, did not use SP as their performance indicator.

Finally, the strategic management accounting practices (SMAP) of the manufacturing firms helped to enhance their environmental performance (EP). SMAP has to do with consistent gathering and analysing of data on business competitors and using these as guidelines for informed decision making. The intuition here is that, as the Ghanaian manufacturing firms constantly collect and analyse data on the activities of their competitors and using same to guide their decisions, they are able to improve on their environmental performance indicators. For example, as a manufacturing firm considers the price its competitors are charging for their products, it is able to fix its price at a level that helps to boost its profits, some of which is used to protect the environment.

This result partially supports Maziriri (2017) and Vărzaru et al. (2022) who established significant connection between Strategic Management Accounting Practices (SMAP) and FP of firms in South Africa and Romania respectively. These studies however, focused on FP as a measure of performance. This study also operationalised SMAP as the long term plans of firms instead of the activities of competitors as suggested by Ma et al. (2022). The finding of positive relationship between SMAP and EP in this study, is a timely response to the need to conduct a study on the impact of SMAP on EP (Nartey & van der Poll, 2021).

6. Conclusion

6.1. Implications for Research

The findings of the study have a lot of methodological and theoretical contributions to offer. In terms of theory or knowledge, the findings have extended the literature of institutional theory. For instance, the institutional theory made it possible to establish the fact that Strategic Management Accounting Practices (SMAP) of manufacturing firms in Ghana will help to enhance the Sustainability Performance (SsP) of these firms. This has been verified into a conceptual framework. This implies that future researchers on management accounting should read and find different dimensions of SMAP and how these can impact sustain-

ability performance of organisations.

In terms of methodological contribution, the study has a lot to offer. In the first place, Association of Ghana Industries (AGI) offers ideal and well represented population of manufacturing firms in Ghana. This is because, AGI has a pool of manufacturing firms that spread across all the regions of Ghana. Some of the manufacturing firms are small, medium and large. AGI also has a representative on the board of the Public Utilities and Regulatory Commission (PURC) and the government of Ghana always consults them before taking any decision that affects their members. This ensures that findings can be generalised to all manufacturing firms in Ghana. Thus researchers who want to conduct a study on manufacturing firms in Ghana should focus on those that are registered with AGI as the target population. The findings of this study should also encourage academic scholars to use Smart PLS-SEM to analyse studies on manufacturing firms since it can be used to analyse both normal and non-normal data. It is also very easy to use.

6.2. Implications for Management

The findings of the study also have some managerial contributions to top level management as well as the board of manufacturing firms. In order to boost their SsP, they must implement CS (like variable costing), DSS (like customer profitability analysis), PMS (like variance analysis and ratio analyses) and SMAP. For instance, a manufacturing firm must constantly gather information on what its competitors are doing and use it as a guide in taking informed decisions. They must also come out with a policy to regularly train their staff on these MAPs in order to enhance their EP. The key take away here is that, leadership of all manufacturing firms in Ghana should prioritise Strategic Management Accounting Practices (SMAP) where actions of competitors are constantly monitored to serve as important guide in decision making. This will ensure that SsP of firms is boosted. This will be in the interest of existing and future generations.

6.3. Implications for Practice

The findings also have some practical contributions to offer. The Institute of Chartered Accountants-Ghana, which is the body that is responsible for training professional accountants in Ghana as well as issuing auditing firms in Ghana with practising licence should put SMAP in their syllabus and set examination questions on it. This will help auditors to advise their clients to implement SMAP to boost their SsP. This will ensure that manufacturing firms in Ghana survive as going concerns.

7. Limitations of the Study

This research used quantitative techniques, but qualitative approach may present a different picture. Another drawback is that the study adopted the cross-sectional survey to collect data at one point in time so the conclusions might not reflect

the firms' future conditions. However, the relevance of studying the relationship between MAPs and SsP has been stressed in this study. The findings with the limitations should pave way for further research in this area.

8. Suggestions for Future Research

This study gathered data from respondents at one point in time. Future research should therefore, collect data at more than one point in time to capture changes that may occur over time. This will help the researcher to compare findings from different time periods.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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