MODERN MANAGEMENT ACCOUNTING PRACTICES: EFFECT ON MANAGEMENT ACCOUNTING SYSTEM PERFORMANCE OF LISTED MANUFACTURING SECTOR ORGANISATIONS IN SRI LANKA

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Abstract

Sri Lanka is facing challengers in achieving economic growth in the resent years. Contribution from the manufacturing sector is significant in this regard. This study was undertaken to answer the management problem of whether the addition of Modern Management Accounting practices improves the performance of existing Management Accounting Systems in manufacturing sector organizations. Adoption level of ten most prominent Modern Management Accounting practices were tested using a performance measurement construct to understand the level of Management Accounting System performance. Quantitative method of study supported by in-depth interviews and a further explanatory study was undertaken to explain the relationships observed. It was revealed that the adoption levels of all ten practices were below the previously known findings and the average level of adoption was at 54%. Analysis of the quantitative data showed that Management Accounting System performance level average of 74% for all the variables. Simple correlation analysis revealed that there was a fair positive association between the use of Modern Management Accounting practices and Management Accounting System performance in the sample studied. The explanatory study was undertaken using the contingency theory framework. And in conclusion it can be stated that the mix of contingency factors affect the level of adoption of Modern Management Accounting Practices and Management Accounting System performance can be enhanced by the adoption of Modern Management Accounting Practices in manufacturing organizations.

1. Introduction

The Finance function of an organisation is one of the core areas in supporting the managerial decision making processes, organisational growth and performance. Thus, the need for continuous performance improvement has increased the importance of analytical financial information to support decision making (Johnson and Kaplan, 1987). This in turn has increased the use of Management Accounting (MA) practices across the world. Use of MA techniques are not new for Sri Lankan entities while traditional MA techniques are popular in most companies (Fonseka, & Subasinghe, 2009). However, the development of Modern Management Accounting Practices (MMAP) that provide more accurate and important information for management decision making is expected to contribute to better organisational performance. A study done by Fonseka, Manawaduge, & Senaratne (2005) has identified that there is a clear gap between the

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theory and practice of management accounting in public quoted companies in Sri Lanka. Fonseka, & Subasinghe (2009) has elucidated that while there is a clear gap in the level of adoption of MA practices across different industries, the importance of MA has not being adequately identified in Sri Lankan organisations. Fonseka (2000) describes the level of decision making of Sri Lankan managers involved in more of 'daily firefighting' than challenging the status quo in problem solving. Study done by Ameer, & Ismail (2003) in the Hotel Sector states that they are evasive of adopting MMAP's due to complexity in application. The findings of Karunarathne (2007) indicates that usage of management accounting practices leads to increase in asset turnover, sales growth, and gross profit in the Small and Medium Enterprise (SME) sector. It further illustrates that a negative relationship exists between the usage of management accounting practices and the stock residence period and the debtors' collection period. Therefore, Modern MA techniques are an important contributor to organisational performance, and the managerial question is, '*Whether the performance of MA Systems (MAS) would improve with the implementation of more sophisticated Modern MA techniques and practices?*' This study will attempt to understand the same. As per Fonseka, & Subasinghe (2009), MA practices are more prominently adopted by the manufacturing sector rather than the trading and service sectors. The nature of the manufacturing sector is such that its significant cost factors and high usage of process oriented systems require the implementation of MA practices. However, according to the findings of this research, even in the manufacturing sector, the implementation

of activity based management, value chain analysis, total quality management, just-in-time systems, balance scorecard, kaizen costing, business process re-engineering and benchmarking ranges between 40% and 80%. The Central Bank annual report (2019), states that the manufacturing sector contributed 15.6% to the GDP in 2019. Due to this significant contribution this study was focused on the manufacturing sector of Sri Lanka. Therefore, the primary goal of this study is to fill this knowledge gap and introduce practical solutions to business managers. It will reveal the possible relationships between adoption of MMAP and current level of MAS performance. This will ultimately be useful in identifying and implementing Modern MA practices that can improve MAS performance of the manufacturing sector in Sri Lanka.

This paper will include a background introduction to the study and the management problem. Secondly a literature review on relevant literature published in the international and local arena. Thirdly conceptualization of the problem and conceptual framework. Fourth section will present Survey data including statistical analysis. Fifth section presents a detailed discussion on the revelations of the research while quantitative data will be triangulated with qualitative findings. Further analysis of contingency-based study will also be discussed in this section of the paper. The last section will discuss the conclusions and recommendations of the study and areas for future research.

1.1 Research Problem

The management problem statement can be formulated as follows;

"The adoption of MMAP and its effect on MAS[1] performance of public quoted manufacturing organizations in Sri Lanka"

MAS[1] means' the systematic use of MA practices in organizations to support managerial decision making. Researcher is expected investigate whether the performance of MAS is affected by the adoption level of Modern MA practices in manufacturing sector organizations. Since, it is important to understand whether MMAP enhance the performance of MA information systems in manufacturing sector organizations.

2. Development of MMAPs, Contingency based approach and MAS development, A Review of International and Local Literature

2.1 Development of Management Accounting

Cost accounting was seen as important in the 1880-1910 period. As firms grew and the manufacturing techniques and information needs of managers became more sophisticated, An increasing concern to control workers' efficiency, and thus productivity, created additional demand for new management accounting techniques (MAT's) (Johnson & Kaplan, 1987). It is also observed that MA techniques were at its peak by 1920's and innovation of modern MA techniques were not accurately included in the body of knowledge until the 1980s. According to Johnson and Kaplan (1987), modern day MA is believed to have been developed during the industrial revolution. Thus, the emerging needs of the dynamic business world forced MA to develop.

In the early stages, the main area that was developed was the costing of products and services in order to identify profitable products and unprofitable products. Kaplan (1994) stated that "We have seen remarkable innovations in Management Accounting; even more remarkable has been the speed with which the new concepts have become widely known, accepted and implemented in practice and integrated in to a large number of educational programs" (p. 247).

2.2 Development of Modern Management Accounting

Organisations and their management accountants were continually pushed to provide more timely and relevant information to support the management (Cooper, 1988; Drucker, 1990; Bromwich and Bhimani, 1994; Drury and Tayles, 1998) and modern MA techniques emerged due to this organisational information need. Modern MA techniques include activity-based costing (ABC), Cost modeling, cost of quality reporting, target costing, strategic management accounting (SMA), throughput accounting, backflush costing, and lifecycle costing. The techniques were developed and promoted individually and organisations may benefit from the potential synergies of the combined use of these techniques (Adler, 1999). Adler, Andre and Waldron, (2000) outlined traditional accounting techniques, that are full costing, direct costing, standard costing using prior period results, and standard costing using an engineering approach, are more popular than any of the advance management accounting techniques.

Kader and Luther (2008) study on UK food industry found that MMAPs indicating relatively low adoption when compared to more

traditional budgeting and control techniques (McLellan. & Moustafa. 2011). Smith (2007) reveals that Strategic Management Accounting (SMA) practices are not widely adopted in Australian context. Abdel-Kader and Luther (2008) states that organisations that follow product differentiation strategy tend to use advance MAPs than the organisations with cost leadership strategies. The size of the organisation is also another factor that may result in the implementation of MAPs (Yi Ma & Mike Tayles, 2009). Influence of external environment and completive pressure demanding innovative SMA practices within the organisation. Wachira and Wang'ombe (2019) states that there is positive relationship between environmental regulation and financial performance with the level of adoption in Environmental Management Accounting practices by manufacturing firms. Oyewo, Vinh Vo & Akinsanmi (2020) identified that Business Strategy strongly moderates MAP sophistication while Information technology also significantly moderates same and Organizational effectiveness. The influence of stakeholder groups on MAP was studied by Oyewo, Ajibolade & Obazee (2019) and the study shows that Institutional investors, Government and Financiers are the most prominent groups that influence on MAP sophistication while Customers and competitors as important stakeholders in utilizing customer based MAPs in the organization.

In the Sri Lankan context, limited published research available on the adoption of management accounting practices. Fonseka (2001) executed a study to examine the uncompetitive trends in the four industries, Tea, Garments, Gems, and Tourism. Findings reflect

very low usage of information for decision making. A Study on MA practices in the hospitality and tourism (hotel) sector by Ameer, & Ismail (2003) elucidates that there is a tendency to avoid usage of advance tools such as activity based costing, Benchmarking and balanced scorecard mainly due to complexity issues which arise during implementation. Goonesekera (2004) disclosed that the usage of modern MA tools such as balance score card and activity based costing are at a low level. It explains that the sector uses a set of "Uniform Accounting Practices for Hotels" in a non-structured manner. In the study by Fonseka, at al (2005) has revealed that the use of MA practices significantly varies within individual industry sectors. Study of Karunaratne (2007) identified that the level of usage of inventory control practices and product costing practices in SME's was relatively high. However, budgetary control, Ratio analysis, and Variance analysis indicated a relatively low usage. The study by Fonseka, & Subasinghe (2009) revealed the manufacturing sector is prominent in adopting MA practices in comparison with the trading and service sectors.

Further unpublished research by Fonseka (2012) has found that most of the Sri Lankan manufacturing companies did not adopt sophisticated management accounting practices. De Zoysa, Bhati, and Zoysa (2014) states the emphasis were given to use of financial accounting-based reports for decision making than the use of Modern Management accounting practices such as Activity based Costing, balance score card and lifecycle costing. Kariyawasam (2018) states that use of Activity Based Costing as the main costing method and the reason for increased use of cost accounting is due to the decline in firm

profitability, increasing cost, intense competition, and high customer and supplier bargaining power within the public quoted manufacturing companies in Sri Lanka.

2.3 Contingency-based research to Management Accounting Systems (MAS)

Much research has been conducted world over on the contingency-based approach to understand the design of Management Accounting Systems (MAS) and Management Control Systems (MCS) in organisations. The contingency theory research on MAS and MCS are rooted in line with the simple but appealing idea that there is no single, universal MCS that serves all organisations in all circumstances and the effectiveness of MCS are reliant on the particular circumstances faced by the organisations which are important for MCS design. (Otley 1980; Fisher 1995). Chenhall (2003, p.129) states that "MA refers to a collection of practices such as budgeting or product costing, while MAS refers to the systematic use of MA to achieve some goal. MCS is a broader term that encompasses MAS and also includes other controls such as personal controls or clan controls". Furthermore, many studies have been conducted on contingency factors such as external environment, organisational structure, size, technology and the impact of strategy upon the design of MCS and subsequently MAS. (Khandwalla 1972; Chenhall and Morris 1986; Kaplan and Mackey 1992; Abdel-Kader and Luther 2008; Ferreira and Otley 2009). Chenhall (2003) states that: i) Organisations with high environmental uncertainty will have non-accounting style of performance evaluation rather than a budget constrained or profit

oriented style participative budgeting. ii) Technology refers to how an organization's work processes operate and includes hardware, materials, people, software and knowledge, iii) Organizational structures that are large and decentralized have usually placed strong emphasis on formal MAS with formality in budgetary processes, iv) When an organisation grows larger in size the need for managers to handle greater quantities of information increases to a point where they have to institute controls such as rules, documentation, specialization of roles and functions, extended hierarchical structures, v) Strategies characterized by a conservative orientation, defenders, harvest and cost leadership are best served by centralized control systems, specialized and formalized work and simple co-ordination mechanisms with more attention focused on problems. vi) Different countries possess particular cultural characteristics and this predisposes individuals from within these cultures to respond in distinctive ways. Certain researchers have suggested that reliance on traditional MAS may result in poor performance and hence they argued that if the MAS fail to provide appropriate goals, performance measures, or reward systems, it could result in poor performance (Kaplan, 1983; Johnson & Kaplan, 1987). Therefore, factors such as external environment, technology, organisational structure, size, strategy, and culture act as the main contingency variables in the MAS design (Ajibolade, Arowomole & Ojikutu, 2010). The contingency theory looks at certain influential factors that will assist the management to decide on appropriate management accounting practices. These factors can be either technological changes or changes on the

infrastructure of an organisation (Alleyne & Marshall. 2011).

2.4 Management Accounting Systems (MAS) performance

Bromwich, & Bhimani (1989) suggests that entities should be cautious when embracing the more sophisticated systems as it is yet to be proven if the system has a direct relationship to MAS performance. The systematic use of management accounting practices such as budgeting, costing, performance measurement…etc with other forms of controls such as personal controls, clan controls and informal controls is defined as a Management Control System (MCS) by Chenhall (2003). Ferreira and Otley (2009) identified that design misfit has a negative effect on MCS performance while intensity of use has a strong positive effect on MCS performance and intensity of MCS use interacts with MCS design misfit in ways that enhance MCS performance. They further explained that poorly designed MCS with high intensity of use out performs a well-designed MCS with low intensity of use. Moreover, Ferreira and Otley (2009) have used seven MCS performance measures as a construct in their study and they are:

I. Comprehensiveness of information
II. Details of information
III. Accuracy of information
IV. Cost-effectiveness of the system
V. Overall performance of the system
VI. MCS contribution to firm performance
VII. Satisfaction with MCS

The author intends to use the same set of performance measures when investigating into

the manufacturing organisations in Sri Lanka. No significant study has identified the relationship between the use of modern management accounting techniques and management accounting system performance in Sri Lankan companies. The researcher is expected to fill the knowledge gap that exists in the Sri Lankan business arena and understand the identified variables through studying an in-depth manner.

3. Conceptual framework and Methodology

The researcher intends to find out the effects of Modern MA practices and its effect on the Management Accounting System performance. Hence, the research questions can be set as;

"To what extent do public quoted manufacturing companies adopt Modern Management Accounting Practices in Sri Lanka?"

"Is Modern MA Practices necessarily associated with High MA System Performance?", If not why?

The researcher has developed the below conceptual model considering adoption level of Modern MA practices as an independent variable and the MA System performance as the dependent variable.
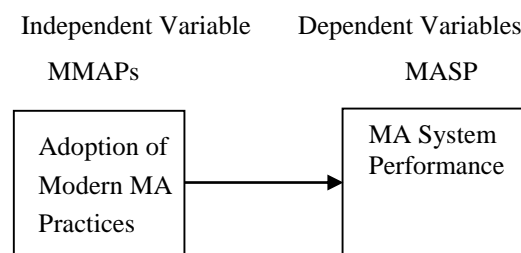
Independent Variable   Dependent Variables
MMAPs   MASP

Figure 1: Conceptual Framework

Hypotheses of the study are as follows,

H1. There is high level (Higher than 3 on a Likert scale of 1-5) adoption of Modern Management Accounting practices in quoted public manufacturing companies in Sri Lanka.

H2. There is a positive association between the adoption of Modern Management Accounting techniques and Management Accounting System performance.

3.1 Proposition

A high level of the adoption of Modern Management Accounting Practices is dependent on the mix of contingent factors affecting the company.

3.2 Operationalization

The hypotheses stated above will be broken down in to variables, indicators and measures in the study. The level of adoption of Modern MA practices will be tested using ten selected Modern MA practices which span over four categories as listed in Table 1 below,

Table 1. Adoption level of Modern MA Practices

Concept	Variable	Indicator	Measure
Strategic planning and controlling	I.Balanced scorecard		
	II.Strategic MA		
Decision making	III.Activity Based Costing		In full use
Resource management	IV.Capital budgeting	Level of adoption	High Use
	V.Business Process Re-engineering		Moderate use
	VI.Total Quality Management		Low use
	VII.Life cycle costing		Not in use
Performance management	VIII.Kaizen costing		
	IX.Value chain analysis		
	X.Activity based management		

Source: Fonseka, at al (2005) and Author

3.3 Level of Management Accounting System performance

The relationship (if any) to MA System Performance is tested using the structure tested by Ferreira and Otley (2009) which includes seven performance indicators,

Table 2. Level of Management Accounting System Performance

Concept	Variable	Indicator	Measure
MA System	I.Comprehensiveness	Performance Level	Very High
	II.Detail		High
	III.Accuracy		Moderate
	IV.Cost-effectiveness		Low

V.Overall performance	Very Low
VI.MAS contribution to firm performance	
VII.Satisfaction with the MAS	

VI. The extent of MAS contribution to organizational performance

VII. Satisfaction or fulfillment of the exact requirements of the users by the existing Management Accounting System in the organisation

Quantification of the qualitative variables are as follows,

Source: Adapted from Ferreira, Otley (2009), Author

The seven variables in the above construct by Ferreira, Otley (2009) was further elaborated by the author for better understanding of the participants to the questionnaire survey as follows,

Table 3. Quantification of qualitative variables

Level of adoption	Quantification	Performance Level	Quantification
In full use	5	Very High	5
High use	4	High	4
Moderate use	3	Moderate	3
Low use	2	Low	2
Not in use	1	Very low	1

Source: Survey data

I. The extent of comprehensiveness is the scope of information provided for decision making by the existing MAS. *e.g.; Internal-External, Financial-Non financial, Historical-Futuristic*

II. The amount of detail is derived by whether the information given by the management accounting system consists of adequate amount of facts and depth

III. Accuracy is the closeness to the true value of information provided by the MAS for decision-making. *e.g.; minimum variation between Sales forecast vs. Actual sales,*

IV. Cost-effectiveness can be identified as the cost of MAS vs. benefits derived from implementation of such MA practices. *e.g.; cost of Activity Based Costing system vases benefits from better pricing decisions*

V. Overall performance of the MA System in the organisation

3.4 Sample selection and analysis

There are 50 public quoted companies identified in the manufacturing sector that are listed at the Colombo Stock Exchange. Judgment sampling is used in selecting participants who are placed most advantageously or those in the best position to provide the required information, Data were collected from 40 companies out of the sample space of 50, which indicates a response rate of 80% and margin of error ±5.6% at 95% confidence level. The companies were categorized based on the industry classification and eight sub sectors identified among the respective sample involved in manufacturing.

4. Survey Data Analysis

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4.1 Adoption level of Modern Management Accounting practices

Survey data shows that the usage level of eight MMAP are above 40% and capital budgeting techniques has the highest usage level of 78%. It also elucidates that seven MMAP out of 10 have a usage level of more than 50% and 6 indicate a 60% adaptation level. The usage level of all 10 MMAP range from 34% to 78% and Life cycle costing and Kizen costing recorded the lowest usage level. MMAP that indicate a rate above 60% are Total Quality Management, Business Process Re-engineering, Capital Budgeting Techniques, Activity Based Costing (ABC), Strategic Management Accounting and Activity Based Management (ABM).

A detailed analysis was conducted to understand the usage level based on the industry classifications of the sample. Therefor following were the eight industry classifications identified i) Construction material, ii) Electrical and electronics, iii) Food & Beverage, iv) Personal & Household Goods, v) Industrial Goods & Services, vi) Petrochemical and polymer, vii) Rubber products and viii) Textiles and apparel.

4.1.1 MMA practices in Strategic planning and controlling

It is evident, that the industrial goods & services sector has an 80% adaptation level for both, the highest-level in both strategic management accounting and balanced scorecard techniques. The usage level of strategic management accounting is notably higher than the use of balanced scorecard in all industry sectors. In manufacturing sector organisations, the overall usage of strategic management accounting is

68% while balanced scorecard is used by only 45%.

4.1.2 MMA practices in decision making

Capital budgeting techniques showed higher adoption level ranging between 67% lowest to 90% highest and an overall usage level of 78% when compared with activity based costing. The activity based costing technique which had more than 60% usage level across five industry sectors.

4.1.3 MMA practices in resource management

Three MMAP were tested under resource management category out of which Total Quality Management (TQM) was mostly adopted. Which ranged from 47% lowest to 90%. TQM is mostly applied by industrial goods and services at 90%; due to the demanding quality levels by their customers.

4.1.4 MMA practices in performance management

The performance management category was separated in to three MMAP; Activity Based Management, Value Chain Analysis, and Kizen Costing. It is evident that Kaizen costing had the lowest usage level ranging from 25% to 60%, while ABM was mostly adopted averaging over 70% across all industries.

4.2 Analysis of Management Accounting System Performance

MAS performance was tested using a construct researched by Ferreira and Otley (2009) in their study of "Design and use of management control systems" as identified in the literature review it consists of seven variables (Table. 2). Questionnaire 2 of the survey was used to

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collect data then converted to numerical figures by using an appropriate weighting.

It is evident that the perceived performance level of the existing MAS was ranging from 70% lowest to 77% highest. Data suggests that more than 70% of organizations in the sample are having MAS that performs more than moderate (50%) level and close to High (80%) satisfaction level. However it is important to identify the MAS performance level across different industry classifications for further analysis.

4.3 MASP in different industry classifications within the manufacturing sector

It can be seen that the MAS performance varies among different industry classifications, cost effectiveness criteria and Accuracy of MAS is another variable that shows variation among different industry classifications, Industrial Goods & Services and rubber products showing high level of accuracy in their existing MAS while Textile and apparel and Personal & Household goods showing lowest MAS performance levels of 67% and 65% respectively.

This is further analyzed by separating the performance construct variables in to two categories i) Detail, Accuracy, Comprehensiveness and Cost effectiveness, ii) Overall performance, Contribution to OP and Satisfaction with the existing MAS, and this classification was done considering the similarities between the variables.

Data showed higher level of accuracy for Industrial goods & services at 100% and Rubber products at 87%, however the amount of detail and comprehensiveness is at 70% for both industries, resulting a 70% satisfaction

about the existing MAS in Industrial goods & services industry and 73% satisfaction about the existing MAS in Rubber products industry.

Personal and household goods and Textile and apparel industries having below 70% performance level in accuracy, comprehensiveness and cost effectiveness and retrospectively showing below 70% in Overall performance, contribution to Organizational Performance and satisfaction in their management accounting systems.

4.4 Statistical Analysis of MMAP adoption Level

The total level of MMAP adoption was measured by obtaining the mean score for each of the 10 MMAP separately for all entities (N=40) and the descriptive statistics for the tested set of MMAP is as follows,

Table 4. Descriptive statistics for adoption level of MMA practices.

	N	Minimum	Maximum	Mean	Std. Deviation
Adoption level of MMAP's	40	1.2	4.0	2.8050	.66601
Valid N (list wise)	40				

Source: Survey data/SPSS 20.0

The minimum score was 1.2 and the maximum score was 4.0 (Table: 4), Minimum possible score indicates lower level adoption (Not in use=1) while maximum possible score indicates high level adoption (In full use=5) for considered MMAP. The scores are distributed with a mean of 2.805 and a standard deviation of 0.666, as per the statistics the mean score of 2.805 is about 70.13% of the maximum score

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recorded and that indicates the adoption level of MMAP in the sample was high.

As a measure of reliability Cronbach's alpha was calculated for the ten MMAP tested in the study and the result is listed in Table 5. Cronbach's alpha for the independent variable

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.834	.830	10

is 0.834 which indicates that there is high internal consistency and stability in the 10 MMAP used in the study.

Table 5. Reliability statistics for the 10 MMAP

Source: Survey Data/ SPSS 20.0

4.5 Statistical Analysis of MAS Performance of manufacturing sector PLC's

The descriptive statistics for MAS performance shows a maximum possible value of 5 (Table 6) and a minimum value of 2 as per the survey data. Mean of the sample 3.692 indicates that the average performance level of the sample is at 73.86% relative to the maximum possible value.

		Test Value = 3				
					95% Confidence Interval of the Difference	
	T	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Adoption Level of MMAP's	-1.852	39	.072	-.19500	-.4080	.0180

Table 6. Descriptive statistics for MAS Performance

	N	Minimum	Maximum	Mean	Std. Deviation
MAS Performance	40	2.0	5.0	3.6927	.82424
Valid N (list wise)	40				

Source: Survey data/SPSS16.0

The descriptive statistics for MAS performance shows a maximum possible value of 5 and a minimum value of 2 as per the survey data. Mean of the sample 3.692 indicates that the average performance level of the sample is at 73.86% relative to the maximum possible value.

Table 7. Reliability statistics for the seven MAS Performance measures

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.953	.952	7

Source: Survey data

Calculated Cronbach's alpha for the seven MAS performance variables shows a value of 0.952 which is higher than 0.8 suggesting that the internal consistency and reliability of the data is high for the tested construct.

4.6 Testing of Hypotheses

4.6.1 Hypotheses 1.

H1. There is high level (Higher than 3 on a Likert scale of 1-5) adoption of Modern Management Accounting practices in quoted public manufacturing companies in Sri Lanka.

Table 8. Results of the one sample t- test for adoption level of MMA practices

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Source: *Survey data/SPSS 20.0*

It was evident that the adoption level of selected modern management accounting practices had a mean of 2.807 and a standard deviation of 0.659 (Table 4). The one sample *t*-test was carried out for the adoption level of MMAP with a significance of 0.05. However the result was 0.072 for the sample. This is higher than the 5% significant level tested (α=0.05). The sample mean 2.805 is less than the assumed mean of 3. Therefore it can be stated that adoption level is equal or less than 3 (Moderate) for the sample tested. Hence the null hypothesis can be rejected. There isn't enough evidence to accept H1, further analysis was undertaken on the same.

4.6.2 Hypothesis 2

H2. There is a positive association between the adoption of Modern Management Accounting techniques and Management Accounting System performance. The testing of hypothesis will be done using Pearson Correlation analysis and 2-tailed test with a significant level of 1%. The correlation between adoption level of MMAP and MAS performance was calculated and presented as follows.

Table 9. Correlation for adoption of MMAP and MAS performance

Source: *Survey data/SPSS 20.0*

Correlation analysis has shown a value of 0.592 for the adoption level of MMAP (Independent variable) against MAS performance in manufacturing organizations (Dependent variable). This was tested with a significant level of 0.01 and the P (Sig.) value

of .000 indicating strong significance, hence H2 cannot be rejected. It is evident that positive association exists between the two variables with a 'Fair positive correlation' of 0.592 ($0.5 \leq \rho < 0.8$ = Fair positive). Although it is not a strong positive correlation, researcher further analyzed the correlation using a simple scatter diagram with a line of best fit generated using the SPSS 20.0 software. Further coefficient of determination (R Square = r^2) gives a value of 35.1%, which means that 31.6% variation in MAS performance can be explained by the adoption level of MMAP and the rest is determined by factors other than the adoption

		Adoption level of MMAP	MAS Performance
Adoption level of MMAP's	Pearson Correlation	1	.592**
	Sig. (2-tailed)		.000
	N	40	40
MAS Performance	Pearson Correlation	.592**	1
	Sig. (2-tailed)	.000	
	N	40	40

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

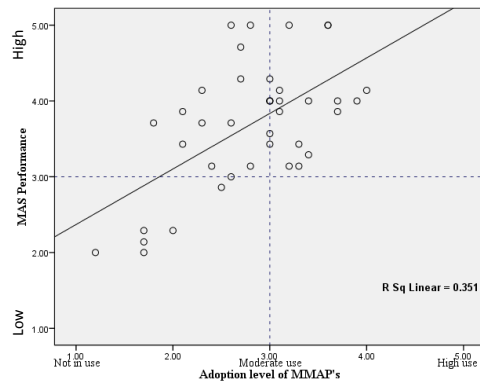level of MMAP in manufacturing sector organizations.

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Figure 2. Scatter diagram for adoption level of
MMAP and MAS performance

Source: Survey data

The scatter plot in Figure 2 clearly shows a spread in the adoption level of selected MMAP in manufacturing PLC's. Coefficient of determination recording a value of 35.1% shows that low adoption level of MMAP does not necessarily mean MAS performance is low in a particular organization. In a similar note, High adoption level of MMAP does not necessarily mean there is high MAS performance in that organization. In order to explain this relationship, researcher intends to use the contingency-based approach. And it is expected to understand the extent of MA sophistication required by the mix of contingency factors against the existing adoption level of the companies to explain the extent of MAS performance. Scatter plot generated for 40 companies in the sample shows a pattern with R Sq Linear =0.351 as identified before. Hence the hypothesis **H2** can be accepted

4.7 Proposition 1; Adoption of high level of Modern Management Accounting practices dependent on the mix of contingent factors affecting the company

Contingency framework identified form literature review was based in describing the patterns (if any) that can be identified among

organizations that fall under Low adoption-Low performance, Low adoption-High performance and High adoption-High performance, categories. Therefore researcher has selected 12 companies using the scatter plot (Figure 2) derived in H1 for the descriptive study. (Four companies were selected from each category)

An in-depth study of the selected companies (Figure 3) was done using secondary data and interviews. In collecting secondary data latest annual reports were used and the information was also gathered from their web sites. Revenue size, Operating profit, Total asset size, and number of employees were presented using meaningful thresholds by the researcher to identify and compare the relative size. Figure 3 shows a distinct pattern in contingency factors among the organizations that are within respective categories.

4.7.1 High adoption-High performance

It was evident that these companies are large in revenue size, operating profit, total assets and number of employees than other two categories. It is also evident form in-depth analysis of their annual reports and interviews that Perceived Environmental Uncertainty (PEU) is relatively higher than other two categories. Further they have formalized processes and de-centralized decision making structures that support their differentiation strategies. Therefore the mix of contingency factors 'call for' more sophisticated MA practices to cater the information needs. It was evident that these companies have taken the lead in adopting MMAP in their organizations to support the DM processes (Yi Ma & Tayles, 2009).

4.7.2 Low MAS performance in Low MMAP adopters

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It is evident from the critical evaluation in Table XII that, even though the large size, high PEU, high product diversity and differentiation strategies tend to suggest that these companies should have more sophisticated control systems, they only possess minimum amount of MA information for managerial decision making. This has resulted in having large operating losses, poor control on stocks, poor management of debtors, and organizational

Analysis of contingency factors indicates that these companies are relatively smaller in size, and having low PEU. Hence they are able to perform well even with less MMAP adoption. Further it was evident that traditional MA practices like standard costing, budgeting, variance analysis and ratio analysis were effectively used by them by introducing modern technologies, systems and processors in

| Company | Size | | | | | | | | | Business Env | | Technology | | | | | | Structure Decision making | | | Strategy | | Culture | |
| | Revenue | | P/(L) | | | Assets | | Employees | | | | Processors&Systems | | diversity | | R&D | | | | | | | | |
	Revenue < 2Billion	Revenue > 2Billion	Loss	Profit < 500 Million	Profit > 500 Million	Value < 2 Billion	Value > 2 Billion	# of Employees < 500	# of Employees > 500	Low PEU	High PEU	Conventional, traditional, less flexible systems and processors	Modern advance systems, processors and software that supports TQM ++	Low	High	Low	High	Centralized	De-centralized/ Departmentalized	Participative/Team based	Cost leadership	Differentiation	Supportive for MMAP's	Less supportive for MMAP's
Low adoption of MMAP's-Low performance of MAS																								
PLC23	√	√		√				√	√			√			√			√	√				√	√
PLC38		√	√		√			√		√		√			√	√		√	√				√	√
PLC20		√	√		√			√		√		√				√	√	√		√			√	√
PLC29	√		√		√			√		√		√				√	√	√					√	√
Low adoption of MMAP's-High performance of MAS																								
PLC36	√		√	√		√			√			√			√			√		√		√	√	
PLC32	√		√	√		√				√			√		√		√		√			√	√	
PLC17		√	√		√	√		√					√			√	√		√			√	√	
PLC39		√	√		√			√		√			√	√			√		√			√	√	
High adoption of MMAP's-High performance of MAS																								
PLC9		√		√	√		√		√				√		√		√		√			√	√	
PLC33		√		√	√		√		√				√		√		√		√			√	√	
PLC25	√		√			√		√		√			√		√		√			√		√	√	
PLC37	√		√		√		√		√				√		√		√		√			√	√	

inefficiencies. Hence the performance of those existing MA information systems (MAS) were low.

catering the information needs. Hence the satisfaction of the existing MAS was seems to be high.

4.7.3 High MAS performance in Low MMAP adopters

Figure 3. Contingency factors and findings form secondary and qualitative data

Source: Survey Data

5. Discussion of Findings

It is important to understand the spread in the use of MMAP in different industry classifications within the manufacturing sector in Sri Lanka. Companies in Industrial goods and services industry indicates adoption levels in strategic management accounting, balanced scorecard, capital budgeting and TQM at 80%, 80% and 90%. When compared with the lowest of 47%, 67% and 47% for the same in Textiles and apparel industry, It can be stated that there is still a gap between the adoption level of MMAP among manufacturing sector organizations. Notably Petro chemical and polymer industry recorded lowest level for Kizen costing of 25% together with Personal and Household goods industry which also recorded 25% for the same. And it is the lowest level recorded for the tested ten practices. It was identified that in the four categories of MMAP tested in the study, resource management (BPR, TQM) and decision making (capital budgeting, ABC) were having an overall adoption level of 60% to 80% across all industries.

MAS Performance studied using the Performance construct (Ferreira and Otley, 2009) and the analysis of the quantitative data shows that all the above variables have recorded a performance level of 70% to 80% in a one to five Likert scale varying form low to high, weighted appropriately. Indicating a higher overall performance of the sample studied. Industry classification wise analysis was then formed to understand the variations in the performance level of different industries. Figure: IX, X further indicated all industries except for Electrical and Electronic and Rubber products have shown higher contribution of MAP to organizational performance. And

satisfaction with the existing MAS has shown highest of 85% for Petro chemical and polymer and lowest of 60% for Personal and Household goods industries. Whereas cost effectiveness was varying from 55% lowest for Personal and Household goods, the same was high as 80% for Industrial goods and services, Petro chemical and polymer and Rubber products. There were no similar studies done to find the performance of MAS in the Sri Lankan context and therefore above findings were then carefully used to identify the relationship (if any) between adoption level of MMAP and MAS performance using statistical techniques.

The hypothesis one (**H1**) was tested in the analysis using Pearson's correlation and the findings suggested that there is a fair positive correlation of 0.592 exists between the two variables. R Sq Linear=0.351 suggesting that 35.1% of the variation in MAS performance can be explained by the independent variable of MMAP adoption level. Hence the hypothesis can be accepted. Further analysis using the scatter plot was showing that the 40 organizations are having a spread across three areas of the scatter plot. Namely: Low MMAP adoption-Low MAS performance, Low MMAP adoption-High MAS performance and High MMAP adoption-High MAS performance. A further in-depth study of the companies in those three areas was done by the researcher using the contingency based research framework.

	MMAP adoption level suggested by the Mix of contingency factors		Current adoption level of MMAP		Level of MAS Perfromance	
	Less	More	Low	High	Low	High
Low adoption of MMAP's-Low performance of MAS						
PLC20		√	√		√	
PLC23	√		√		√	
PLC29		√	√		√	
PLC38		√	√		√	
Low adoption of MMAP's-High performance of MAS						
PLC17	√		√			√
PLC32		√	√			√
PLC36	√		√			√
PLC39	√		√			√
High adoption of MMAP's-High performance of MAS						
PLC9		√		√		√
PLC25		√		√		√
PLC33		√		√		√
PLC37		√		√		√

Figure 4. Contingencies, MMAP adoption

level and MAS performance

Source: *Survey data*

Figure 4 shows that contingency factor analysis suggests PLC 20, 23, 29, & 38 to have a high adoption level of MMAP in their organizations. However their current level of adoption was low. Hence the data revealed that their MAS performance was also low. The context of PLC 17, 32, 36, & 39 suggests them to have low level complexity or low adoption level of MMAP in their organizations. Rightly so they have low level adoption. This means they are satisfied with the low level MMAP in their organizations, while they were using more traditional MA practices. Therefore it is seen that they have high level MAS performance. Further it was evident that contingency factors affecting PL C9, 25, 33, & 37 'call for' high level adoption of MMAP in their organizations. And it was evident that these companies are proactive in reacting to requirements indicates by the contingencies. Hence they have adopted high level MMAP in their organizations. This has enabled the management to have more comprehensive, detailed, accurate MA information, with cost-effectiveness. Therefore the overall performances, contribution to OP

and management satisfaction with the MA systems in those organizations were high.

6. Conclusions and Recommendations

Out of many MA practices, only Modern MA practices were selected for the study based on the available literature and relevant research studies. It was evident that the adoption levels of all ten practices were below the previously known findings (Average level of adoption at 54%). And also the level of adoption was varying among different industry classifications in the manufacturing sector. Reasons for different levels of adoption were explained using the contingency theory framework. The systematic use of MA practices was defined as a Management Accounting System (Chenhall 2003). The performance measurement construct of seven variables used by Ferreira and Otley (2009) was tested by the researcher in the Sri Lankan context. And the results concluded that; Overall performance level in the use of existing MA practices was about 74% among the manufacturing sector companies in Sri Lanka. There was a fair positive association (Pearson Correlation=0.562) between the use of MMAP and MAS performance in the sample studied. Therefore it can be stated that the introduction of MMAP will enhance the performance of existing MAS in terms of: i) Comprehensiveness of information, ii) Detail of information, iii) Accuracy of information, iv) Cost-effectiveness of the system, v) Overall performance of the system, vi) MAS contribution to organizational performance (OP) and vii) Satisfaction with MAS for management. Therefore introduction of appropriate MMAP's could enhance quality of Management Decision making.

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6.1 Directions for future researches

This research study was focused on manufacturing sector PLC's in Sri Lanka. This may not be applicable across all sectors. The study represents only 40 companies and hence it is important to be cautious in generalizing. It was noted that the level of satisfaction about the existing MAS were fairly high. Further research can be undertaken to find out the reasons for high satisfaction level with the existing MA practices presumably they may still be using traditional practices and satisfied with the same.

Acknowledgement

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