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Application of Management Accounting Techniques in Manufacturing Firms in Bangladesh

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ABSTRACT

Management accounting in recent years has changed significantly due to the change in production technology, bitter competition, involvement of consumers, and increased professionalism in managing business. Billions of dollars are now invested in manufacturing process whereas life cycle of modern technology becomes shorter. This dilemma exerts a big challenge on the scope of management accounting. In response, advanced techniques in the field of management accounting have been evolved in last couple of years. However, researchers in management accounting will give contradictory opinion regarding the application of advanced management accounting techniques (AMAT) in modern manufacturing environment (MME). Relevance Lost: The Rise and Fall of Management Accounting (Johnson and Kaplan, 1987) brings criticism on the relevance of management accounting information which is produced too late, too aggregated, and too distorted to be relevant for managers' planning and controlling decisions. Manufacturing process is refined regularly whereas management accounting lags behind in addressing the revised needs. However, it's very difficult to define AMAT and MME objectively as they depend on a lot of contextual variables. Again, establishing a crude relationship between AMAT and MME is not so easy. Amid such difficulty and differences in opinion, it is heartening for the management accounting researchers that a couple of techniques have already been developed and used in the field of management accounting giving sufficient support to MME. Exploring the relationship between AMAT and MME is an important area of study in Bangladesh as Bangladesh has become a destination of large industrial investments, even by international investors. Asian countries are lagging behind in terms of advanced manufacturing process as compared with advanced economy. Therefore, AMAT has already been developed strongly to cater to the specific need of management in these countries. This study basically intends to focus light on the management accounting techniques developed so far in response to modern production technology and their application from the perspective of Bangladesh. It also intends to highlight the specific benefits that management may capitalize from the use of such management accounting techniques. It will open up new avenues to carry out further researches in line with the specific objectives of different management accounting techniques. To fulfill the prime objective, a semi-structured questionnaire has been constructed and administered covering sampled manufacturing firms in Bangladesh to find out the possible bearing of management accounting techniques on productivity, competitive advantage and strategic positioning. The outcome of the study shows that the firms operating in Bangladesh still utilizes traditional techniques widely and the relationship among the chosen variables are not strong. It develops a weak profile of management accounting tools applied in Bangladesh. However, the result should be interpreted keeping the time frame and profile of the responding companies into consideration.

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We are really sorry if we have unintentionally missed any name who has supported us in this research. We believe that this research will open up new avenues of further research in coming days.

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Abbreviations

ABC	Activity Based Costing
ABM	Activity-based Management
AMAT	Advanced Management Accounting Techniques
AMT	Advanced Manufacturing Technology
BSC	Balanced Scorecard
CA	Customer Accounting
CGMA	Chartered Global Management Accountant
CL	Cost Leadership
CVP	Cost Volume Profit
EVA	Economic Value Added
IC	Intellectual Capital
ICMAB	Institute of Cost and Management Accountants of Bangladesh
IMA	Institute of Management Accountants
JIT	Just in Time
LCC	Life Cycle Costing
MA	Management Accounting
MME	Modern Manufacturing Environment
MNC	Multinational Corporations
NOPAT	Net Operating Profit after Taxes
PD	Product Differentiation
QC	Quality Costing
RCA	Resource Consumption Accounting
SCM	Strategic Cost Management
TC	Target Costing
TOC	Theory of Constraints
TQM	Total Quality Management

1.0 Introduction

The development and use of management accounting techniques is related to the need of useful information to deal with uncertainties of business and to support the decision-making process in order to improve the profitability of products, reduce costs, provide more relevant and timely information, reduce stock levels, improve delivery performance and generally to reduce critical management accounting timing (Bright et al., 1992). Thus, management accounting techniques serve management from different perspectives.

However, most new cost management systems came about after the publication in 1987 of Johnson and Kaplan's book, Relevance Lost: The Rise and Fall of Management Accounting, which served as a wake-up call to management accountants. This book emphasized that virtually all management accounting practices had been developed by 1925, after which innovation stopped. A few years ago Kaplan (Dent, 2002) again referred to the inadequacy of existing management accounting systems in these times of technological change, global competition and knowledge management. Moreover, many of the management accounting systems that developed after 1987 emanated from practitioners, not from academics.

Management accounting fails to keep pace with the development of manufacturing system. As newer manufacturing technologies are coming regularly proving earlier best practices wrong, it becomes a big challenge for management accountants to address the revised need. Management accounting, as a separate branch of knowledge, has got its identity in supporting management with any sort of information to supplement their decision making process. Thus, there should be a close relationship between changes in business environment and nature of management accounting. Changes in business environment are caused by technological advances of doing business which should be addressed in management accounting through innovation of advanced techniques. Now the question is, whether such innovation results in management accounting?

Management accounting techniques developed so far give support to the manufacturing staff and management to take decision. However, there was a gap in management accounting research for a period of more than half a century (from 1925 to 1987) when the discipline has witnessed a big loss due to the stagnation. Later on, it has been recovered as management accounting literature has been enriched with some advanced techniques like ABC, TC, BSC, JIT and Lean Manufacturing Systems etc. Question is whether it is possible to absorb such management accounting techniques in a particular organizational set up.

Manufacturing adjustments in Asian countries, particularly in Bangladesh, is not so rapid as compared to West, which makes the management accounting techniques more powerful. In a simple manufacturing process, management accounting techniques can be applied avoiding complexities making such application cost effective. Current research targets to identify management accounting techniques with their specific role in decision making from different perspectives. Literature review will guide the process to delineate AMAT and their application status in different countries. The study has been taken up to find the contribution of management accounting techniques in explaining productivity, competitive advantage and strategic positioning of firms in Bangladesh. A semi-structured questionnaire is developed and used for the study. Different descriptive and inferential statistical tools are used to present the findings of the study. The research in this area is completely a newer one in Bangladesh which can be used to develop further research agenda for possible extension in coming days.

1.1 Research Rationale

Manufacturing environment in Bangladesh has been improving since privatization initiatives started in nineties. Foreign direct investment in economic zones is also increasing significantly. Global brands are also coming to take the productive advantages that Bangladesh offers. All together, the manufacturing sector in the country is observing tremendous growth. And when the foreign management enters into the affairs of local operation, they are not only bringing the funds, skilled staff members and advanced technologies but they also bring management philosophies and styles to run the business here. Bangladesh has already entered into the development highway. The base of the economy has already been shifted from agriculture to industry. Industrial products are getting exported and the country offers enough infrastructural facilities for smooth development of industrial sector. As the industrial sector grows and sustains, it requires the support from accounting systems for taking different tactical and strategic decisions. Traditional financial accounting system is not enough to provide required data to take decisions. Thus management accounting system enters into the realm of provision of unstructured decision making process. Against this backdrop, a research on the state of application of management accounting techniques and their implication on the outcome becomes an important research agenda. This research will be a pioneering one to guide future work in the area.

1.2 Problem Statement

The development of management accounting as a separate branch of accounting lies on great industrial revolution when the industrial process changed dramatically and financial accounting failed to provide relevant information to supplement the decision making process of management. Due to the changing profile of corporate sector in Bangladesh, it becomes important to know the level of application of different management accounting techniques and the inherent reasons of their choices in the form of any pertinent relationship between management accounting practices and productivity, competitive advantage, and strategic positioning.

1.3 Research Objectives

The objectives of the study are –

a. to develop a profile of management accounting techniques as used by sampled Bangladeshi firms.
b. to explore the relationship between management accounting techniques and productivity.
c. to explore the relationship between management accounting techniques and competitive advantage.
d. to explore the relationship between management accounting techniques and strategic positioning.

1.4 Theoretical Framework

Choice of different management accounting techniques is driven by some contextual factors. This is the reason why contingency theory becomes operational in management accounting research. The contingency theory approach to the study of organizations developed at the beginning of 1950's as a response to prior theories of management that, despite their diversity, commonly emphasized "one best way" to organize. The contingency approach

to management accounting is based on the premise that there is no universally appropriate accounting system that applies equally to all organizations in all circumstances (Otley, 1980). This approach is summarized by Szilagyi and Wallace (Szilagyi & Wallace, 80) from the original work (Kast & Rosenzweig, 73):

> "The contingency approach attempts to understand the interrelationships within and among organizational subsystems as well as between the organizational system as an entity and its environments. It emphasizes the multivariate nature of organizations and attempts to interpret and understand how they operate under varying conditions ..."

Contingency theories were developed from the sociological functionalist theories of organization structure such as the structural approaches to organizational studies by Reid and Smith (2000), Chenhall, (2003) and Woods (2009). These studies postulated that organizational structure was contingent on contextual factors such as technology, dimensions of task environment and organizational size. In some other literature, contingency theory was still regarded as a dominant paradigm in management accounting research (Fisher, 1995; Cadez and Guilding, 2008). This section presents a brief review of existing literature on the application of contingency theory in the field of management accounting research.

One of the earlier works in management accounting research adopting a contingency perspective was Hofstede's (1967) classic field work. Hofstede (1967) found that economic, technological, and sociological considerations had a significant impact on the functioning of budgeting systems. In addition, cultural effects on management control systems have been studied (Hofstede, 1983; Brownell, 1982; Brownell and Hirst, 1986). This has become an important area of research (Harrison, 1992, 1993; O'Connor, 1995; Taylor, 1996; Chenhall, 2006).

Contingency theory has also been applied to the subunit level of organizational behavior. Hayes (1977) examined the appropriateness of management accounting in order to measure the effectiveness of different departments in large organizations and found that contingency factors or contingencies were the major predictors of effectiveness for production departments. Hayes (1977) also advocated the use of contingency theory in studies of organizational assessment and subunit evaluation. Hayes' study hypothesized three major contingencies affecting sub-unit performance: internal factors, interdependency factors, and environmental factors. The results of the study suggest that the underlying causal variables should be studied rather than just narrowly examining surrogates. The results also implied that a contingency approach should be taken to managerial accounting and the relevant assessment methods should be determined by sub-unit type, sub-unit inter-relationships and the extent of environmental influence on the performance of sub-units.

Flamholtz et al. (1985) reviewed the contingency literature concerned with the issue of control. In this aspect of the contingency literature, the issue of control is studied along three main traditions: the sociological, the administrative and the psychological perspectives. The sociological perspective focuses on the entire organization and the larger groups within it. In this view, structural mechanisms of rules, policies, hierarchy of authority or coordinative units obtain control (Flamholtz et al., 1985). The administrative perspective focuses on the individuals or departments within an organization. The control mechanisms employed by the administrative theorists are plans, measurement, supervision, evaluation and feedback. The psychological perspective emphasizes goal and standard setting, extrinsic and intrinsic rewards, feedback or interpersonal influence (Flamholtz, 1979).

Shank (1989) applied contingency principles in investigating the use of managerial accounting systems and information in a strategic way. Banker et al. (1991) looked at the impact of structural factors and found that firms which implemented just-in-time (JIT) or other team-work programs were more likely to provide information regarding performance to shop-floor workers.

Research studies such as Govindarajan and Gupta (1985) have investigated the relationship between firms' strategies and the design of their control systems. Merchant (1985) uncovered contingent relationships between corporate contextual factors, such as the size of the firm, product diversity, extent of decentralization, and the use of budgetary information. Additionally, some studies have investigated the influence of external factors such as impact of environmental uncertainty. Environmental uncertainty was found to be a major explanatory variable as to whether accounting data was appropriate in evaluating the performance of business units (Fisher, 1995; Hartmann, 2000; Chenhall, 2003).

From review of management accounting research using contingency theory, the usage of contingency theory is summarized. Contingency theory has been applied in management accounting research in order to address three types of questions. These questions are about: first, the fit between organizational control and structure; second, the impact of such fits on performance; third, investigation of multiple contingencies and their impact on organizational design.

Contingency theorists attempted to identify the important variables assumed to influence organizational performance. They then attempted to operationalize and measure these variables and determine their effects on performance. Seminal studies were done by researchers such as Lawrence and Lorsch (Lawrence & Lorsch, 67) (influence of the environment on organizational integration and differentiation), Burns and Stalker (Burns & Stalker, 61) (influence of environment on organization structure), and Woodward (Woodward, 65) (influence of the technology on organizational structure).

Based on the above discussion, this research assumes that the selection of particular management accounting techniques by firms is driven by contingency approach. Thus the way management accounting techniques are classified in other countries may not resemble the classification that exists in Bangladesh. This study attempts to develop a profile of management accounting techniques used in Bangladesh and their possible relationship with some preset parameters. The theoretical framework of the research is presented in the figure below:

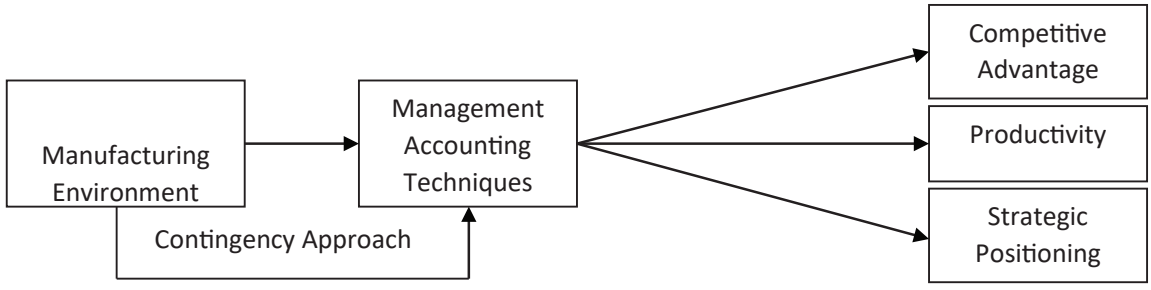

Figure 1: Theoretical framework of the study

1.5 Limitations of the Research

The research follows quantitative methodology which is based on survey data on sampled organizations. The findings should be read very carefully with reference to the organizations and years. Nature of management accounting depends on the organizational factors and decision making needs which change very rapidly. The current study simply addresses the state of management accounting practices in some organizations and tries to find out the causes. Thus, the findings should not be generalized. Few case studies and in-depth interview might have been done to bring triangulation to the outcome of the study. This gap of the study may be addressed by the researchers in the days ahead.

2.0 Literature Review

Organizations of different kinds: industrial, service, or commercial currently exercise their activities in an environment characterized by complexity and constant change, where these organizations face varied environmental conditions, which require from these organizations to use all their necessary means and tools to be able to survive and maintain their market share and achieve success. Management accounting practice helps an organization to survive in the competitive, ever-changing world, because it provides an important competitive advantage for an organization that guides managerial action, motivates behaviors, supports and creates the cultural values necessary to achieve an organization's strategic objectives.

Ittner & Larcker (2002) defined management accounting practices as a variety of methods specially considered for manufacturing businesses so as to support the organisation's infrastructure and management accounting processes. Management accounting practices can include among others budgeting, performance evaluation, information for decision-making, and strategic analyses. Ittner & Larcker (2001) have also argued that due to the development of these new methods, it has changed the basic principles of management accounting to a more superior one that adds value to various practices. The literature has also indicated that some practices such as absorption costing and marginal costing have not been highly favoured by most manufacturing businesses. For example, Dugdale and Jones (2002) stressed that there is a limitation within these costing systems, since they do not provide an accurate method of recording costs to be exact in order to make sound management decisions.

The reflections of strategic approach in management began in the emergence of many methods and techniques in cost accounting and management accounting which directed mainly to serve the goals of the contemporary strategic management of business organizations, where it developed many accounting methods and techniques in the field of strategic cost management and strategic management accounting, such as ABC costing, Value chain, Benchmarking, BSC, etc. which aim to assist modern strategic management in achieving its functions and objectives in the strategic-term. The use of these methods and techniques is no longer limited to industrial organizations but has been expanded to all organizations of all kinds and in different sectors, as became the adoption of strategic tools and ways is one of the main characteristics of modern management in the contemporary world of business.

2.1 Techniques of Management Accounting: Nature and Types

Several attempts have been made to identify a set of tools and techniques that can be classified under the banner of Management Accounting. However, there has not been little agreement within the academic and professional literature on the associated techniques, nor is the term widely used by practicing accountants (Nixon et al., 2011). In such a context, an attempt has been made to review selected literature for identifying the tools/techniques of management accounting in practice.

Management accounting, or managerial accounting, is the use of accounting techniques for business analysis to support strategy formation, business execution, decision making and risk management. It includes both analyses of financial and non-financial measures. A management accounting tool is a framework, approach, model, technique, or process that enables management accountants to: improve performance; facilitate decision-making; support strategic goals and objectives; and otherwise add value. There is a huge array of

practices and tools available, all promising to help define and manage the organization's strategy, resources, customers and costs, and improve overall performance. In this context, managers can often struggle to evaluate and identify the most suitable tools to support their organization and to implement and manage them effectively.

There are almost an infinite number of tools, methods, techniques, approaches, and other concepts floating around; and management accountants must first own up to their inability to canvas the MA landscape exhaustively. In such a context, Clinton and Merwe (2006) segment the Management Accounting (MA) landscape into three categories such as: (1) comprehensive MA approaches, (2) MA techniques, and (3) management processes.

2.1.1 Comprehensive MA approaches: Comprehensive MA approaches attempt to offer enterprise-wide capabilities in each of three areas:

- Providing a monetary reflection of enterprise operations;
- Accommodating the management processes of planning, control, and adaptive and corrective actions with the aim of overall enterprise optimization; and
- Contributing to key organizational processes such as performance measurement and the reward system.

Five entries make up this category. Traditional approaches include standard costing and normal costing. Reasonably new or advanced approaches include ABC/M, GPK, and Resource Consumption Accounting (RCA). Comprehensive MA approaches also serve as the foundation or the enabling platform for a number of MA techniques and management processes. Table 1 provides a comparison of the five approaches discussed here based on a set of criteria.

Criteria:	Traditional Standard Costing	Traditional Normal Costing	Activity Based Costing / Management	Resource Consumption Accounting (RCA)	Grenzplan-kosten -Rechnung (GPK)
Consistent treatment of consumption and cost behavior	Low	Low	Low	High	High
Integrations					
• Conceptual	Low	Low	Medium	High	High
• Value Chain	Low	Low	Low	High	Some
• Technology	Low	Low	Low	High	High
Self-updating/ maintaining	Low	Low	Low	High	High
Flexibility	Low	Low	Low	High	High
Capacity treatment	Low	Low	Medium	High	High
Ability to generate relevant decision support information	Low	Low	Medium	High	High
Easy to implement	High	High	Medium	Low	Low
Adaptable to existing organization	High	High	Medium	Low	Low
Exposure in the U.S.	High	High	Medium	Low	Low

Table 1: Comprehensive management accounting approaches comparison

2.1.2 Management Accounting Techniques: MA Technique addresses one, or at the most two, of the three areas of MA approaches explained above and not necessarily comprehensively. Techniques are predominantly MA-related but they do not offer the full spectrum of information of MA approaches. Examples include lean, theory of constraints (TOC), and just-in-time (JIT). MA techniques contribute to specific but limited purposes. Alternatively, they may address a weakness of a less than stellar MA approach such as a lack of integrated budgeting, which attempts to facilitate the management process of planning. However, techniques cannot provide the benefits of integration. Management and management accountants should therefore examine those specific company goals that they cannot achieve without additional MA techniques. Managers should be careful about being talked into adopting MA techniques.

2.1.3 Management Processes: The broad management processes category includes methods that are most confined to MA application. Examples of management processes include capital budgeting, CVP analysis, incentive compensation, transfer pricing, and benchmarking. Some MA approaches include beneficial tools that need not be replicated. The benefits of using tools that are not integrated into the MA approach must be weighed against the cost of bolting it on and compromising important features of integration.

It should be noted that this categorization ignores the term MA system which is viewed as the specific combination of an approach, relevant techniques, and management processes required to effectively manage a particular enterprise. Spacey (2015) considered the following as fundamental techniques of management accounting:

Activity Based Costing	Statistical Model	Theory Of Constraints
Cost Benefit Analysis	Statistical Population	Debottlenecking
Data Dredging	Probability Distribution	Bottleneck
Data Mining	Throughput Accounting	Total Cost Of Ownership
Demand Forecasting	Time Value Of Money	Cost To Company
Forecasting	Rate Of Return	Variance Analysis
Lifecycle Cost Analysis	Statistical Analysis	Regression Analysis
Net Present Value		

Table 2: Techniques of management accounting (Source: Spacey, 2015)

Money Matters (2017) classified the management accounting tools used into the following groups:

Groups	Management Accounting Tools
1. Based on Financial Accounting Information	• Analysis of Financial Statements through Ratio Analysis • Analysis of Financial Statements through comparative statements, trend, graph and diagram • Fund flow and cash flow analysis • Return on capital employed techniques

2. Based on Cost Accounting Information	• Marginal costing (including cost volume profit analysis) • Direct or incremental Costing and differential costing • Standard Costing • Analysis of Cost Variances
3. Based on Mathematics	• Operations Research • Linear Programming • Network analysis • Queuing theory and Games Theory • Simulation Theory
4. Based on Future Information	• Budget and Budgeting • Budgetary control: Analysis of Budget Variance / Revenue Variance • Business Forecasting • Project Appraisal or Evaluation
5. Miscellaneous Tools	• Managerial Reporting • Integrated Auditing • Financial Planning • Revaluation Accounting • Decision making Accounting • Management Information System

Table 3: Types of management accounting tools (Source: Money Matters, 2017)

Gichaaga (2014) studied the effects of Management Accounting Practices on Financial Performance of Manufacturing Companies in Kenya where the following management accounting tools have been used to examine the practice.

Category	Management Accounting Practices
1. Costing System	• Separation of variable cost, incremental costs & fixed costs
	• Use of plant- wide overhead rate
	• Department or multiple plant-wide overhead rates
	• Activity- based costing (ABC)
	• Target costs
	• The cost of quality
	• Regression and /or learning curve techniques

2. Budgeting	• Budgeting for planning
	• Budgeting for controlling costs
	• Activity- based budgeting
	• Budgeting with "what if analysis"
	• Flexible budgeting
	• Zero-based budgeting
	• Budgeting for long-term (strategic) plans
3. Performance evaluation	• Financial measures
	• Non-financial measure(s) related to customers
	• Non-financial measures(s) related to operation and innovation
	• Non- financial measure(s) related to employees
	• Economic value added or residual income
	• Benchmarks
4. Information for decision making	• Cost-volume-profit analysis (break-even analysis) for major products
	• Product profitability analysis
	• Customer profitability analysis
	• Stock control models
	• Evaluation of major capital investment based on discounted cash flow method(s)
	• Evaluation of major capital investments based on payback period and/ or accounting rate of return
	• For the evaluation of major capital investments, non-financial aspects are documented and reported
	• Evaluating the risk of major capital investment projects by using profitability analysis or computer simulation
	• Performing sensitivity "what if" analysis when evaluating major capital investments projects
	• Calculation and use of cost of capital in discounting cash flow for major capital investment evaluation
5. Strategic analysis	• Long-range forecasting
	• Shareholder value
	• Industry analysis
	• Analysis of competitive position
	• Value chain analysis
	• Product life cycle analysis
	• The possibilities of integration with suppliers' and/or customers' value chains
	• Analysis of competitors' strengths and weaknesses

Table 4: Use of management accounting practices (Source: Gichaaga, 2014)

It is evident from the study of Talha et al. (2010) that budgeting, variance analysis and return on investment techniques will continue to be adopted by organizations, but new techniques are likely to assume greater relevance. Management accounting should focus on performance management, asset management, business control management, environmental management, financial management, intellectual capital management, Information management, quality management and strategic management. Their study has mentioned the following strategic indicators and corresponding tools for analysis:

Strategic indicators	Relevant Tools for analyses
1. Performance Management	• Benchmarking • Key financial and non-financial performance indicators • Shareholder wealth maximization and customer value creation • Value chain analysis • Target costing
2. Corporate Finance	• Activity based management • Measuring and managing business and financial risk
3. Information Management	• Electronic commerce and electronic data interchange • Outsourcing information systems • Just-in-time production systems
4. Quality Management	• Costs of quality • Total quality management

Table 5: Strategic indicators and relevant tools for analyses (Source: Talha et al., 2010)

Ahmed (2010) conducted a desk study for the identification of management accounting tools randomly from different published literature and suggested the following fifty two tools of management accounting.

1. Balanced Scorecard	17. Human Resource Accounting	35. Flexible Budget
2. Cost Volume Profit Analysis	18. Grenzplankostenrechnung	36. Six Sigma
3. Lean Thinking Model or Just In Time	19. Value Based Management	37. Job Order Costing
4. Theory of Constraints	20. Economic Value Added	38. Process Costing
5. Total Quality Management	21. Output / Unit Costing	39. Absorption Costing
6. Enterprise Resource Planning	22. Full Cost Accounting	40. Variable Costing
7. Activity Based Costing	23. Service / Operating Costing	41. Standard Costing
8. Resource Consumption Accounting	24. Operation Costing	42. Value Engineering
9. Throughput Accounting	25. High Low Method	43. Target Costing
10. Transfer Pricing	26. Least Squares Regression Methods	44. Risk Modeling
11. Cost Benefit Analysis	27. Operating Leverage	45. Quality Costing
12. Flow Cost Accounting	28. Break Even Analysis	46. Contract Costing
13. Environmental Management Accounting	29. Tear Down Analysis	47. Uniform Costing
14. Capital Budgeting	30. Functional Analysis	48. Quality Function
15. Managerial Risk Accounting	31. Taguchi Cost Function	49. Reengineering
16. Process Management	32. Return On Investment	50. Kaizen Costing
	33. Economic Value Added	51. Variance Analysis
	34. Environmental, Salvage and Disposal Costing	52. Life Cycle Costing

Table 6: Tools of management accounting (Source: Ahmed, 2010)

Abdel-Kader and Luther (2006) have considered the management accounting practices in five dimensions in their studies. There are 38 management accounting practices present in these dimensions which are depicted in Table 7 below.

Budgeting	• Budgeting for planning • Budgeting for controlling costs • Activity-based budgeting • Budgeting with "what if analysis" • Flexible budgeting • Zero-based budgeting • Budgeting for long-term (strategic) plans
Costing System	• A separation is made between variable/incremental costs and fixed/non-incremental costs • Using a plant wide overhead rate • Departmental or multiple plant-wide overhead rates • Activity-based costing (ABC) • Target costs • The cost of quality • Regression and/or learning curve techniques
Strategic analysis	• Long-range forecasting • Shareholder value • Industry analysis • Analysis of competitive position • Value chain analysis • Product life cycle analysis • The possibilities of integration with suppliers' and/or customers' value chains • Analysis of competitors' strengths and weaknesses
Performance evaluation	• Financial measure(s) • Non-financial measure(s) related to customers • Non-financial measure(s) related to operations and innovation • Non-financial measure(s) related to employees • Economic value added or residual income • Benchmarks

Information for decision making	• Cost-volume-profit analysis (break-even analysis) for major products • Product profitability analysis • Customer profitability analysis • Stock control models • Evaluation of major capital investments based on discounted cash flow method(s) • Evaluation of major capital investments based on payback period and/or accounting rate of return • For the evaluation of major capital investments, non-financial aspects are documented and reported • Evaluating the risk of major capital investment projects by using probability analysis or computer simulation • Performing sensitivity "what if" analysis when evaluating major capital investment projects • Calculation and use of cost of capital in discounting cash flow for major capital investment evaluation

Table 7: Management accounting application (Source: Abdel-Kader and Luther, 2006)

2.2 Traditional Tools of Management Accounting

From the review of the historical data it can be seen that in order to support organizations and their managers a number of techniques were used from the late 1800's. These techniques which have their origin in the industrial age are classified as traditional. They are listed below:

Traditional Tools of Management Accounting
1. Budgeting
2. Budgetary Control
3. Standard Costing
4. Absorption Costing
5. Marginal Costing
6. Capital budgeting
7. Traditional performance measures

Table 8: Traditional tools of management accounting (Source: Lorenz, 2015)

2.3 Contemporary Tools of Management Accounting

Lorenz (2015) has developed the following framework to categorize the contemporary tools and techniques:

1. Extensions to existing practice	• Budgeting • Throughput Accounting
2. New Techniques	• Activity Based Costing • Activity Based Management • Kaizen costing
3. Costing tools	• Attribute Costing • Life-cycle Costing • Quality Costing • Target Costing • Value Chain Costing
4. Planning, Control and performance measurement	• Benchmarking • Integrated Performance measurement • The Balanced Scorecard • Results and Determinants model • Performance Pyramid • Performance Prism
5. Strategic Decision Making	• Strategic Cost Management • Strategic Pricing • Brand Valuation • Competitor Accounting • Competitor Cost Assessment • Competitive Position Monitoring • Competitive Performance Appraisal
6. Customer Accounting	• Customer Profitability Analysis • Lifetime Customer Profitability Analysis • Valuation of Customers or Customer Groups as Assets

Table 9: Contemporary tools of management accounting (Source: Lorenz, 2015)

The management accounting techniques, according to Ferreira (2002), may be divided into traditional and contemporary:

Traditional techniques	Contemporary techniques
1. Sales break even 2. Strategic Planning 3. Budgeting 4. Budget deviation analysis 5. Product costing 6. Product profitability 7. Tableau de bord 8. Return on investment	1. Balanced Scorecard 2. Activity-based budget 3. Activity-based costing 4. Target costing 5. Customer profitability analysis 6. Economic Value Added 7. Product life cycle costing 8. Benchmarking 9. Backflush costing 10. Theory of constraints 11. Kaizen costing

Table 10: Management accounting techniques (Source: Ferreira, 2002)

In this regard, the Chartered Global Management Accountant (CGMA, 2013) conducted a diagnostic study on the management accounting tools and identified the most important tools from the study. The study confirmed that there is a huge array of practices and tools available, all promising to help define and manage the organization's strategy, resources, customers and costs; and improve overall performance. In this context, managers can often struggle to evaluate and identify the most suitable tools to support their organization and to implement and manage them effectively. CGMA (2013) classified the management accounting tools into the following groups and discussed these tools in brief:

Category	Management Accounting Tools and Techniques
Governance and risk management	• CIMA Strategic Scorecard • Enterprise Risk Management (ERM) • CGMA Ethical Management Reflection Checklist • Risk Heat Maps
Strategic planning and execution	• Strategic Planning Tools (including mission/vision statements, goals and objectives, SWOT, PEST) • Balanced Scorecard, including operational dashboards • Strategy Mapping • Porter's Five Forces of Competitive Position Analysis
Performance management and measurement	• KPIs – financial and non-financial • Benchmarking • The Performance Prism
Planning and forecasting	• Rolling Plans and Forecasts • Activity-Based Budgeting (ABB) • Scenario and Contingency Planning • Cash Flow Modeling

Category	Management Accounting Tools and Techniques
Product and service delivery	• Activity based costing (ABC) • Lean • Quality Management Tools – Including TQM, Six Sigma, Cost of Quality and EFQM
Value recognition	• Value Chain Analysis • Customer Relationship Management (CRM)

Table 11: Category of management accounting tools and techniques (Source: CGMA, 2013)

The above literature supports the existence of contingency framework in management accounting research where the selection of different management accounting techniques depends on some contextual factors. Different authors from different countries propose different types of classifications and grouping among different management accounting techniques. This section brings some example of studies in Bangladesh and then we will select some management accounting techniques for current research. Sarkar & Yeshmin (2005) have focused on the application of responsibility accounting as one of the management accounting techniques in 30 organizations. The authors have focused on four responsibility centres as cost center, revenue center, profit center and investment center to show the accountability of the organization. This study has also revealed that the most common technique - budget is being used to evaluate the performance. It puts a selective focus on responsibility accounting in few organizations which needs to be extended.

Sharkar et al. (2006) has given an overview of the management accounting practices in the listed manufacturing companies of Bangladesh. The analysis of this study has revealed that all sectors fail to practice some newly developed techniques. They have suggested improving and fastening the management accounting practices. Considering only listed company has narrowed the focus of the study as listed companies are primarily concerned with financial accounting, not with management accounting.

Mazumder (2007) has examined the status of the use of management accounting techniques in the manufacturing enterprises of Bangladesh. It has been discovered that modern techniques like Activity-Based Costing, Target Costing, Just-in-Time (JIT), Total Quality Management (TQM), Process Reengineering and The Theory of Constraints (TOC) were not used in public and private sector manufacturing enterprises but a few Multinational Corporations (MNC) are using some of techniques like JIT and TQM. Also, traditional techniques like financial statement Analysis, Cash Flow Analysis, budgetary control, management reporting were found widely used followed by CVP Analysis, Marginal Costing, and Fund Flow Analysis etc. This study mainly focuses on the level of application of different management accounting techniques but doesn't cover the reasons of such choice which may be driven by different firm specific factors.

Yeshmin and Das (2009) have conducted a study on financial institutions in Bangladesh. It revealed that managers of the financial institutions are very much satisfied with the application of budgetary control analysis and variance analysis to measure their performance among the fourteen management accounting techniques. At the same time managers were very much dissatisfied with the application of segment reporting. This study considers service sector for studying the level of application of different management accounting techniques

and thus highly innovative techniques like Activity Based Costing, Target Costing, Lean Manufacturing, etc. remains outside the scope.

Another study (Yeshmin and Fowzia, 2010) aimed to examine the use of the management accounting techniques in manufacturing and service industries of Bangladesh for discharging managerial functions. To achieve this objective, 151 organizations from manufacturing and service industries had been surveyed. By identifying 14 management accounting techniques, three factors had been identified to determine the variability of the usage level in managerial functions. The findings revealed that management accounting techniques such as financial statement analysis, budgetary control, CVP analysis, variance analysis, and fund flow analysis were common in both the industries and were used frequently in managerial decision making. This study considers both service and manufacturing sectors together which evoked some analytical problems.

The study conducted by Yeshmin & Hossan (2011) has emphasized on the level of usage of twenty-three management accounting techniques in making effective decisions by the different manufacturing organizations in Bangladesh. This study would be of particular relevance to Bangladesh, because it would help to assess the significant influence of management accounting techniques in decision-making by manufacturing organizations of Bangladesh. **Table 12** below identifies different management accounting techniques used in different researches conducted in Bangladesh from time to time. However, these studies are mostly perception based study. Case studies in Bangladeshi firms are rare and thus it is very difficult to say about the extension of using different management accounting techniques. Due to the narrow focus of the study, most of the researches conducted in Bangladesh so far demonstrate the co-existence of both traditional and advanced management accounting techniques.

SL	Management Accounting Tools	Yeshmin & Hossan (2011)	Yeshmin and Fowzia (2010)	Mazumder (2007)
1	Cash flow Statement Analysis	√		√
2	Ratio Analysis	√	√	√
3	Budgetary Control	√	√	√
4	Cost Volume Profit Analysis	√	√	√
5	Variance Analysis	√	√	
6	Fund Flow Analysis	√	√	√
7	Standard costing	√		√
8	Variable Costing	√	√	√
9	Target Costing	√	√	√
10	Absorption Costing	√		√
11	Inter-firm Comparison	√		√
12	Activity Based Costing	√	√	√
13	Differential costing	√		√
14	Just in Time	√		√
15	Opportunity Costing	√		√
16	Responsibility Accounting	√	√	
17	Segment Reporting	√	√	

SL	Management Accounting Tools	Yeshmin & Hossan (2011)	Yeshmin and Fowzia (2010)	Mazumder (2007)
18	Total Quality Management	√	√	√
19	Theory of Constraint	√	√	√
20	Management by Exception	√	√	
21	Process Reengineering	√		√
22	Kaizen Costing	√		
23	Balance Scorecard	√	√	
24	Management Reporting			√

Table 12: Management accounting tools used by Bangladeshi firms (Authors' compilation from relevant literature)

The study (Yeshmin & Hossan, 2011) reveals that cash flow statement analysis, ratio analysis, budgetary control, CVP analysis, variance analysis, fund flow analysis, TQM, and TOC are widely used management accounting techniques. The study also applies factor analysis to identify any hidden relationship resulting five factors considering the variability of the responses given by the respondents. Finally, the authors have tried to find out the level of significance of different managerial accounting techniques in decision making. Out of 23 techniques, only eight techniques namely, budgetary control, fund flow analysis, absorption costing, balanced scorecard, TOC, ABC, segment reporting and inter firm comparison become statistically significant. At the same time, the study concludes that only 25.6% of the variation in decision making of manufacturing organizations is explained by 23 management accounting techniques used in the study.

In another study (Shil & Pramanik, 2012), a survey was conducted across 25 manufacturing companies to put comments on the adoption and implementation status of Activity Based Costing. The study reveals that a good number of companies surveyed (64%) apply ABC for product costing and other purposes, however, the quality of ABC is not up to standard, even costing system with only one cost driver is also referred to as ABC. Thus the diffusion rate is not satisfactory. At the same time, the sample size was so small and it may not reflect the actual scenario of the market.

Another study (Kabir et al., 2013) aimed at exploring the extent to which the listed pharmaceutical companies in Bangladesh are practicing management accounting tools in making managerial decisions and revealed that management accountants use a number of tools, on average 35, across a wide range of operational, managerial and strategic functions. Based on the above discussions, this study identified the following 26 management accounting techniques (9 under 'traditional' category and 17 under 'advanced' category) to understand their level of applications by Bangladeshi firms and at the same time, to explore any inherent relationship between the application of different management accounting techniques and tactical and strategic goals of firms.

Traditional	Advanced
1. Full Costing	1. Activity Based Costing
2. Standard Costing	2. Target Costing
3. Job Order Costing	3. Life Cycle Costing

Traditional	Advanced
4. Process Costing	4. Customer Accounting
5. Activity- based budgeting	5. Customer and Marketing Channel Analysis System
6. Flexible budgeting	6. Benchmarking
7. Zero-based budgeting	7. Competitor Analysis
8. Budgeting for short-term plans	8. Competitive Position Monitoring
9. Budgeting for long-term plans	9. Economic Value Added
	10. Balanced Scorecard
	11. Intellectual Capital Evaluation
	12. Quality Costing
	13. Total Quality Management
	14. Strategic Cost Management System
	15. Activity Based Management
	16. Value Chain Costing
	17. Lean Manufacturing

Table 13: Management accounting tools used in the study

This section briefly explains each of the seventeen advanced management accounting tools selected for the study below.

Activity Based Costing: Activity Based Costing (ABC) is the best technique developed so far in the area of cost management and described by Cooper (1998), Chalos (1992) and Kaplan (1994). It refers to product and service costing systems in which costs are first assigned to activities in the production process and then either directly traced to products/services or allocated by using the cost driver that most accurately captures variations in the cost activity. ABC emphasizes the homogeneity of costs in establishing cost pools, and the identification of cost drivers for allocating cost pools to products. Volume and non-volume related cost drivers are employed (Cooper, 1989; Chalos, 1992; Kaplan, 1994) for the purpose. This method is based on defining the company's activities; it is regarded as the main cause of incidental costs and as the main cost object (Cooper, 1988 and 1989; Cooper and Kaplan, 1991). According to such costing method, resources (costs) are allocated to each activity on the basis of a resource driver, and the costs of such activities are allocated to the cost object (mainly products, services and customers) based on their use through an activity driver.

Target Costing: Target Costing technique is also focussed on costs but, unlike traditional costing systems, it is not aimed at determining a "real" final cost but at finding the highest sustainable cost of a product/service at a given time, targeted to a specific, clear market segment. So, target cost is a definite cost objective in the stages that come before the launch of a product, based on market requirements and demands. It is the result of the difference between the product price, i.e. the price the market is willing to pay to buy that product with its specific qualities, and the desired target profit (Monden and Hamada, 1991; Morgan, 1993; Tani *et al.*, 1994). A target cost is the estimated long-run cost of a product/service that enables the company to achieve a targeted profit. The target cost is often lower than the actual cost of making and selling a product/service (Czyzewski & Hull 1991; Chalos 1992; Artto 1994; Brausch 1994).

Life Cycle Costing: Life Cycle Costing technique aims at determining the total cost of a product all through its life cycle (Berliner and Brimson, 1988; Shields and Young, 1991;

Wilson, 1991). In organizations employing advanced manufacturing technologies, many costs are designed into the product/service and cannot be reduced later. Life cycle costing tracks and accumulates the actual costs attributable to each product/service, from the initial research and development to the time when support to customers is withdrawn. The terms "cradle-to-grave costing" and "womb-to-tomb costing" conveys the sense of fully capturing all costs associated with a product/service (Czyzewski & Hull 1991; Shields & Young 1992; Chalos 1992; Artto 1994). This approach is shared by the Total Cost of Ownership; in addition to Life Cycle Costing, it also calculates the costs incurred by consumers for the installation, operation, maintenance and disposal of a product (Ellram and Siferd, 1998). From this perspective, Life Cycle Costing is closely related to cost reduction and containment techniques (such as Target Costing) and tends to open a managerial perspective rather than a mere calculation of costs.

Customer Accounting: This technique treats customers or groups of customers as units that can be subjected to profitability analyses (Bellis-Jones, 1989; Howell and Soucy, 1990). So the customer becomes an important cost object in support of the company's strategic decision-making process. From a strictly economic and financial point of view, different customers do not only contribute differently to the company's turnover, but they also lead to a different consumption of the company's resources. Therefore, by carefully determining customer costs, one can measure the real contribution of each customer to the company's result. Operationally, the CA is rooted in the Activity-Based Costing technique. Actually, incidental customer costs involve activities that consume resources themselves. Finding the drivers that do transmit the complexity of the customer-company relationship is crucial to a proper allocation of customer costs. Once the overall customer cost has been determined, it only needs to be compared with the proceeds it generates to measure its impact on the company's profitability.

Customer and Marketing Channel Analysis System: This system reports on costs that reflect the way in which customers (or marketing channels) differentially use the resources of an organization. These systems may be used to ensure that those customers (or marketing channels) that make a sizeable contribution to the profitability of an organization, receive a commensurate level of attention from the organization (Petty & Goodman 1996).

Benchmarking: This technique consists in locating, comparing, emulating and developing the industry best practices in order to improve the company's performance (Miller et al., 1992; McNair and Leibfried, 1992). There are different kinds of benchmarking: internal (a comparison of levels of performance between the company's business units), external (a comparison of levels of performance between the company and competitor companies working in the same or similar line of business) and best practice benchmarking (a comparison of levels of performance between the company and the industry leaders). By measuring such gaps and acting on the causes of such gaps, a company can implement measures to correct or improve its own performance.

Competitor Analysis: Competitor Analysis system involves a re-assessment of the cost-competitive position of an organization's products/services by comparing it with the costs incurred by competitors. Competitor cost analysis should lead to the adoption of successful practices by reengineering existing processes. The emphasis is on considering the costs associated with existing work practices as well as the estimated costs incurred by competitors in similar activities with a view to emulating successful practices (Chalos 1992).

Competitive Position Monitoring: This method involves a regular analysis of the company's position compared with that of its competitors. In particular, it underpins a holistic view of competitor analysis that involves an assessment of the main competitors' sales, market shares and output (Simmonds, 1981). Based on such information, a company can assess its own position compared with that of its competitors and realign or develop suitable strategies according to the competitive scenario. In its most advanced form, this technique may be related to a competitive intelligence system (Bernhardt, 1993; Kahaner, 1996). It is an intelligence system that legally gathers information on competitors, extending its range of action to any information, both quantitative and non-quantitative, about the company's competitive market.

Economic Value Added: The Economic Value Added (EVA) is an indicator of changes in the shareholder value which was developed by the consultancy firm Stern Stewart & Co. EVA results when capital cost (C) is deducted from net operating profit after taxes (NOPAT). Therefore, the EVA is a distinctive configuration of residual income (Bromwich and Walker, 1998), which, as such, expresses the surplus of the rate of return of the invested capital over the cost of all forms of funding used. The EVA may be calculated for a company as a whole or for one of its divisions/business units. The calculation of the EVA involves many adjustments to the accounting information that the authors suggest so as to improve the significance of the NOPAT and C and to induce value-oriented behaviours in the management (Stewart, 1991). This indicator is actually used as a tool to guide the management's choices towards creating value for shareholders in the long term and is a way to accomplish the so-called Value-Based Management (Arnold and Davies, 2000).

Balanced Scorecard: An assessment of the company's behaviour, when reviewing its financial and non-financial dimensions, is what defines an integrated performance measurement system (Lynch and Cross, 1989; Nanni et al., 2002). The higher relevance acquired by physical and technical information in the corporate management scenario and the availability of increasingly powerful and cheap information systems have gradually "depreciated" any purely economical-financial information. The last few years have seen a remarkable spreading of systems which can integrate financial information with non-financial information with a view to gaining a better understanding of a company's performance. The Balanced Scorecard (Kaplan and Norton, 1996a, 1996b, 2001; Malina and Selto, 2001) falls within this category, and its role in a strategic management process is understandable through an analysis of the four perspectives it includes: financial, learning and growth, internal, and customer perspective.

Intellectual Capital Evaluation System: Intellectual capital (IC) is the system of the intangible assets of an organisation that can be relied on to gain a lasting, sustainable competitive advantage (Roos et al., 2005). The IC is regarded as separable into three dimensions: human capital*,* i.e. the people's expertise, skills and capabilities, organisational capital*,* consisting of knowledge as encoded and stored in elements that make it shareable and transmissible in time and space, and relational capital*,* indicative of the value of relations with external stakeholders, such as customers, suppliers and investors. Over twenty methods have been proposed to measure the IC (Zambon, 2003) and they can be divided into four major categories: models using financial methods which calculate a synthetic value of intellectual capital (e.g. Market to Book Value, Tobin's Q), methods which can only measure individual intangible assets (e.g. Citation-Weighted Patents, Intellectual Asset Valuation), more innovative methods which, as well as being CI-measuring systems, can also be considered to be corporate complexity management systems (Balanced Scorecard,

Intangible Assets Monitor, Skandia Navigator), and models that measure the overall value of the IC in non-monetary terms (IC-index, Knowledge Capital Earnings).

Quality Costing: For years now, quality costing has become a prerequisite for competing on the market. This technique classes, reviews and monitors quality costs by dividing them into four categories: prevention costs, assessment costs, internal failure costs and external failure costs (Feigenbaum, 1983; Heagy, 1991). The rationale behind a quality system is based on an ideal concentration on fault-prevention activities, rather than activities acting downstream of the productive process. This means that, in an ideal quality system, the greatest quality cost portion would be the prevention costs, while the assessment costs would be a minimal portion and no cost would be incurred for faulty products/services (internal or external failures).

Total Quality Management: The objective of TQM is to provide goods or services that at least meet and hopefully exceed the customer's requirements. The underlying philosophy is that the customer and not the organization determine the value of goods and services. The organization only controls costs. The implication for management accounting is a demand for information regarding the different costs of quality (Hansen & Mowen, 2005).

Strategic Cost Management: The strategic cost management system or SCM involves an organization's relationship with its suppliers and customers with a view to reconfiguring these relationships to add value and/or to reduce costs. Strategic cost management aims to estimate the effect of an organization's decisions on the costs/profits of its suppliers and customers as well as on its own costs/profits. SCM systems provide information to support these activities (Chalos 1992; Shields & Young 1992; Shank & Govindarajan 1992, 1994).

Activity Based Management: Activity-based management (ABM) is an extension of activity-based costing. The objective of ABM is to determine key business activities and to use that information to identify opportunities to improve productivity; increase value generated by given resources, or eliminate non-value adding activities. The emphasis is on identifying and controlling the causes of costs associated with activities (cost drivers) rather than cost recording and subsequent cost analysis (Turney 1992; Cooper, Kaplan, Maisel, Morrissey & Oehm 1992). The value added provided by the ABC consists of understanding and implementing the transition from the cost accounting system to an activity-management system through which one can define measures for reducing corporate costs and for continuous improvement (Cooper and Kaplan, 1999).

Value Chain Costing: By developing the Value Chain model (Porter, 1985), Shank and Govindarajan (1992) propose an analytical approach that covers all activities, from the provisioning of raw materials from suppliers to the distribution of the end product to customers. This technique involves opening wide the corporate boundaries to stakeholders that are upstream and downstream of the productive chain. In this way, the company can harness the synergisms that are created with suppliers and customers as well as optimising the relations within the company. Looking at the whole value chain, one can understand how costs behave and are formed, so one can find new opportunities to contain such costs (Shank and Govindarajan, 1992; Dekker, 2003).

Lean Manufacturing: Toyota Motor Company's original just-in-time (JIT) manufacturing philosophy has evolved into a broad-based, lean production paradigm. This paradigm, characterized by continuous improvement, low inventories, short cycle times, elimination of waste, and improved quality, has transformed much of the U.S. manufacturing landscape over the last 30 years. The management accounting literature (e.g., Kaplan, 1983; Milgrom

& Roberts, 1995; Wruck & Jensen, 1994) has long recognized that management accounting system must adapt to lean production strategies. However, prior research also shows that management accounting systems often fail to provide appropriate performance measures and incentives to support lean production objectives (e.g., Majchrzak, 1988; Snell & Dean, 1992; Wafa & Yasin, 1998; White & Prybutok, 2001).

The above discussion clearly presents a major change in management accounting practice, caused and sustained by the impact of the forces of change. For example, in a study conducted by Adler et al. (2000), it was indicated that about 62% of the respondents expected to change their cost management accounting systems over the following three years. Several other studies focused on the adoption of advanced management accounting systems. Tani et al. (1994) found that 61% of Japanese manufacturers used target costing, and Israelsen et al. (1996) reported that 50% of Danish manufacturers used target costing. Chenall and Langfield-Smith (1998) found that 56% of Australian organizations used ABC and that 38% used target costing. Despite criticism of traditional management accounting techniques in a drastically altered manufacturing environment, studies in the USA and the UK have shown that organizations have been slow to adopt new techniques despite the fact that a significant competitive advantage can be gained from adopting these systems (Adler et al., 2000). Many manufacturing entities continue to rely on traditional measures such as standard costs (Chenall & Langfield –Smith, 1998).

2.4 Productivity, Competitive Advantage and Strategic Positioning

In a very simple sense, productivity is the ratio between output and input. Competitive advantage grows out of value a firm is able to create for its buyers that exceeds the firm's cost of creating it. Value is what buyers are willing to pay, and superior value stems from offering lower prices than competitors for equivalent benefits or providing unique benefits that more than offset a higher price. There are two basic types of competitive advantage: cost leadership and differentiation (Porter, 1985).

The application of AMAT in practice is highly motivated due to their perceived importance in decision making. They improve productivity, bring competitive advantage and help firms to position strategically. In management accounting literature, different researchers tried to establish this from different perspectives. Armitage (1984) studied the use of management accounting techniques to improve productivity analysis in distribution operations. In a more complex study Chenhall and Langfield-Smith (1998) examined how combinations of management techniques and management accounting practices can enhance the performance of organizations with differing strategic priorities. Considerable attention has been paid to incorporating strategy as a factor of choosing the AMAT (e.g. Langfield-Smith, 1997 and Gerdin and Greve, 2004). Strategic management accounting is considered to be a generic approach to management accounting for strategic positioning (Simmonds, 1981). The contributions of Roslender and Hart (2003) return to the quest for a generic framework which, after almost twenty years of academic discourse, is still to be developed. Like Simmonds (1981), they also treat strategic management accounting as "a generic approach to strategic positioning". Three generic taxonomies have been employed in studying the strategy-AMAT relationship: Miles and Snow's (1978) prospectors/analysts/defenders model, Gupta and Govindarajan's (1984) build/hold/harvest model, and Porter's (1980) product differentiation/ cost-leadership classification. In June 2008, IMA published a new definition of management accounting replacing the earlier one which is read as 'Management accounting is a profession

that involves partnering in management decision making, devising planning and performance management systems, and providing expertise in financial reporting and control to assist management in the formulation and implementation of an organization's strategy". Thus, the new definition explicitly covers the role of management accounting with the strategy.

Isa and Foong (2005) examine advanced manufacturing technology (AMT) adoption in manufacturing firms and its relationship with management accounting practices. One of the strategies for manufacturing firms to become agile and responsive to market changes is to adopt AMT, which often results in drastic changes in the production cost structure. Hence, it is conjectured that AMT adoption would lead to adoption of new costing methods, such as activity-based costing (ABC) and a higher emphasis on non-financial performance measurement indicators. To attain competitive advantage in market place, the adoption of AMT via AMAT has no alternative. It has been further confirmed in a study where the researchers' acknowledged that use of advanced management accounting techniques may provide firms an opportunity to realize a competitive advantage (Adler et al., 2000).

In line with the literatures presented above, the current research targets to conduct an integrated study on the motivation of choosing and using different management accounting techniques. A couple of management accounting techniques has been identified from the literature as discussed before and the potential benefits of their ultimate application have been searched to frame up the managerial consideration. The following hypotheses have been considered for testing.

H1: Management Accounting Techniques have a positive relationship with productivity.

H2: Management Accounting Techniques have a positive relationship with competitive advantage.

H3: Management Accounting Techniques have a positive relationship with strategic positioning.

3.0 Research Methodology

The study is based on both primary and secondary sources of data. Different management accounting techniques and other parameters used in the study are identified from extensive literature review on the topics. A questionnaire has been designed, tested and used as a tool for survey. Surveys are often conducted simply because it is the only way to get the information needed. Individuals or organizations usually sponsor surveys for one of three basic reasons (Alreck and Settle, 1995):

a) They want to influence or persuade some audience;
b) They want to create or modify a product or service they provide for a particular public;
c) They want to understand or predict human behavior or conditions because it is the focus of their academic or professional work.

Hussey and Hussey (1997) pointed out that "a survey is a positivistic methodology whereby a sample of subjects is drawn from a population and studied to make inferences about the population." The study covers manufacturing firms due to the theme of the research which form the population of the study. A sample frame is thought of the manufacturing companies where professional management accountants are working. This is done through the scrutiny of membership directory of ICMAB[1] for the year 2016. Such scrutiny results 245 companies as given in Table 14 below where the members of ICMAB were working. The study doesn't consider any service industry and companies operating outside Dhaka. Out of the 245 companies, management accountants from 61 companies expressed their reluctance to participate in the survey. Other 184 companies were considered as the sample for the study. However, questionnaires were not received from 72 companies though they had been given reminder in time and 15 of the received questionnaires were rejected due to the missing data. Finally a total of 97 questionnaires have been used for data analysis based on which the study draws major conclusions. The reliability of a measure in terms of its stability and consistency was tested through the parallel test and Cronbach's coefficient alpha and all the scales in the questionnaire were considered as reliable. Also an external and an internal validity were established in this research.

SL	Industry	Number of Members Worked	Number of Firms	Usable Questionnaires Received
1	Cement	13	10	4
2	Chemicals/ Fertilizer	18	15	7
3	Garments & Textiles	95	91	40
4	Jute	2	2	1
5	Oil, Gas, Fuel & Power	33	24	6
6	Paper, Printing & Publication	8	6	2
7	Pharmaceuticals	37	42	12
8	Sugar, Food & Allied	15	15	5
9	Tannery/Leather	5	4	2
10	Tobacco	6	3	2
11	Others	184	33	16
	Total	416	245	97

Table 14: Distribution of participating firms in the study

1 ICMAB is the Institute of Cost and Management Accountants of Bangladesh, the only national level institute in the country to conduct research and impart management accounting education in Bangladesh.

3.1 Respondents' Profile

The quality of research output seriously depends on the quality of respondents participating in the survey. A clear understanding between the researcher and the respondents on research agenda is also important to keep the survey free from any misunderstanding at either side. Considering the significance of the topic, the study is conducted based on a very rich respondents' profile. As already mentioned in research methodology section, respondents are identified from 97 manufacturing firms where initial contact point in each case was a professional cost and management accountant working in respective firms. However, when they are approached for the survey, good percentages (about 59%) of them have let it to be done by subordinates and have requested to keep their identity undisclosed. Due to the nature of the research, one respondent represents one firm which result a total of 97 respondents from 97 firms. Respondents' demographic biography in terms of their educational background, experience (in years), intention to switch, number of jobs worked so far and designations is presented below (Table 15):

Demographic Profile of Respondents	Frequency	Percentage
a) Educational Background		
Professional Certifications	40	41
Master's Degree	52	54
Bachelor Degree	5	5
b) Years of Experience		
Less than 5 years	22	23
5 – 10 Years	38	39
More than 10 years	37	38
c) Intention to Switch		
Yes	18	19
No	79	81
d) Number of Jobs		
Less than 3	45	46
3-5	48	49
More than 5	4	5
e) Organizational Designation		
i) Top Level Management		
Managing Director	2	
Director	7	
Chief Financial Officer	5	
Country Manager	2	
Group CFO	3	

Demographic Profile of Respondents	Frequency	Percentage
Finance Controller	6	
VP Finance and Company Secretary	3	
Total	**22**	22
ii) Mid Level Management		
Production Supervisor	2	
General Manager	7	
Manager	21	
Assistant Manager	9	
Chief Accountant	3	
Assistant General Manager	2	
Deputy General Manager	2	
Assistant Finance Controller	2	
Head of Accounts	4	
Total	**52**	55
iii) Lower Level Management		
Executive	16	
Accounts Officer	7	
Total	**23**	23

Table 15: Respondents' profile

As already mentioned, mostly all the respondents are affiliated with professional accounting institutes, some of them are already qualified members and others are senior student members who are very close to their certification. In terms of years of experience, a good percentage of respondents (77%) are having more than 5 years of experience. It reflects the required maturity of the respondents to address a questionnaire related to satisfaction, its antecedents and precedents. In another case, it reveals that only 19% of the respondents have an intention to switch current job. It signifies that the accounting practitioners are not severely job hopper which may be driven by their satisfaction with the existing job. Satisfaction with the job is a very important criterion for loyalty and commitment which will lead high level of customer satisfaction through ensuring product and service quality at a commendable rate. In terms of managerial hierarchy, only 23% respondents are holding lower level management position. And these respondents come from highly decentralized organization where there are independent departments taking care of cost and management accounting related issues. Due to the semi-structured questionnaire, these executives are referred by top level management and thus it is expected that there will be no asymmetry of feedback given by them. It is also nice to observe that in most of the firms, top level and mid level management plays role as management accountant which is important to undertake customer pleasing move for the betterment of the respective firms.

3.2 Corporate Profile

This section presents the profiles of companies (Table 16) participated in the survey in terms of different firm specific parameters like years in operation, number of employees, annual turnover and net assets. These parameters are important to have a general understanding on the firms who have taken part in the study.

Corporate Profile	Frequency	Percentage
a) Years in Operation		
0-10	18	16
11-20	51	45
21-30	8	7
31-40	7	6
41-50	4	4
More than 50	9	8
	97	100
b) Number of Employees		
0-1000	58	60
1001-2000	14	14
2001-3000	12	12
3001-4000	6	6
4001-5000	2	2
More than 5000	5	5
	97	100
c) Annual Turnover (in BDT)		
Less than 100 million	32	33
101 – 1000 million	27	28
1001-10,000 million	29	30
More than 10,000 million	9	9
	97	100
d) Net Assets (in BDT)		
Less than 100 million	22	23
101 – 1000 million	38	39
1001-10,000 million	26	27
More than 10,000 million	11	11
	97	100

Table 16: Corporate profile

Like respondents' profile, corporate profile of the responding firms is also very rich. More than 80% of the firms are in operation for more than 10 years. 40% of the firms are having more than 1,000 employees. Around 40% of the firms have annual turnover of more than 1,000 million taka. It gives some idea regarding the maturity, stages of life cycle, value of the firms, and target market size of the responding firms all of which are important for surveys relating to satisfaction.

Different variables used in the study and their measurements are presented in Table 17. In case of different management accounting techniques, the questionnaire includes a question, "To what extent does your company (or business unit) use the following management accounting techniques?" Then the list of the 26 management accounting techniques followed. Next to each one, a Likert scale ranging from 1 ("not applied") to 7 ("extensively applied") was given. Next to each accounting technique a link to the glossary permitted a clear understanding of their significance. Appendix A provides the definitions of the accounting techniques included as glossary in the questionnaire. The same method was employed by other studies (Guilding, 1999; Guilding, Cravens and Tayles, 2000; Cravens and Guilding, 2001).

Variables	References	Construct
Management Accounting Techniques (MAT)	Ferreira, 2002; Abdel-Kader and Luther, 2006; Mazumder, 2007; Talha et al., 2010; Ahmed, 2010; Yeshmin and Fowzia, 2010; Yeshmin & Hossan, 2011; Gichaaga, 2014; Lorenz, 2015; Spacey, 2015; Money Matters, 2017	Level of implementation of twenty six techniques was measured using 7 points Likert scale for each. 1= not applied, 4 = moderately applied, 7 = extensively applied.
Productivity	Armitage, 1984; Chenhall and Langfield-Smith, 1998	It is measured in terms of material, labor and overhead with an overall index in a 7 point scale. 1 = unproductive, 4 = moderately productive, 7 = Highly productive
Competitive Advantage	Simmonds, 1981; Langfield-Smith, 1997; Roslender and Hart, 2003; Gerdin and Greve, 2004	Competitive advantage depends on variable cost percentage, status of innovation, research and development expenditure as a percentage of sales, return on capital invested, and total turnover as a percentage of market size. An average index value has been computed in a 7 point scale for each respondent.
Strategic Positioning	Miles and Snow, 1978; Porter, 1980; Gupta and Govindarajan, 1984	Either cost leadership or differentiator has been used as strategic positioning strategy in a 7 point Likert Scale. 1 = Strongly Disagree, 4 = Undecided, 7 = Strongly Agree

Table 17: Measurement of variables

The study contains a total of 36 sub-variables belonging to the four main constructs of the study, i.e., MAT, Productivity (P), Competitive Advantage (CA) and Strategic Positioning (SP). In each construct, the constituent sub-variables were grouped based on the literature, i.e., literature-based. Details of measurement of variables are presented in Table 17.

In assessing the reliability of the measurement of questions related to the variables incorporated, Cronbach's alpha was calculated for respondents' answers in relation to questions on the levels of implementation of MATs, state of productivity, competitive advantage and strategic positioning. Results are presented in Table 18 below.

Constructs	No. of Items	Cronbach's Alfa
MAT	26	.824
P	3	.798
CA	5	.776
SP	2	.804

Table 18: Results of reliability test

Based on the alpha value, it can be concluded that the variables considered under the study are reliable. In addition, the validity of the variables incorporated was reviewed in the piloting stage and they are also supported by literature.

3.3 Statistical Tools

A detailed descriptive statistics has been used across all of the twenty six management accounting techniques to find out their usage rates that help in understanding the extent of adoption of management accounting techniques by Bangladeshi companies. The provision of frequencies information could help in a deeper interpretation of the results. In particular the first consideration regards the distinction between "non adopters" and "adopters" of management accounting techniques. Those respondents indicating 1 are classified as "non adopters" (1 means "not applied" used) instead of those indicating 2, 3, 4, 5, 6 and 7 are considered "adopters" of management accounting techniques. Among the "adopters" two clusters have been created to distinguish the intensity of use of the techniques. The first one collects respondents indicating 2, 3 or 4 which indicates a low usage level of the technique. The second cluster collects respondents indicating 5, 6 or 7 which indicates a high usage level of the technique.

In order to evaluate the features of management accounting techniques, an exploratory factor analysis based on usage rates have been employed. This permits a deeper reflection in a double sense. Firstly, it highlights positive relationships across management accounting techniques, meaning they can be grouped in coherent clusters. Secondly, stemming from the analysis of the techniques comprised in each factor, it is possible to associate and define distinctive features/dimensions underlying management accounting techniques. The principal component method of extraction with varimax rotation has been used. Selecting factors with eigenvalues greater than one (Sharma, 1996), a couple of factors with a significant percentage of explained variance have been determined.

A substantial objective of the research concerned the investigation of variables potentially explaining the use and selection of management accounting techniques. To test the hypotheses posited in the study, a Pearson correlation analysis between management accounting techniques and nine dependent variables will be employed. Three variables concern "productivity" (ratio of input and output, labor cost as a percentage of cost of goods sold and overhead cost as a percentage of product cost), five "competitive advantage" (variable cost percentage, status of innovation, research and development expenditure as a percentage of sales, return on capital invested, and total turnover as a percentage of market size) and other regard "strategic positioning" (differentiator or cost leadership). Finally, a multiple regression model will be applied to find out the degree of achievements in different category achieved by different management accounting techniques.

4.0 Analysis and Findings

This section presents the major findings and analysis of the study in line with the objectives of the research. It has been divided into two parts. First part presents different descriptive statistics giving an overall profile of different management accounting practices. Second part presents some inferential analyses to test the hypotheses taken before.

4.1 Status of Adoption of Different Management Accounting Techniques

One of the important purposes of the study is to develop a brief profile of management accounting techniques applied in manufacturing firms operating in Bangladesh. Table 19 provides a frequency count of different management accounting practices.

Management Accounting Practitioners	Non-Adopters	Adopters	
		Low	High
Traditional			
Full Costing	- (0%)	37 (38%)	60 (62%)
Standard Costing	3 (3%)	22 (23%)	72 (74%)
Job Order Costing	7 (7%)	14 (14%)	76 (78%)
Process Costing	17 (18%)	52 (54%)	30 (31%)
Activity- based budgeting	62 (64%)	14 (14%)	21 (22%)
Flexible budgeting	38 (39%)	40 (41%)	19 (20%)
Zero-based budgeting	42 (43%)	38 (39%)	17 (18%)
Budgeting for short-term (strategic) plans	- (0%)	30 (31%)	67 (69%)
Budgeting for long-term (strategic) plans	12 (12%)	26 (17%)	59 (61%)
Advanced			
Activity Based Costing	62 (64%)	28 (29%)	7 (7%)
Target Costing	16 (16%)	52 (54%)	29 (30%)
Life Cycle Costing	42 (43%)	46 (47%)	9 (10%)
Customer Accounting	28 (29%)	37 (38%)	32 (33%)
Customer and Marketing Channel Analysis System	48 (49%)	32 (33%)	17 (18%)
Benchmarking	32 (33%)	42 (43%)	23 (24%)
Competitor Analysis	38 (39%)	46 (47%)	13 (13%)
Competitive Position Monitoring	36 (37%)	48 (49%)	13 (13%)
Economic Value Added	65 (67%)	27 (28%)	5 (5%)
Balanced Scorecard	23 (24%)	58 (60%)	16 (16%)
Intellectual Capital Evaluation	37 (38%)	46 (47%)	14 (15%)
Quality Costing	- (0%)	15 (15%)	82 (85%)
Total Quality Management	- (0%)	19 (20%)	78 (80%)
Strategic Cost Management System	11 (11%)	58 (60%)	28 (29%)
Activity Based Management	62 (64%)	28 (29%)	7 (7%)
Value Chain Costing	37 (38%)	49 (51%)	11 (11%)
Lean Manufacturing	68 (70%)	25 (26%)	4 (4%)

Table 19: Adoption status of different management accounting practices (figures in parenthesis represent the percentage of adopting firms)

4.2 Level of Diffusion

Based on Table 19, it is observed that adoption rate is high across traditional management accounting techniques. However, some of the advanced management accounting techniques is also used by Bangladeshi firms widely. The following table ranks the management accounting techniques as per their total score in a seven point Likert scale.

Management Accounting Practitioners	N	Max	Min	Mean	Std. Deviation
Highly Diffused Techniques:					
Quality Costing	97	7.00	1.00	6.215	1.17912
Total Quality Management	97	7.00	1.00	5.783	1.31124
Job Order Costing	97	7.00	1.00	5.249	1.24801
Standard Costing	97	7.00	1.00	5.184	1.30550
Budgeting for short-term (strategic) plans	97	7.00	1.00	4.852	1.45356
Full Costing	97	7.00	1.00	4.627	1.37011
Budgeting for long-term (strategic) plans	97	7.00	1.00	4.573	1.46865
Moderately Diffused Techniques:					
Target Costing	97	7.00	1.00	4.327	1.44964
Process Costing	97	7.00	1.00	4.158	1.47815
Customer Accounting	97	7.00	1.00	3.873	1.44483
Strategic Cost Management System	97	7.00	1.00	3.541	1.44522
Benchmarking	97	7.00	1.00	3.427	1.52066
Flexible budgeting	97	7.00	1.00	3.335	1.58638
Zero-based budgeting	97	7.00	1.00	3.124	1.53756
Customer and Marketing Channel Analysis System	97	7.00	1.00	2.934	1.37294
Balanced Scorecard	97	7.00	1.00	2.845	1.48784
Competitive Position Monitoring	97	7.00	1.00	2.759	1.41968
Competitor Analysis	97	7.00	1.00	2.619	1.52435
Slowly Diffused Techniques:					
Activity- based budgeting	97	7.00	1.00	2.547	1.41823
Intellectual Capital Evaluation	97	7.00	1.00	2.417	1.42407
Value Chain Costing	97	7.00	1.00	2.374	1.27828

Management Accounting Practitioners	N	Max	Min	Mean	Std. Deviation
Life Cycle Costing	97	7.00	1.00	2.215	1.31291
Activity Based Costing	97	7.00	1.00	2.117	1. 42753
Activity Based Management	97	7.00	1.00	1.982	1.51294
Economic Value Added	97	7.00	1.00	1.829	1.42382
Lean Manufacturing	97	7.00	1.00	1.722	1.26937

Table 20: Level of diffusion of different management accounting techniques

Based on the average score, management accounting techniques are grouped into three categories. Those management accounting techniques scored above 4.50 out of 7.00 are classified as highly diffused techniques, scored below 2.60 out of 7.00 are classified as slowly diffused techniques and the remaining techniques are classified as moderately diffused techniques. Highly diffused techniques are mostly traditional, slowly diffused techniques are mostly advanced and moderately diffused techniques include both traditional and advanced techniques.

4.3 Pair-Wise Application

Another type of analysis is presented in Table 21 where the status of pair-wise application is evaluated. This analysis shows the choices of different firms to a particular management accounting techniques while they are using another management accounting techniques. For example, the table shows that the firms using Target Costing (TC), 37% also use Activity Based Costing (ABC) and the firms using Activity Based Costing (ABC), 56% also use Target Costing (TC). It shows the relative preferences of different management accounting techniques. Another reason of the analysis is to look at the adaptability of firms in using competitive techniques. Some management accounting techniques are competitive and supplementary though they have some additional perspectives. For example, the techniques Quality Costing (QC) and Total Quality Management (TQM) look for the quality dimension that exists in particular firms. But the techniques have different perspectives also. Quality costing looks at the accounting and reporting issue whereas total quality management deals with the overall managerial part relating to quality requirements of a company. Even Quality costing may be a narrow part of total quality management. The table reflects that the firms using Quality Costing (QC), 57% also use Total Quality Management (TQM), and the firms using Total Quality Management (TQM), 63% is also using Quality Costing (QC). The firms using advanced techniques also use traditional ones, however, the firms using traditional techniques predominantly, they are using less advanced techniques. It means that traditional techniques are more popular to the firms operating in Bangladesh; however, advanced techniques are also used in parallel with traditional techniques.

			◊ Of those using ….																										
			Traditional									**Advanced**																	
			FC	SC	JOC	PC	ABB	FB	ZBB	BST	BLT	ABC	TC	LCC	CA	CMCAS	BM	CA	CPM	EVA	BSC	ICE	QC	TQM	SCMS	ABM	VCC	LM
● What percent also use?	Traditional	FC		39	45	58	63	64	29	43	38	54	68	28	45	37	31	42	63	45	56	37	64	65	45	54	39	34
		SC	82		71	69	47	78	56	56	45	43	54	45	56	59	36	63	59	56	54	59	53	74	48	43	28	23
		JOC	65	59		75	73	47	49	55	48	47	68	65	51	55	23	25	57	51	42	55	43	81	53	47	45	42
		PC	78	62	38		68	69	63	68	54	51	57	37	46	49	41	51	61	46	46	49	54	56	55	51	65	45
		ABB	69	73	56	37		63	61	36	67	34	59	58	56	45	25	48	68	56	68	45	58	66	43	34	37	49
		FB	73	65	64	54	45		57	48	74	37	61	48	47	56	23	58	67	47	75	56	64	57	48	37	58	35
		ZBB	77	71	38	75	69	54		65	56	46	67	61	54	51	37	47	42	64	63	51	72	48	51	46	48	29
		BST	67	82	56	54	52	67	82		49	41	75	69	48	46	33	51	42	53	54	46	39	51	35	41	61	51
		BLT	72	42	48	48	67	59	57	64		38	39	58	32	56	31	45	64	56	48	56	45	36	47	38	69	47
	Advanced	ABC	34	33	32	42	47	41	37	45	42		37	58	58	45	37	57	43	48	65	47	43	58	56	47	54	31
		TC	53	57	59	73	45	69	74	56	63	56		66	69	53	58	53	49	42	51	64	65	67	58	51	63	36
		LCC	34	45	37	48	37	38	47	51	25	48	54		48	49	52	53	58	47	49	53	58	73	59	45	47	23
		CA	54	56	59	51	58	48	49	46	51	48	55	53		52	47	48	48	49	54	53	52	65	61	48	57	41
		CMCAS	46	54	55	62	43	46	75	56	48	58	64	58	51		43	65	53	43	51	68	46	68	54	56	62	25
		BM	53	42	49	53	54	64	49	47	58	57	59	65	47	53		47	52	47	55	63	47	54	52	47	33	23
		CA	32	46	45	56	48	47	43	64	47	54	48	28	39	69	38		32	46	37	37	29	68	63	56	36	37
		CPM	59	68	56	63	51	58	65	53	51	63	53	45	28	73	45	54		53	58	74	56	57	45	43	29	33
		EVA	37	75	51	59	49	69	58	43	45	47	55	65	45	77	48	67	37		43	47	49	59	56	32	43	31
		BSC	59	63	46	57	54	53	52	54	48	57	43	37	65	67	54	59	59	59		49	63	61	58	38	45	37
		ICE	55	54	56	61	51	59	46	58	56	62	48	58	37	72	67	41	55	37	48		61	67	53	23	51	48
		QC	49	48	47	68	55	55	47	64	47	33	51	48	58	34	74	69	49	59	51	49		63	48	32	31	39
		TQM	46	65	54	67	69	42	65	72	56	36	35	61	48	53	56	38	45	55	49	43	57		56	37	61	47
		SCMS	54	57	48	42	47	35	42	39	47	29	45	69	61	34	47	48	56	49	54	65	47	57		47	36	37
		ABM	34	33	32	42	47	41	37	45	42	41	37	58	53	45	58	46	51	48	51	53	43	59	52		21	31
		VCC	47	57	58	64	58	55	53	59	64	61	61	53	58	59	63	64	46	48	55	53	59	43	39	36		23
		LM	31	35	32	25	36	33	41	45	21	25	54	43	26	27	29	34	56	26	27	31	25	34	31	23	19	

Table 21: Joint use of management accounting techniques (values shown as % of those using pairs of techniques)

Table 21 should be interpreted as follows:

'◊ of those using COLUMN techniques, ● what percentage also use ROW technique?' Because different number of respondents used each technique, the pair-wise usages are not having identical values, e.g., of those use full costing (FC), 82% also use standard costing (SC); while of those using standard costing, 39% also use full costing.

FC	Full Costing	CMCAS	Customer and Marketing Channel Analysis System
SC	Standard Costing	BM	Benchmarking
JOC	Job Order Costing	CA	Competitor Analysis
PC	Process Costing	CPM	Competitive Position Monitoring
ABB	Activity Based Budgeting	EVA	Economic Value Added
FB	Flexible budgeting	BSC	Balanced Scorecard
ZBB	Zero Based Budgeting	ICE	Intellectual Capital Evaluation
BST	Budgeting for Short Term Plans	QC	Quality Costing
BLT	Budgeting for Long Term Plans	TQM	Total Quality Management
ABC	Activity Based Costing	SCMS	Strategic Cost Management System
TC	Target Costing	ABM	Activity Based Management
LCC	Life Cycle Costing	VCC	Value Chain Costing
CA	Customer Accounting	LM	Lean Manufacturing

4.4 Sector-wise Application

The extent of different management accounting techniques varies in line with the sectors under consideration. As the study considers multi-sector analysis, the following table (Table 22) shows the sectoral variation in choosing different types of management accounting techniques.

This analysis helps to identify different sectors using management accounting techniques significantly. Garments and Textile, Pharmaceuticals and Tobacco sectors demonstrate the absorption of most of the management accounting tools. Some other sectors like Cement, Chemical/Fertilizer, Tannery/Leather sectors become average in adopting different management accounting sectors. Full costing is highly used in Chemicals/Fertilizer sector whereas it reflects that in Paper, Printing & Publication sector, the application of full costing is found minimum. This way, the table could be used to identify the sectors where different management accounting techniques are applied and to what extent. The overall result is not disappointing rather all the sectors are showing some promising picture regarding their particular interest on different management accounting techniques. Towards some techniques, the sectors have particular interest due to typical nature of that sector.

Management Accounting Techniques	Cement	Chemicals/ Fertilizer	Garments & Textiles	Jute	Oil, Gas, Fuel & Power	Paper, Printing & Publication	Pharmaceuticals	Sugar, Food & Allied	Tannery / Leather	Tobacco	Others
Traditional											
Full Costing	32	35	29	18	27	16	31	29	21	26	18
Standard Costing	41	38	43	21	28	22	38	31	28	35	39
Job Order Costing	22	24	54	22	26	32	12	31	35	32	28
Process Costing	42	37	45	24	27	25	62	21	30	36	22
Activity- based budgeting	21	25	35	18	27	21	38	26	21	42	26
Flexible budgeting	31	28	35	28	31	26	41	28	32	37	27
Zero-based budgeting	21	36	35	21	25	18	30	22	24	34	24
Budgeting for short-term plans	34	38	48	27	31	36	54	23	34	38	27
Budgeting for long-term plans	35	34	39	21	26	28	35	28	31	42	21
Advanced											
Activity Based Costing	21	23	26	12	15	18	31	17	15	26	19
Target Costing	24	26	37	21	42	24	34	15	21	32	23
Life Cycle Costing	28	29	24	26	23	42	32	28	21	29	12
Customer Accounting	34	21	32	15	22	27	24	21	26	28	16
Customer and Marketing Channel Analysis System	33	20	34	18	21	25	22	17	26	24	19
Benchmarking	21	24	23	17	21	24	22	21	27	18	16
Competitor Analysis	31	35	37	18	26	28	32	24	27	31	19
Competitive Position Monitoring	28	38	32	19	22	27	29	26	28	30	17
Economic Value Added	22	26	24	12	18	16	28	16	23	26	19
Balanced Scorecard	14	16	22	8	10	11	22	17	14	23	12
Intellectual Capital Evaluation	16	18	20	10	12	14	24	18	22	21	16
Quality Costing	32	36	45	21	26	29	53	34	38	40	41
Total Quality Management	30	34	42	23	27	28	55	32	31	42	38
Strategic Cost Management System	25	23	22	21	18	17	23	19	18	24	18
Activity Based Management	22	27	32	16	28	20	37	23	20	41	22
Value Chain Costing	21	24	26	21	22	23	28	21	18	26	14
Lean Manufacturing	16	15	17	14	8	10	21	9	11	18	10

Table 22: Accounting techniques used by industries (values shown as percent of respondents within as industry indicating use)

N.B.:
Single underline indicates lowest reported usage (excluding 'Other')
Double underline indicates highest reported usage (excluding 'Other')

4.5 Reasons of Applying Management Accounting Techniques

Management accounting techniques are applied for different reasons. The following table (Table 23) presents the reasons of applying different management accounting techniques in percentages.

Management Accounting Techniques	Cost	Product Pricing	Investment Justification	Management Performance	Sourcing Materials/ Services	New Product Introductions	Market Strategy	Engineering Process Changes	Engineering Product Changes	Quality Control	Employee Motivation
Traditional											
Full Costing	20	30	5	15	8	12	10				14
Standard Costing	30	45	6	25	5		4			12	21
Job Order Costing	22	35		11	14		8				14
Process Costing	23	45		12				10	12	15	
Activity- based budgeting	12	22	34	23		11	5	23	25		25
Flexible budgeting	22	25		35			10				28
Zero-based budgeting	12	22		32		21	12			12	24
Budgeting for short-term plans			10	25	32	22		12	15	13	21
Budgeting for long-term plans			25	15	10			10	12		14
Advanced											
Activity Based Costing	21	25	12	18				22	24		14
Target Costing	35	35		20	12	14				10	18
Life Cycle Costing	24	22	25			32					
Customer Accounting	21		22	24		14		12	13		14
Customer and Marketing Channel Analysis System	12		11	14	16	14	13	10	10	12	17
Benchmarking	14		12	14	15	13		14	11	18	12
Competitor Analysis	15			16	12			21	24	26	14
Competitive Position Monitoring	18			14	15			23	21	23	18
Economic Value Added	14	12	16	17	11		10			12	17
Balanced Scorecard				32		12	14	12	15	14	37
Intellectual Capital Evaluation			12	19	22					21	47
Quality Costing	12			22		21	15	14	16	43	12
Total Quality Management	10			18		24	12	18	14	38	16
Strategic Cost Management System	12	13		12		17	12	13	15	23	21
Activity Based Management	18	23	10	16				20	21		12
Value Chain Costing	12	14	12		23		12	13	16	12	18
Lean Manufacturing			23	14				32	28	12	23

Table 23: Accounting techniques and their applications (Values shown as % of those indicating use*)

*Values for each technique sum to greater than 100% as multiple applications could be indicated for each technique

Management accounting techniques are applied for different reasons. This study explores the reasons of applying management accounting techniques across eleven areas which are –

a) For costing
b) For product pricing
c) For evaluating different investment opportunities
d) For assessing the performance of management
e) For taking sourcing decisions of materials and services
f) For new product launching decisions
g) As a market strategy
h) For engineering process change
i) For engineering product change
j) For controlling quality
k) For motivating employees

Different management accounting techniques are found used for different reasons due to their technical specifications. For example, full costing is mainly used for product pricing, flexible budgeting is mainly used for performance evaluation.

4.6 Benefits of Management Accounting Techniques

Different management accounting techniques offer different nature of benefits to companies who use them. This study tries to capture the pattern of benefits received by applying units to give the discussion a practical look. The following table (Table 24) summarizes the benefits received by different manufacturing firms from the application of management accounting techniques across different categories like,

a) For improving profitability across products
b) For reducing costs
c) For providing relevant information to management in time
d) For reducing stock levels
e) For instilling a simplified cost management systems
f) For redesigning business process
g) For measuring performance
h) For improving quality
i) For improving production flow
j) For capturing and increasing market share
k) For enhancing employee commitment
l) Other

Management Accounting Techniques	Product Profitability Improvement	Cost Reduction	More timely and relevant management information	Lower Stock Levels	Improved delivery performance	Reduced lead time	Simplified cost management systems	Business process redesign	Performance measurement	Improved quality	Improved production flow	Increased market share	Enhanced employee commitment	Other
Traditional														
Full Costing	14	16	10				15		15			10	14	10
Standard Costing	42	28	14	12					25	12		4	21	
Job Order Costing	29	21					12		11			8	14	
Process Costing	28	16	12	14	18			10	12	15	10			
Activity- based budgeting	21	12	15	21	16	16		23	23		23	5	25	
Flexible budgeting	22	18		12	12		13		35			10	28	
Zero-based budgeting	20	12	12							12		12	24	
Budgeting for short-term (strategic) plans	18	14	16	21	14	12	11	12	25	13	12		21	
Budgeting for long-term (strategic) plans		11		10				10	15		10		14	
Advanced														
Activity Based Costing	28	24	12	12	10	12	9	20	18		20		14	11
Target Costing	33	35	21	18			21	17	22	12			18	18

Life Cycle Costing	15	17	12	13		13						13		
Customer Accounting		11			12			12	13		12	15	14	
Customer and Marketing Channel Analysis System	10	16	28	17	28	12		10	12	12	10	13	17	14
Benchmarking	8	12	14	16	10	14	15	14	18	18	14	12	12	
Competitor Analysis		14		12	16			18	14	26	21	12	14	
Competitive Position Monitoring	10	12			14	10	12	23	12	23	23	14	18	
Economic Value Added	12		10				10		20	12		10	17	
Balanced Scorecard	21		12	8			16	12	34	14	12	14	37	13
Intellectual Capital Evaluation	18			14			12	10	15	15	8	10	32	10
Quality Costing	15	15				10	12	12	20	43	11	17	14	13
Total Quality Management	10	12	12	8	10		10	20	13	38	15	13		
Strategic Cost Management System	10	15						15	10	12	12	14		
Activity Based Management	25	20		12		12		28	14	15	18	12	18	14
Value Chain Costing	12	10	12	20	22	14		15		10	12	10	12	
Lean Manufacturing	21		25	27		26		35	12	15	32		26	12
Expected value of benefit, from 0 (least important) to 7 (most important)														
Mean	6.25	6.82	5.79	4.32	4.21	4.73	5.18	6.13	5.37	5.28	4.13	4.09	4.97	3.21
Standard deviation (σ)	1.82	1.69	2.83	2.00	1.38	1.85	1.63	1.29	1.87	2.31	2.58	1.03	2.13	2.54

Table 24: Benefits experienced from application of accounting techniques (value shown as % of those indicating use)
Underline indicates most frequently reported benefit for each technique

4.7 Exploratory Factor Analysis

As already mentioned, this study uses 26 management accounting techniques to understand the level of application of different management accounting techniques by manufacturing firms operating in Bangladesh. However, using these 26 techniques separately for inferential analysis is operationally difficult and will not bring any merit in analysis. Thus, categorizing these techniques into smaller groups is important for making the analysis worthy and manageable. Exploratory factor analysis is done as a data reduction technique to identify whether any grouping among them is possible or not. A summary of the factor analysis is presented below (Table 25):

	Measures	**Values**
1.	Measure of Sampling Adequacy	**.817**
2.	Level of Significance	**.000**
3.	Number of Factors Extracted	**5**
4.	Cumulative Percentage	**67.985**
6.	Reliability – Cronbach's Alpha	**.863**

Table 25: Summary of factor analysis

Interpretive adjectives for the Kaiser-Meyer-Olkin Measure of Sampling Adequacy are: in the 0.90 as marvelous, in the 0.80's as meritorious, in the 0.70's as middling, in the 0.60's as mediocre, in the 0.50's as miserable, and below 0.50 as unacceptable. The value of the KMO Measure of Sampling Adequacy for this set of variables is .817, which would be labeled as 'meritorious'. Bartlett's test of sphericity tests the hypothesis that the correlation matrix is an identity matrix; i.e. all diagonal elements are 1 and all off-diagonal elements are 0, implying that all of the variables are uncorrelated. If the Sig value for this test is less than our alpha level, we reject the null hypothesis that the population matrix is an identity matrix. The Sig. value for this analysis leads us to reject the null hypothesis and conclude that there are correlations in the data set that are appropriate for factor analysis. This analysis meets this requirement. A total of 5 factors have been extracted having more than 1 eigenvalues with a cumulative percentage of about 68 which is within the accepted range. Finally alpha value of .863 ensures the reliability (α=.863>.70). The five factors as per the rotated component matrix are presented below (Table 26) with different management accounting techniques in each factor:

Factors	**Naming**	**Management Accounting Techniques**
Group 1	Cost Management Techniques	Full Costing, Standard Costing, Job Order Costing, Process Costing, Activity Based Costing, Target Costing, Life Cycle Costing
Group 2	Budgeting Techniques	Activity- based budgeting, Flexible budgeting, Zero-based budgeting, Budgeting for short-term (strategic) plans, Budgeting for long-term (strategic) plans
Group 3	Competitive Position Management Techniques	Customer Accounting, Customer & Marketing Channel Analysis System, Benchmarking, Competitor Analysis, Competitive Position Monitoring

Group 4	Performance Management Techniques	Economic Value Added, Balanced Scorecard, Intellectual Capital Evaluation
Group 5	Value Management Techniques	Quality Costing, Total Quality Management, Strategic Cost Management System, Activity Based Management, Value Chain Costing, Lean Manufacturing

Table 26: Grouping of management accounting techniques as per factor analysis

4.8 Regression Analysis

This section presents the results of regression analysis. The purpose of this analysis is to identify any relationship between the groups of management accounting techniques and other parameters assumed on the study like productivity, competitive advantage and strategic position grouped into cost leadership and product differentiation criteria. In two different modules, four models are run considering four different variables.

Module 1: In this module, 5 factors as identified by exploratory factor analysis are considered as independent variables where productivity, competitive advantage and strategic positioning are considered as dependent variables in four different models. Based on the grouping, the dataset is manipulated to bring average value of all the 27 techniques into five categories. The regression runs result the following summary:

Dependent Variables	**Model 1:** Productivity		**Model 2:** Competitive Advantage		**Model 3:** Strategic Positioning - CL		**Model 4:** Strategic Positioning - PD	
	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.
Cost Management Techniques	**.244**	**.042**	.061	.668	**.239**	**.036**	-.190	.195
Budgeting Techniques	.006	.959	.014	.912	-.090	.484	-.074	.563
Competitive Position Management Techniques	.028	.813	**.293**	**.024**	.038	.770	**.243**	**.021**
Performance Management Techniques	**.256**	**.038**	.047	.696	-.081	.577	-.061	.601
Value Management Techniques	-.100	.368	.021	.859	.035	.765	**.298**	**.018**
ANOVA								
F	2.463		1.188		2.650		1.109	
Sig.	**.019**		.319		**.020**		.363	
Model Summary								
R	.762		.428		.814		.511	
R Square	.581		.183		.663		.261	

Table 27: Summary of regression analysis

As per the summary presented in Table 27 above, only Model 1 and Model 3 out of 4 models become significant and explanatory power of these two models are comparatively better. Model 1 shows the impact of different management accounting techniques on productivity. About 58% variability in productivity is explained by different management accounting techniques. However, only two categories of management accounting techniques, i.e., cost management techniques ($p<.050$) and performance management techniques ($p<.050$) becomes statistically significant meaning that management accounting techniques grouped under cost management techniques and performance management techniques explains the variability of productivity.

Similarly, about 66% variability in strategic positioning – CL (cost leadership) is explained by different management accounting techniques and the model is significant at $p<.050$. However, only those management accounting techniques grouped under cost management techniques become significant in explaining the variability of dependent variable leaving all other management accounting techniques grouped under other four categories.

Other two models, where dependent variables are competitive advantage and strategic positing – PD (product differentiation), becomes very poor in terms of explanatory power and they are not significant even. In model 2, competitive position management techniques become significant in explaining competitive advantage at $p<.050$. And in Model 4, competitive position management techniques and value management techniques become significant both at $p<.050$.

This analysis concludes that selective management accounting techniques explain the variability in productivity and strategic positioning for companies which take cost leadership strategy. It means, firms operating in Bangladesh still work within the core objective which is controlling cost. Management accounting techniques are not being used from broader perspectives.

Module 2: In this module, the grouping of management accounting techniques is done based on their average score on 7.00 point scale which is summarized in Table 19 before. As per that classification, 26 management accounting techniques are grouped into three categories: highly diffused, moderately diffused, and slowly diffused techniques. A summary of which is presented in Table 28 below.

Groups	**Rules**	**Techniques**
Highly Diffused Techniques	Average score above 4.50	Quality Costing, Total Quality Management, Job Order Costing, Standard Costing, Budgeting for short-term (strategic) plans, Full Costing, Budgeting for long-term (strategic) plans
Moderately Diffused Techniques	Average score above 2.60 but less than 4.50	Target Costing, Process Costing, Customer Accounting, Strategic Cost Management System, Benchmarking, Flexible budgeting, Zero-based budgeting, Customer and Marketing Channel Analysis System, Balanced Scorecard, Competitive Position Monitoring, Competitor Analysis

Groups	Rules	Techniques
Slowly Diffused Techniques	Average score less than 2.60	Activity- based budgeting, Intellectual Capital Evaluation, Value Chain Costing, Life Cycle Costing, Activity Based Costing, Activity Based Management, Economic Value Added, Lean Manufacturing

Table 28: Grouping of management accounting techniques as per average score

Based on these 3 revised groupings, four different models are formulated again considering the four variables (as done before in Module 1) as dependent in each model with the following summary results.

Dependent Variables	Model 1: Productivity		Model 2: Competitive Advantage		Model 3: Strategic Positioning - CL		Model 4: Strategic Positioning - PD	
	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.
Highly Diffused Techniques	.567	.000	-.065	.595	.078	.524	-.065	.609
Moderately Diffused Techniques	-.270	.020	-.170	.299	.155	.329	.191	.266
Slowly Diffused Techniques	-.162	.193	.043	.756	-.069	.610	.088	.544
ANOVA								
F	5.724		1.328		1.078		1.813	
Sig.	.001		.269		.362		.150	
Model Summary								
R	.783		.257		.427		.338	
R Square	.613		.066		.182		.114	

Table 29: Result of regression analysis

It is very interesting to note that, as per this analysis, only model 1 (with productivity as dependent variable) becomes significant where around 61% of variation in productivity is explained by different management accounting techniques. Highly diffused techniques become significant individually ($p<.001$). Moderately diffused techniques also become significant ($p<.050$) though it shows a negative relationship with productivity. Slowly diffused techniques are not significant. Other models are not significant.

The analysis checked the possible existence of multicollinearity in the regression models. Multicollinearity is a high degree of correlation among several independent variables when a regression model incorporates a large number of independent variables. It is because some of them may measure the same concepts or phenomena. Existence of multicollinearity is not only a violation of OLS assumption but also it violates the assumption that X matrix is full ranked, making OLS impossible. When a model is not full ranked, that is, the inverse of X cannot be defined, there can be an indefinite number of least squares solutions. However, there is no clear-cut criterion for evaluating multicollinearity of linear regression models.

Correlation coefficients of independent variable may be checked. But, high correlation coefficients do not necessarily imply multicollinearity.

In multiple regression models, collinearity can be related to the existence of linear dependencies among the columns of the X matrix. For each regressor x_j, the tolerance (Tol) can be computed as $Tol_j = 1 - R_j^2$, where R_j^2 is the coefficient of determination obtained in each of the k auxiliary regressions of the form:

$$x_{ji} = \delta_0 + \delta_1 x_{1i} + \ldots + \delta_{j-1} x_{j-1i} + \delta_{j+1} x_{j+1i} + \ldots + \delta_k x_{ki} + v_i$$

Thus, Tol_j shows the proportion of variance x_j that is not accounted for by the remaining $k-1$ regressors and can be used as an index of the degree of collinearity associated to x_j. Another index of collinearity of x_j, called variance inflation factor (VIF) can be obtained as a measure of the increment of the sampling variance of the estimated regression coefficient of $x_j (b_j)$ due to collinearity. It shows how multicollinearity has increased the instability of the coefficient estimates (Freund and Littell, 2000). Putting differently, it tells us how 'inflated' the variance of the coefficient is, compared to what it would be if the variable were uncorrelated with any other variable in the model (Allison, 1999). VIF_j can be computed as the jth diagonal value of the inverse of the R correlation matrix among the regressors or alternatively as $1 / Tol_j$.

However, there is no formal criterion for determining the bottom line of the tolerance value or VIF. Some argue that a Tol_j less than 0.1 or VIF_j greater than 10 roughly indicates significant multicollinearity. Others insist that magnitude of model's R^2 be considered determining significance of multicollinearity. Klein and Nakamura (1962) suggest alternative criterion that R_j^2 exceeds R^2 of the regression model. In this vein, if VIF_j is greater than $1 (1 - R^2)$ or a Tol_j is less than $(1 - R^2)$, multicollinearity can be considered as statistically significant. As the last column of the table above indicates both Tol_j and VIF_j is within the range causing no multicollinearity that may be of concern.

Overall measures of collinearity which take all regressors into account simultaneously have also been suggested. The most often used overall collinearity diagnostic is the condition number (Belsley et al., 1980; Belsley, 1982). The condition number of a matrix is the square root of the ratio of the largest to the smallest eigen-values. A large condition number of the X'X augmented moment matrix reflects the existence of one or more linear dependencies among the columns of X (Belsley et al., 1980).

When there is no collinearity at all, the eigenvalues, condition indices and condition number will all equal one. As collinearity increases, eigenvalues will be both greater and smaller than 1 (eigenvalues close to zero indicate a multicollinearity problem), and the condition indices and condition number will increase. An informal rule of thumb is that if the condition number is 15, multicollinearity is a concern; if it is greater than 30 multicollinearity is a

serious concern. The Table below incorporates collinearity diagnostics data that again produces no data of serious concern.

Statistics	Tol_j	VIF_j	**Eigenvalue**	**Condition Index**	**Proportion of Variation**
Critical Value	Less than $(1-R^2)$, roughly less than 0.1	Greater than $1/(1-R^2)$ roughly greater than 10	Less than .01	Greater than 50 (or 30)	Greater than 0.8 (or 0.7)
Method	R_j^2 from a regression $X_j = X_{others}$		Principal Component Analysis on the X'X matrix		

Table 30: Collinearity diagnostics data

Durbin-Watson test is important to check whether there exists any serial autocorrelation. In multiple regression analysis, it has been assumed that the error term is independent with a mean value of zero but in practice, it may happen that the errors are not independent instead *auto-correlated*. Such error autocorrelation, or "serial correlation", has many undesirable but correctable consequences (e.g., the least-squares estimates are sub-optimal, standard confidence intervals for β are incorrect; the error term is forecastable). Thus, it is highly desirable to try to detect error autocorrelations. The Durbin-Watson Test for serial correlation assumes that the ε_i are stationary and normally distributed with mean zero. It tests the null hypothesis H_0 that the errors are uncorrelated against the alternative hypothesis H_1. Since d is approximately equal to $2(1-r)$, where r is the sample autocorrelation of the residuals, $d = 2$ indicates no autocorrelation. The value of d always lies between 0 and 4. If the Durbin–Watson statistic is substantially less than 2, there is evidence of positive serial correlation. As a conservative rule of thumb, Field (2009) suggests that values less than 1.0 and greater than 3.0 are definitely cause for concern. Small values of d indicate successive error terms are, on average, close in value to one another, or positively correlated. If $d > 2$, successive error terms are, on average, much different in value to one another, i.e., negatively correlated. In regressions, this can imply an underestimation of the level of statistical significance. In this analysis, the value of d is calculated as 1.726 which is not lower than 1 or substantially less than 2. Thus, it may be concluded the autocorrelation that may exist in the analysis is not of alarming.

4.9 Impact of Strategic Positioning on the Choice

The analysis is done to understand the variation of choosing different management accounting techniques due to the difference in strategic positioning, viz., cost leadership and product differentiation. Some of the responding firms takes cost leadership strategy and some others take product differentiation strategy. It is an important issue to look at their behavior while they are choosing management accounting techniques. Here, strategic positioning

has been taken as independent variable with two options, either cost leadership or product differentiation. And management accounting techniques have been considered as dependent variables. To find out any relationship between management accounting techniques and strategic positioning, the Mann-Whitney U test is applied. The test is a nonparametric test that can be used to analyze data from a two-group independent groups design when measurement is at least ordinal. It analyses the degree of separation (or the amount of overlap) between the groups. The null hypothesis assumes that the two sets of scores are samples from the same population; and therefore, because sampling was random, the two sets of scores do not differ systematically from each other. The alternative hypothesis, on the other hand, states that the two sets of scores do differ systematically. The test results two important tables based on which the decision should be taken whether null hypothesis will be accepted or rejected.

Ranks				
	Strategic Positioning	N	Mean Rank	Sum of Ranks
Management Accounting Techniques	Cost Leadership	59	5.39	318.01
	Product Differentiation	38	4.15	157.70
	Total	97		

Test Statistics[a]	
	Management Accounting Techniques
Mann-Whitney U	123.000
Wilcoxon W	548.000
Z	-1.837
Asymp. Sig. (2-tailed)	.066
a. Grouping Variable: Strategic positioning	

Ranks Table

The Ran.ks table is the first table that provides information regarding the output of the actual Mann-Whitney U test. It shows mean rank and sum of ranks for the two groups tested (i.e., CL and PD groups). The table is very useful because it indicates which group can be considered as having the higher practices of management accounting techniques, overall, namely, the group with the highest mean rank. In this case, the 'CL' group had the highest score.

Test Statistics Table

This table shows us the actual significance value of the test. Specifically, the Test Statistics ta.ble provides the test statistic, *U* statistic, as well as the asymptotic significance (2-tailed) *p*-value. From this data, it can be concluded that the application of management accounting techniques in the groups do not differ significantly ($U = 123$, $p = .066$).

Decision

As per the output of Mann-Whitney U test, it can be concluded that the model is not statistically significant and thus null hypothesis is not accepted. In other words, alternate hypothesis is accepted which means that adoption of different management accounting techniques varies with the choice of strategy. The justification of such conclusion is well-founded and matched with previous findings. Choice of management accounting techniques should be aligned with the choice of strategy. Companies that take cost leadership strategy will use such management accounting techniques which will help the company to achieve cost advantages whereas companies that take product differentiation strategy will go for other management accounting techniques that support product differentiation drive of the firms.

5.0 Conclusion

Application of management accounting techniques depends on some contextual variables guided by the contingency theory. Such practices cannot be grossly generalized. Every micro unit of the economy has its own characteristics to adopt and diffuse different techniques. This study researched the level of management accounting techniques applied by different manufacturing firms and tried to draw a brief profile including benefits from such application, level of applications, objectives, and reasons of application for further studies. Literature review has been done extensively to develop a list of available management accounting techniques applied by firms with different categories of grouping. From this review, a list is developed to study their level of application and other peripheral issues in Bangladesh.

The study undertook a positivist paradigm of quantitative research and develops a semi-structured questionnaire to capture the selective information from the practitioners. From various studies done so far, three variables have been identified to analyze the impact of chosen management accounting techniques on them. These variables are productivity, competitive advantage and strategic positioning. It is hypothesized that management accounting techniques have a positive relationship with productivity, competitive advantage and strategic positioning.

The study results that traditional techniques of management accounting have been used widely by Bangladeshi firms whereas advanced techniques are selectively used. Some other techniques are moderately used. All the management accounting techniques selected in the study have been grouped considering their internal consistency and hegemony. Exploratory factor analysis has been used as a data reduction technique which confirms the construct validity and results five grouping among the management accounting techniques. Regression analysis reveals the management accounting techniques have positive relationship with productivity and strategic positioning for those firms taking cost leadership strategy. However, other models become insignificant where competitive advantage and strategic positioning in the form of product differentiation have been considered as dependant variables. In another analysis it is revealed that the choice of management accounting techniques differ due to the strategic choice of firms.

The result carries enough significance to understand the state of management accounting practices in Bangladesh. As most of the Bangladeshi firms are in first generation, they receive regulatory support and thus, they are still busy managing the core objectives of firms, e.g., ensuring productivity while maintaining cost competitiveness. Firms are not taking the expanding role like competitive advantage. However, the findings should be studied considering the limitations of the study; it is based on a sample of 97 firms and it is done based on a semi-structured questionnaire survey during 2015-16. The study may act as a baseline study for similar studies in the days ahead.

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