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Contingencies Driving Management Accounting Practices in Manufacturing Industries: Bangladesh Perspective

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Abstract: *This paper examines the contingencies explaining the management accounting practices (MAPs) in Bangladesh. The application of management accounting tools (MATs) is the proxy of MAPs. Data from a sample of 215 respondents were collected using a structured questionnaire. The respondents are professional chartered accountants and production managers of the listed manufacturing companies. This research utilizes partial least-square structural equation modelling to evaluate and verify the theoretical concept. The results indicate that four factors under three categories, external, organizational and processing characteristics, have a significant influence on MAPs. Under the external characteristics category, customer power is found to be positively influencing, while competitive strategy and product diversity are positively influencing factors in the organizational characteristics segment. Complexity in processing systems is found as the most influencing factor under the head of processing characteristics. This research highlights the significance of understanding the contingencies that impact MAPs in manufacturing industries. Thus, it contributed by presenting a contingency model to explain the application of MATs.*

Keywords: Bangladesh, Contingency Theory, MAPs, MATs, Manufacturing Industries

1. Introduction

The business world is undergoing rapid changes. To cope with the ever-changing business context, firms need to adopt new techniques and data-driven decision-making processes (Susilawaty & Lubis, 2023). Technological advancement, competition and business innovation have fetched noteworthy changes in manufacturing sectors (Alsharari, 2024; Kabir, 2019). In the past three decades, a variety of creative management accounting (MA) tools have been initiated through a broad spectrum of industries to the ever-changing business model needs (Abdel-kader & Luther, 2008). Manufacturing in every nation is a crucial industry for fostering systemic reform, meaningful employment and sustainable economic development (European Union, 2012; Naudé & Szirmai, 2012; Westkämper & Walter, 2014). Reindustrialization by competitive and efficient manufacturing is required in the sense of economic globalization and to ensure sustained economic growth and development. (Herman, 2016). Again, MA literature proposes the advantages of implementing Management Accounting Practices (MAPs) to enhance the market competitiveness of the manufacturing sectors.

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The goal of this paper is to illustrate the determinants of MAPs for the sustainable growth of the manufacturing industry. In reality, MAPs include numerous methods, strategies and useful knowledge for operational, managerial and strategic decision-making (Azudin & Mansor, 2018). Since there is no best primary tool for all organizations in all environments, the management must choose appropriate accounting tools and techniques in decision-making based on the specific context (Ahmad & Zabri, 2015). Amara and Benelifa (2017) classified the factors influencing MA into internal and external factors. They adopted the contingency model to determine the main external and internal contingencies for explaining the application of MA. However, to get a more comprehensive picture of Maps the factors in this research include three broad categories called external, organizational and processing characteristics in line with the model proposed by Abdel-Kader and Luther (2008). The MAPs are represented by the application of Management Accounting Tools (MATs) under three broad areas called operational, managerial and strategic tools suggested by the Chartered Institute of Management Accountants (CIMA) and the Institute of Management Accountants (IMA).

Rapid technological changes in the business environment, more overhead intensified production, and product diversity have called for research on the application of MA tools and techniques in the manufacturing sector. Still, the number of research in this specific area is limited, especially in a developing country like Bangladesh (Burns & Baldvinsdottir, 2005; Kabir, 2019). Hence, this paper will investigate the factors influencing the application of MATs in the decision-making process of the manufacturing industry. Prior research has focused on the application of MAPs in a variety of economic scenarios to aid companies in better adjusting to shifting environmental conditions (Pires et al., 2023) and maintaining their competitive advantages (Alkhasawneh et al., 2023). However, the majority of these studies mostly focused on businesses in advanced economies. In undeveloped countries, there are not many studies on this subject (Alkhasawneh et al., 2023). Hence, keeping the importance of the application of tools of management accounting for better performance in mind and the dearth of research in this area, especially in Bangladesh, this research explores the effect of several contingencies on a wide variety of MAPs in the sample of listed firms chosen from the manufacturing industries in Bangladesh. This research aims to answer the following questions:

i)   What are the external contingencies impelling MAPs?
ii)   What are the organizational features driving MAPs?
iii)   What are the processing characteristics influencing MAPs?

2. Theoretical Framework

2.1 Contingency Theory Framework

In examining MAPs, most of the researchers in earlier studies stressed on contingency-based research framework highlighting the significance of external and internal influences as explanatory variables (Ahmad & Zabri, 2015). The relationship between MAPs and contingency theory was the prime issue around the mid-1970s in the MA literature. According to the contingency theory, there is no specific best solution for firm performance; rather, it depends on the firm and industry-specific characteristics. (Otley & Berry, 1980). Contingency theory explains institutional behaviour, referring to the ways contingencies such as technology, ethos and exogenous issues impact the strategy and managerial decision-making of firms. The hypothesis underlying this theory indicates that no specific organizational arrangement is similarly pertinent to every firm.

Instead, firms' efficiency depends on contingencies like external, organizational and product processing factors (Asiri et al., 2020). The theory is grounded on two basic suppositions. First, no specific edifice is fit for all firms. Second, a structure can be optimum when verified by certain contingencies (Amara & Benelifa, 2017). Chenhall (2003), in his study, reviewed the contingency theory initiated in the 1980s and explained many potential contingency factors, including environment, technology, competition, structure, strategy, and national culture, which influence MAP. The contingencies, as identified by Chenhall (2003), are still very much useful in explaining MAP. For making effective decisions and better management accounting practices (MAPs), contextual factors also play an essential role (Islam & Hu, 2012). Firm-specific contingencies like market exposure, product diversity, process complexity, strategic issues of a firm and socio-economic development affect MAPs (Cadez & Guilding, 2008; Aver et al., 2009). Thus, it can be summarized that firms have their own internal and external variables explaining the type and extent of MAPs, and hence, no specific pattern can be proposed. However, a set of internal and external factors are vital to explain MAPs. Therefore, this study is an attempt to identify the factors influencing the applications of management accounting tools for accomplishing different managerial functions, taking contingency theory as the core.

The research explores the effect of several theoretically independent factors on a wide variety of MAPs in manufacturing companies. The MAPs are quantified in terms of the MATs used. The available management accounting tools, as prescribed by CIMA and IMA, USA, are summarized under operational, managerial and strategic groups. The factors are linked to external parameters, features of the organization, and features related to production. This study took into account eight (08) contingency elements, including two constructs (product perishability and consumer power) previously explored in only one UK-based research done by Abdel-Kader and Luther (2008) and one construct called commitment of managers used in the studies of Kalimullah et al., (2012), and Ahmad and Zabri (2015). The following framework for this study was built based on the model given by Abdel-Kader and Luther (2008), which shows the relationship between firm characteristics and MAPs in terms of MATs (Figure 1).

Figure 1: Contingencies Influencing MAPs

Source: Authors' Compilation.
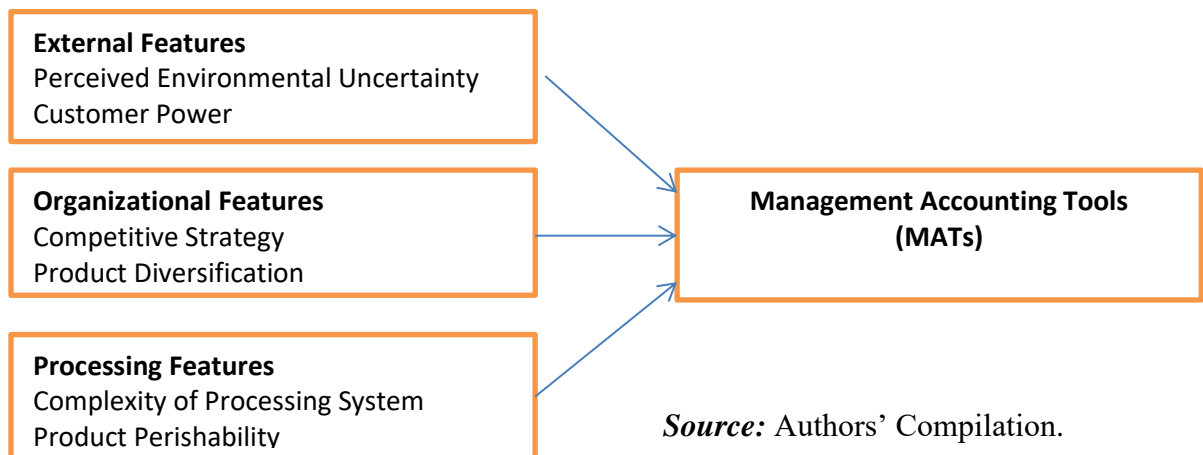
3. Literature Review

3.1 Literature on MAPs

Ittner and Larcker (2002) described MAPs as a range of methods that were primarily regarded by manufacturing enterprises to help with corporate architecture and MA processes. It involves budgeting, success evaluation, decision-making details and strategy planning (Alsharari, 2024). In European companies, studies in management accounting were conducted by various researchers like Pierce et al. (1998); Haldma and Lääts (2002); Laitinen (2001); Decoene and Bruggeman (2006); Szychta (2002); Hyvonen (2005). The study of Alsharari (2019) claimed that the landscape of transformation of organizations is not stagnant. Hence, it demands the adoption of modern MAPs. Pierce et al. (1998) studied MAPs among Irish accountants and found that conventional approaches, such as financial planning measures and performance assessment, tended to rule management accounting systems. This indicates that the key benefit of modern techniques might be to supplement rather than replace existing methods. Recent research has found that financial measures, such as inventory management analysis and cost control budgeting, are essential management accounting features in today's organizations and will continue to dominate in the future (Hyvonen, 2005).

3.2 Literature on Firm Characteristics Influencing Management Accounting Practices

Organizational culture is dynamic. Such dynamism is taking place both for the influence of internal and external factors (Alsharari, 2019). Although internal contingency is classified as technology, operating elements, and regulations, external variables are the characteristics of an external setting (Alkhasawneh et al., 2023) and MA climate that form internal structures (Haldma & Laats, 2002). In a recent study by Geddes (2020), it has been found that emerging technology fields have a substantial impact on MAPs. The exterior characteristics were the central element in contingency-based MA studies, with much of the prior findings endorsing the idea that global instability and business competitiveness have affected the usage of MATs. For instance, Bruns and Kaplan (1987) defined rivalry as the most significant external influence to motivate managers to continue operating on a new structure. To decide on the price and cost of the goods, larger companies with diversified product portfolios must have extensive management accounting practices (Ahmad, 2014; Rumman et al., 2024). This study includes product portfolio diversification as a measure of the company's size because research has shown it to be pertinent in MAPs (Albu & Albu, 2012; Haldma, & Laats, 2002). Smaller businesses with fewer goods choose to use conventional MAPs as opposed to advanced MAPs (Haldma, & Laats, 2002). This occurs because management needs more information to assess how their businesses perform in relation to various products (Haldma & Laats, 2002). Uncertainty in market competition is a significant element influencing a firm to apply MAPs (Pires et al., 2023). MAPs are crucial as market competition develops and as time goes on because they help businesses compete successfully and assist them in making better decisions (Ahmad, 2014). Additionally, MAPs in businesses today compete fiercely with one another due to both internal and external variables. Technological advancements, corporate strategy, and management support are examples of elements that influence the adoption of sophisticated management accounting tools (Ahmad, 2014). Organizations can maintain their competitive edge in the market with the use of advanced manufacturing technologies (Nair & Nian, 2017). Ahmad (2012) examined the relationship between MAP and sophisticated manufacturing technologies.

Additionally, the implementation of modern management accounting tools in manufacturing organizations could be impacted by technological limitations and production process complexity (Haldma & Laats, 2002). As a result, the manufacturing procedure necessitates that MAPs grow increasingly complicated and advanced (Haldma & Laats, 2002). Businesses that use contemporary technology in their production processes have an influence on MAPs. Larger businesses may follow trends since the business environment and technology in the 21st century have been expanding rapidly and being broadly distributed (Ahmad, 2012). Anderson and Lanen (1999) investigated the development of a large variety of MAPs in 14 Indian companies and noticed that shifts in the global world contributed to improvements in MAPs. Based on 110 medium- and small-sized enterprises in Malaysia's production sector, Kalimullah et al. (2012) found that competitiveness, top management engagement, and advanced manufacturing technology (ATM) had a major effect on MAPs. The earlier studies (Tayles & Drury, 1994; Abdel-Maksoud, 2004; Al-Omiri & Drury, 2007; Szychta, 2002) were concentrated to investigate the impact of a sophisticated production system and AMT over the application of MATs. They remarked that relatively advanced MA tools exist in those firms that have made a significant investment in TQM and ATM. Abdel-Kader and Luther (2008) have noted that improvements in MAPs are explained by the introduction of advanced output control techniques such as TQM and ATM. Luther and Longden (2001) attested that variables, such as the strength of rivalry and economic uncertainty, also contributed to the changes in MAPs in South Africa.

On the other side, a few kinds of research have shown both no association and adverse outcomes (e.g., Merchant, 1984; Hoque & James, 2000; Williams & Seaman, 2001; O'Connor et al., 2004; Albu & Albu, 2012). For instance, Williams and Seaman (2001) noticed a significant negative association between the MAPs and the competitive strength in Singapore. In their analysis using a survey of 109 respondents in Romaniaet al. (2012) noticed that there is little statistical support for the external environment and competition variables on MAPs.

3.3 Summary of Literature and Research Gap

While MAP studies on industrial businesses are highly advanced in several advanced nations, an examination of the literature reveals that specific sectors, particularly in Bangladesh, have paid less attention to management accounting research (Kabir, 2019; Rahman et al., 2024). Though there have been several studies on budgeting techniques, Activity Based Costing and customer profitability analysis, there is a dearth of research that covers the use of management accounting tools in a wider context (Rashid et al., 2023). Previous studies have emphasized the significance of MAPs in many economic situations to better adapt to changing circumstances and to support the preservation of competitive advantage. However, the majority of such research is predominantly given importance to companies in advanced economies. There is no many research on this subject conducted in developing nations. Thus, to explain the importance of management accounting practices and the factors influencing such practices, substantial studies are required. Hence, there is a research gap to fulfil that might contribute to the betterment of the manufacturing industries in Bangladesh to become more competitive in the global context.

4. Development of Hypothesis

4.1 Perceived Environmental Uncertainty (PEU)

In earlier studies, the influences of PEU on the application of MA tools and tasks have been revealed along with the impact of MAPs on performance (Chong, 1996; Gul & Chia, 1994; Pires

et al., 2023). Research results suggested that managerial decision-makers prefer to obtain more external knowledge in comparison to certain forms of information under uncertainty. The level of MATs application is also higher when there is more considerable environmental uncertainty (Gordon & Narayanan, 1984). Gul and Chia (1994) concluded that when there is high uncertainty in the business environment, companies may need additional details to resolve environmental complexities. On the other side, low environmental volatility allows managers to render reasonably reliable business forecasts without much intervention and with fewer MATs. This body of evidence shows that when an enterprise is faced with a high degree of confusion, the usage of MM resources and activities may increase. Hence, the following proposition is taken.

Hypothesis 1: PEU has a significant impact on the application of MAT.

4.2 Customer Power (CP)

While the effect of customer power was not studied in management accounting until the early 1990s, Abdel-Kader and Luther (2008) concluded that companies working in the industry with a significant degree of CP are in need of sophisticated MAPs. Such firms are more motivated to use advanced MAPs to enhance their monitoring and decision-making systems. It helps them keep their challenging customers happy. Similarly, companies with relatively narrow product portfolios and dependence on the existing supply chain may have less reliance on MAPs. Alsharari (2024) and Kalimullah et al. (2012) also reported that the strength of market rivalry had a significant effect on the adoption of MATs. The following hypothesis addresses these arguments:

Hypothesis 2: CP has a significant influence on the application of MATs.

4.3 Competitive Strategy (CS)

The intensity of market competition forces managers to adopt changes in competitive strategy, which requires sophisticated MAPs (Alsharari, 2024; Khandwalla, 1972; Libby & Waterhouse, 1996; Bjørnenak, 1997; O'Connor et al., 2004). Unfortunately, the traditional MAPs are inadequate in ensuring the information requirements of firms for making strategic decisions to meet the intensified competition (Nuhu et al., 2017). When competition increases, more accurate MA knowledge is likely to be needed by companies to perform effectively and avoid inaccurate information-based decision-making (Al-Omiri & Drury, 2007). Hence, competitive strategy and MAPs are closely related, leading to the following hypothesis.

Hypothesis 3: CS has a significant impact on the application of MATs.

4.4 Product Diversity (PD)

When firms need to control more affairs requiring much information in comparatively large organizations, they need to adopt more sophisticated management accounting tools (Child & Mansfield, 1972). Khandwalla (1972) claimed that bigger firms had diversified their product portfolios, which required the implementation of sophisticated production techniques and more controls. Past research (e.g., Al-Omiri & Drury, 2007; Abdel-Kader & Luther, 2008; Albu & Albu, 2012; Haldma & Laats, 2002; Magnacca & Giannetti, 2023; Merchant, 1984) have repeatedly demonstrated that the scale and complexity of the company's goods have affected the usage of MAPs in manufacturing industries. Larger companies become more diverse and encounter more complicated challenges when manufacturing diversified products. As a consequence, they need more oversight and knowledge of their market operations and thus require more detailed and advanced MAPs. Haldma and Laats (2002) have claimed that the complexity of cost and MA

continues to grow in line with commodity variety. Thus, the above research findings enable us to hypothesize,

Hypothesis 4: PD has a significant influence on the application of MATs.

4.5 Management Commitment (MC)

The management's commitment to an organization explicitly influences the degree to which MAPs are used (Ahmad & Zabri, 2015). Brown and Caylor (2004), and Albu and Albu (2012) affirm this claim in their MA studies. This variable would then be a contingency for evaluating the theory. It refers to a significant relationship between the commitment of the manager and the degree to which MATs are used. Thus, the following hypothesis is formulated:

Hypothesis 5: MC for the organization has a significant impact on MATs.

4.6 Complexity in Processing System (CPS) and Product Perishability (PP)

Though Amara and Benelifa (2017) found no significant relationship between process complexity and MAPs, Studies of Lin et al. (2002), Tayles and Drury (1994); Abdel-Maksoud (2004), Al-Omiri and Drury (2007), and Szychta (2002) have found a significant impact of process complexity on MAPs. Similarly, Holmes and Nicholls (1988) studied 928 Australian SMEs to see the effect of industry-specific processing type on MAPs and found a positive influence. Thus, the following hypotheses are formulated.

Hypothesis 6: CPS requires higher application of MATs.

4.7 Product Perishability (PP)

Product perishability has a major impact on decisions made by organizations, including warehousing and inventory procedures. Smith and Patel (2022) did research on risk management and insurance techniques in perishable goods, with a focus on adapting MAPs to address perishable item hazards. They found a positive impact of product perishability on MAPs. Nguyen and Tran (2024) explored the importance of timeliness within supply chains and its impact on managerial decisions. They emphasize the requirement for MAPs while managing perishable items. Thus, the following hypothesis is proposed.

Hypothesis 7: PD influences MATs.

4.8 Advanced Manufacturing Technology (AMT)

The application of new technologies in manufacturing operations has been shown to affect the level of usage of MAPs in earlier studies. Technology has grown quite quickly in today's business and has been widely disseminated. The usage of AMT is related to the strengthening of global competitiveness, as well as to the need for innovation in MA activities (Abdel-Kader & Luther, 2008). For this reason, it is crucial to evaluate this variable as one of the possible contingent variables that describe the degree to which MAPs are used in manufacturing companies (Ahmad & Zabri, 2015). Hence, the following hypothesis is formulated to be tested.

Hypothesis 8: Application of AMT has a significant impact on MATs.

5. Study Methods

The approach followed in the study is similar to earlier where there are two steps to evaluate the research model (Shmueli & Koppius 2011; Chong, 2013; Liébana-Cabanillas et al., 2014). In the

first step, the measurement model was checked, while in the second step, the structural equation model was applied to consider the important effect of predictors on the application of MATs.

5.1 Variable Measurement

The conceptual framework of this research contains eight exogenous constructs and one endogenous construct. Twenty-three statements are formed to construct an exogenous variable, while three items are formed to evaluate the endogenous variable. A Likert scale of five (05) points was utilized to assess the model. The following Table (Table 01) highlights the sources of the constructs of the study.

Table 01: Sources of Construct and Items in the Questionnaire

Construct	Source Research
Perceived environmental uncertainty (PEU)	Abdel-Kader & Luther (2008).
Customers' power (CP)	Abdel-Kader & Luther (2008).
Competitive strategy (CS)	Kalimullah et al. (2012)
Product Diversity (PD)	Abdel-Kader & Luther (2008).
Management commitments (MC)	Ahmad & Zabri (2015).
Complexity in Processing System (CPS)	Lin et al. (2002); Tayles and Drury (1994); Abdel-Maksoud (2004); Al-Omiri & Drury (2007); Szychta (2002).
Product Perishability (PP)	Abdel-Kader & Luther (2008).
Advanced manufacturing technology (AMT)	Tayles & Drury (1994); Abdel-Maksoud (2004); Al-Omiri & Drury (2007); Szychta (2002)

Source: Authors' Compilation.

5.2 Data Source

A structured survey questionnaire was constructed to explain and forecast the effect of external, organizational and processing characteristics on MATs from a developing-country perspective. Both face-to-face and mailing platforms were used to gather the necessary data. It allowed access to tap accountants and/or production managers (PMs) in all sample firms.

5.3 The Respondents of the Survey

The respondents of the study work in the accounts and production divisions of 92 listed manufacturing companies in Bangladesh. The participants of the survey were chosen based on the listed manufacturing firms in different industries to ensure representation of all the sectors. A randomized block sampling approach was used as the sampling technique. First, the listed firms are separated into blocks with similar characteristics. Homogeneity is assessed depending on the industry category. Because output, production technique, technical participation, sophistication in a manufacturing process, investment size, and labour orientation vary by industry, each industry is made up of a block with similar characteristics. The respondents are professional accountants (CMA/CA) or production managers and/or strategic decision-makers. A total of 360 questionnaires were administered for the survey. The survey questionnaires are sent through postal mail with a return envelope to 120 potential respondents as they were difficult to reach for face-to-face survey. The rest of the respondents (240) were met in person for the survey.

6. Results and Discussion

6.1 Respondents' Demographic Characteristics

Final survey results include Two Hundred and Fifteen (215) completed questionnaires. 23.25 percent female and 53.8 percent male participants represent the survey responders. The majority of the participants (88) are over 45 years, accounting for 40.93 percent. Seventy-five participants (34.88%) are between the ages of 35 and 45, with 44 (20.47%) falling between the ages of 30 and 35. Only eight (3.72%) of responders are under the age of thirty. The majority of the participants (182) consisting of 84.65%, were postgraduates, while the rest of the 15.35% were graduates. Hence, the respondents have excellent academic qualifications, which help to have knowledgeable feedback. Among the respondents, 112 (52.09%) have been awarded a degree with a major in Accounting and 80 (37.21%) do not have such academic background though they are from Business and Economics faculties. 23 (10.70%) respondents have an educational background in other disciplines. 66.67% of the respondents have professional qualifications in the field of accounting, like CA and CMA. Thus, the study includes accounting expert's opinion to ensure better results. Finally, the highest number of respondents (76) has professional experiences of 10-15 years, which is 35.35% of the respondents. Sixty-one respondents (28.37%) have 5-10 years, 44 (20.47%) have 0-5 years, and 34 (15.81%) respondents have more than 35 years of experience showing adequate professional experience of them, which is also a good sign as they can evaluate the trend of MAPs.

6.2 Outer model

The research model was tested in two phases. Firstly, the outer (measurement) model was analyzed. Secondly, the structural-equation model (SEM) was established. The composite reliability (CR), convergent validity (CV) and discriminant validity (DV) of the constructs are evaluated in this phase (Chong 2013). Cronbach alpha, rho and CRI are also used to assess the strength of all constructions. The standardized root mean square residual (SRMR) of the proposed model is determined to check the model's fitness. The results of 0.072 (Table 2), both for the estimated model saturate model, ensure suitable fitness, with a cut-off point of 0.08 (Henseler et al., 2015).

Table 02: SRMR

	Saturated Model.	Estimated Model.
SRMR	0.072	0.072
d_ULS	1.213	1.213

Source: Estimated.

The CRI rho (rA) was determined to assess the reliability of each construct. The CRI values in this research are higher than 0.7 for all components (Hair et al., 2016). Similarly, rAs are higher than 0.7 in all cases, confirming its reliability (Dijkstra & Henseler, 2015). Three criteria are assessed for the determination of CV. Firstly, the outer loadings are analyzed, accompanied by the average variance extracted (AVE) and, ultimately, the significance of the loading of the predictor is checked. However, Cronbach's alpha is also reported in this study. All loadings and Cronbach's alpha values in Table 3 are greater than 0.70, which is above the cut-off value ((Hair et al., 2017). For all the instances, the AVE is greater than 0.5, suggesting that more than 50% of the variation of the model is attributed to its indicators (Chin, 1998; Hair et al., 2016; Hair et al., 2017). All CRI values are greater than 0.70 and higher than AVE (Table 03) in this analysis. The converging validity of the constructions has thus been verified (Hair et al., 2010). Eventually, the significance of the loadings is calculated by a bootstrapping re-sampling test to achieve t-statistic values (Hair et al., 2016). In this case, all indicators are significant, with a 1% significance level.

Table 03: Validity and Reliability Scores

Construct/Indicator	Loadings	Significance	Cronbach's alpha	Dijkstra–Henseler's rho (r$_A$)	CRI	AVE
PEU1 <- PEU	0.729	0.000	0.784	0.787	0.861	0.607
PEU2 <- PEU	0.785	0.000				
PEU3 <- PEU	0.832	0.000				
PEU4 <- PEU	0.768	0.000				
CP1 <- CP	0.719	0.000	0.792	0.813	0.864	0.616
CP2 <- CP	0.749	0.000				
CP3 <- CP	0.879	0.000				
CP4 <- CP	0.783	0.000				
CS1 <- CS	0.700	0.000	0.743	0.804	0.848	0.653
CS2 <- CS	0.872	0.000				
CS3 <- CS	0.848	0.000				
PD1 <- PD	0.857	0.000	0.763	0.765	0.856	0.748
PD2 <- PD	0.873	0.000				
MC1 <- MC	0.744	0.000	0.721	0.726	0.825	0.542
MC2 <- MC	0.717	0.000				
MC3 <- MC	0.736	0.000				
MC4 <- MC	0.746	0.000				
CPS1 <- CPS	0.881	0.000	0.731	0.733	0.881	0.788
CPS2 <- CPS	0.895	0.000				
PP1 <- PP	0.885	0.000	0.747	0.750	0.888	0.798
PP2 <- PP	0.901	0.000				
AMT1 <- AMT	0.880	0.000	0.754	0.764	0.890	0.802
AMT2 <- AMT	0.911	0.000				

MAT1 <- MAT	0.819	0.000				0.875	0.700
MAT2 <- MAT	0.820	0.000	0.785	0.791			
MAT3 <- MAT	0.869	0.000					

Source: Estimated.

The Fornell Larcker test is applied to evaluate discriminant validity (DV) (Hair et al., 2016). The findings suggest a sufficient degree of DV (Table 4). In the bargain, Henseler et al. (2015) proposed an evaluation of the Heterotrait-Monotrait ratio (HTMT) for discriminant validity with a level of 0.90 (Table 05). This criterion appears to be more rigorous and requires a more robust assessment than the previous standards. This test points out the Hetero-Monotrait ratios, with the discriminant significance verified where the scores are less than 0.90 (Hair et al., 2016).

Table 04: Fornell Larcker Criterion Analysis

	AMT	CP	CPS	CS	MAT	MC	PD	PEU	PP
AMT	**0.896**								
CP	0.590	**0.785**							
CPS	0.525	0.545	**0.888**						
CS	0.511	0.714	0.707	**0.808**					
MAT	0.538	0.602	0.852	0.795	**0.836**				
MC	0.411	0.365	0.328	0.374	0.375	**0.736**			
PD	0.494	0.649	0.413	0.719	0.460	0.305	**0.865**		
PEU	0.893	0.640	0.592	0.566	0.615	0.428	0.526	**0.779**	
PP	0.538	0.501	0.557	0.481	0.566	0.421	0.427	0.579	**0.893**

Source: Estimated.

Table 05: Heterotrait–Monotrait (HTMT) Ratio

	AMT	CP	CPS	CS	MAT	MC	PD	PEU	PP
AMT									
CP	0.763								
CPS	0.704	0.703							
CS	0.685	0.890	0.896						
MAT	0.695	0.754	0.852	0.881					
MC	0.545	0.470	0.434	0.507	0.487				
PD	0.706	0.820	0.590	0.814	0.636	0.435			
PEU	0.873	0.810	0.779	0.744	0.781	0.558	0.734		
PP	0.711	0.649	0.751	0.648	0.735	0.562	0.608	0.752	

Source: Estimated.

Finally, an evaluation of the potential existence of multicollinearity and an examination of the magnitude and significance of the weights were performed (Hair et al., 2016). Collinearity is assessed using the variance inflation factor (VIF) and the significance of weights. VIF should be less than 3.3 (Henseler et al., 2016) to affirm non-collinearity. None of the weights is found insignificant, and all the VIF values are less than 3.3 (Table 06), implying the absence of multi-collinearity (Hair et al., 2016).

Table 06: Collinearity Statistic

statistic	Loadings	Weights	T	Significance	2.5%	97.5%	VIF
PEU1 <- PEU	0.729	0.305	10.465	0.000	0.247	0.365	1.419
PEU2 <- PEU	0.785	0.300	9.962	0.000	0.236	0.357	1.758
PEU3 <- PEU	0.832	0.344	11.307	0.000	0.292	0.409	1.927
PEU4 <- PEU	0.768	0.334	10.442	0.000	0.276	0.404	1.532
CP1 <- CP	0.719	0.263	8.461	0.000	0.201	0.322	1.545
CP2 <- CP	0.749	0.277	10.271	0.000	0.224	0.331	1.540
CP3 <- CP	0.879	0.382	12.706	0.000	0.331	0.447	2.128
CP4 <- CP	0.783	0.342	9.882	0.000	0.279	0.416	1.668
CS1 <- CS	0.700	0.256	9.213	0.000	0.194	0.303	1.380
CS2 <- CS	0.872	0.520	15.175	0.000	0.463	0.592	1.518
CS3 <- CS	0.848	0.436	23.285	0.000	0.399	0.472	1.614
PD1 <- PD	0.857	0.563	12.338	0.000	0.477	0.648	1.327
PD2 <- PD	0.873	0.593	12.844	0.000	0.511	0.698	1.327
MC1 <- MC	0.744	0.306	4.407	0.000	0.190	0.447	1.434
MC2 <- MC	0.717	0.336	4.249	0.000	0.163	0.480	1.360
MC3 <- MC	0.736	0.302	4.714	0.000	0.173	0.425	1.426
MC4 <- MC	0.746	0.415	5.165	0.000	0.267	0.591	1.274
CPS1 <- CPS	0.881	0.547	46.220	0.000	0.524	0.570	1.496
CPS2 <- CPS	0.895	0.580	24.565	0.000	0.543	0.634	1.496
PP1 <- PP	0.885	0.540	15.452	0.000	0.474	0.617	1.553
PP2 <- PP	0.901	0.579	15.981	0.000	0.512	0.656	1.553
AMT1 <- AMT	0.880	0.519	13.094	0.000	0.426	0.589	1.579
AMT2 <- AMT	0.911	0.596	11.945	0.000	0.513	0.712	1.579
MAT1 <- MAT	0.819	0.381	20.481	0.000	0.350	0.422	1.588
MAT2 <- MAT	0.820	0.379	18.840	0.000	0.336	0.416	1.604
MAT3 <- MAT	0.869	0.434	22.054	0.000	0.397	0.474	1.776

Source: Estimated.

6.3 Structural Equation Modeling (SEM)

The suggested SEM was tested after the study of the measurement model and the checking of its validity and reliability. The explanatory capacity of the SEM is assessed using the R^2 value, which represents the stated change in the exogenous construct for the changes in the endogenous constructs. The R^2 and adjusted R^2 measures of the model are 0.945 and 0.943, showing that more than 94% (Table 07) of the variation in the implementation of MATs can be explained by it.

Table 07: SEM Results

	Beta values	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Hypothesis Decision	R^2	R^2 Adjusted
PEU -> MAT	0.060	0.046	1.312	0.190	Not Supported		
CP -> MAT	0.112	0.042	2.703	0.007	Supported		
CS -> MAT	0.303	0.058	5.241	0.000	Supported	.945	.943
PD -> MAT	0.172	0.041	4.202	0.000	Supported		
MC -> MAT	0.024	0.022	1.112	0.266	Not Supported		
CPS -> MAT	0.721	0.044	16.335	0.000	Supported		
PP -> MAT	0.018	0.023	0.801	0.424	Not Supported		
AMT -> MAT	0.051	0.044	1.154	0.249	Not Supported		

Source: Estimated.

The SEM was implemented to evaluate the hypotheses formed earlier. Among the eight hypotheses, four research hypotheses were accepted (see Table 07). Out of the two external features, PEU and CP, Customer power (Beta = 0.112, t= 2.703 & p=0.007) has a positive and statistically significant influence on the application of MATs, supporting hypothesis 2. In contrast, environmental uncertainty (Beta = 0.060, t = 1.312 & p = 0.190) has no statistically significant influence on MAPs. Hence, hypothesis 2 is not supported. There were three organisational factors: CS, PD and MC. Both competitive strategy (Beta = 0.303, t= 2.703 & p=0.007) and product diversity (Beta = 0.172, t= 4.202 & p=0.000) are statistically significant in explaining the application of MATs in the manufacturing industries. Hence, hypotheses 3 and 4 are supported. On the other hand, management commitment (Beta = 0. 024, t= 1.112 & p=0.266) is not statistically significant in influencing MAPs. Thus, hypothesis 5 is not supported. Lastly, three processing characteristics called CPS, PP, and AMT consist of product processing factors. Complexity in processing systems (Beta = 0. 721, t= 16.335 & p=0.000) is the only processing factor influencing the application of MATs. Therefore, hypothesis 6 is supported. The other two procession factors, PP (Beta = 0. 721, t= 0.801 & p=0.424) and AMT (Beta = 0. 051, t= 1.154 & p=0.249), have no significant impact on MAPs. Hence, hypotheses 7 and 8 are not supported.

Figure 2: Path Analysis of the Contingency MAPs Framework
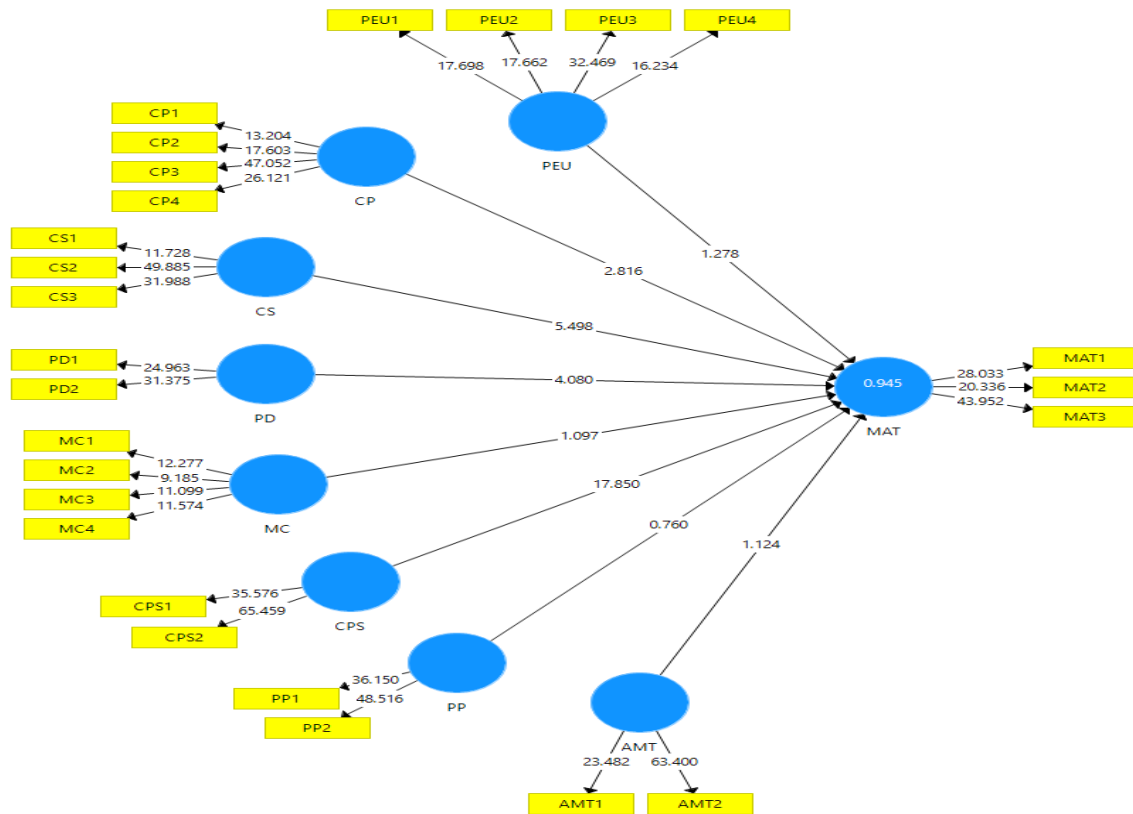
Source: Estimated.

6.4 Discussion

Eight contingencies under three broad categories, external, organizational, and processing characteristics, are analyzed in this research. The R^2 measure of the study indicating the application of MATs was 94.5%. It is considered on the upper side of the acceptance range. The R^2 in this analysis is significantly higher than in the other MA research. The statistical findings ensured that the most significant explanation of the construct of the MAPs is the complexity of the processing systems, with a beta value of 0.721. It shows that the complexity of the production process demands the greater application of MATs. This result is supported by the findings of Tayles and Drury (1994), Abdel-Maksoud (2004), Al-Omiri and Drury (2007), Szychta (2002), Al- Omiri (2003), Isa and Thye (2006), and Azudin and Mansor (2018), who found MAPs to be influenced by sophisticated production under the complexity in processing systems category. Nevertheless, this finding is incompatible with the research by Abdel-Kader and Luther (2008) in the United Kingdom. Unlike the findings of Kalimullah et al. (2012), the other two constructs under this processing category, product perishability and advanced manufacturing technology, are found statistically insignificant with a moderate influence on MAPs (Figure 2). With regards to the external constructs of MAPs, customer power in a competitive market with a beta coefficient of 0.112 has a positive and significant influence on MAPs. This result is supported by Kaplan (1984),

Bruns and Kaplan (1987), Luther and Longden (2001), and Kalimullah et al. (2012). There are some findings that do not support the result of this study too. For example, Williams and Seaman (2001) found that customer power, represented by the intensity of competition, significantly and negatively influences management accounting practices in some companies in Singapore. Likewise, in their analysis utilizing a survey of 109 respondents in Albu and Albu (2012) noticed that there is little statistical evidence for CP to be correlated with MAPs in industrialized and developing countries. On the other hand, perceived environmental uncertainty is found to be statistically insignificant in influencing the MAPS. Albu and Albu (2012) also found similar findings in Romanian companies. However, the study also differs from the results of some earlier studies like Anderson and Lanen (1999), who explored the external environment as an influencing factor of MAPs in his study with 14 Indian firms. Similarly, Kaplan (1984) and Luther and Longden (2001) also reported that contingent variables such as environmental uncertainty affect MAPs in South Africa. Two organizational constructs out of three, called competitive strategy and product diversity, are found to be statistically significant in influencing MAPs positively, with a beta of 0.303 and 0.172, respectively. The other factor, called management commitment, has limited statistical support in this regard. Kaplan (1984), Bruns and Kaplan (1987), Luther and Longden (2001), and Kalimullah et al. (2012) found all of the three constructs under the organizational characteristics category as positive and significant in explaining the application of MATs. Thus, the study result is similar to that found in this study except for managers' commitment, as it is not a significant influencing factor according to the survey.

The findings of the study are consistent with the results of other MA research done by many authors in different countries. For example, Tayles and Drury (1994), Abdel-Maksoud (2004), Al-Omiri and Drury (2007), Szychta (2002), Isa and Thye (2006), and Azudin and Mansor (2018) have revealed similar findings. On the contrary, the conclusions of Williams and Seaman (2001), and Albu and Albu (2012) are inconsistent concerning the contingencies called CP, CS, PD, and CPS. In regards to PEU, MC, PP, and AMT, the findings of the study are similar to the results of Albu and Albu (2012). On the contrary, the findings differ with Luther and Longden (2001), Bruns and Kaplan (1987), Kalimullah et al. (2012), and Ahmad and Zabri (2015).

7. Theoretical Implications

This research primarily has three analytical ramifications. First, this research includes two external characteristics called external uncertainty and customer power, the critical antecedents of contingency theory as potential predictors of MAPs. The findings showed that customer power is profoundly influencing significant predictors of the application of MATs. Second, this study considered three organizational factors in the context of contingency theory: CS, PD and MC. The results of this study reveal that competitive strategy and product diversity positively influence the application of MATs. Finally, the introduction of processing characteristics into the study paradigm has contributed to the current literature. Out of the three predictors, processing complexity and processing system have the highest beta with a strong influence on MAPs. A new research model with four predictors (customer power, competitive strategy, product diversity, and complexity in the processing system) has been created. It has given a new dimension to the understanding of the application of MATs in the manufacturing industries. This research bridges the theoretical gap with this current analysis model, validating and evaluating with the possible reliability and validity measures with a very high R^2.

8. Conclusion

To find the influencing firm characteristics (contingencies) that explain the extent of management accounting practices both in terms of MA tools applied, a structural equation model has been proposed with the contingency theory as the base. A total of eight contingencies were selected based on an extensive literature survey. The contingencies are divided into three heads: external, organizational and processing characteristics. The external contingencies include perceived environmental uncertainty (PEU) and customer power (CP). In the evaluation, CP was found to be positively significant, whereas PEU was not statistically significant in explaining the application of MATs. Three factors called competitive strategy (CS), product diversity (PD), and management commitment (MC) consist of organizational characteristics. Two contingencies, namely CS and PD, have a positive impact on MAPs, while MC has limited statistical support. Finally, complexity in the processing systems is the only processing characteristic with a positive influence on the application of MATs. The other two contingencies, product perishability (PP) and advanced manufacturing technology (AMT), are not statistically significant in explaining the variation of MAPs. Variations in the tests may be attributed to the context of the analysis. The present work has been carried out in the mentioned manufacturing firms in Bangladesh, where the equipment used by businesses is not as advanced as used in developed countries. The heterogeneity of the results mentioned can also be attributed to the items tested. There are several drawbacks to the research that require attention. First, the key emphasis of this analysis was on the factors influencing the application of MATs in the listed manufacturing companies in Bangladesh, where there are many other non-listed companies that need to be evaluated. Thus, similar studies can also be adapted for further analysis in other non-listed companies. Second, this analysis has a relatively lower number of sample companies (92 companies), indicating that a more detailed study could be considered with more companies. Studies can also be performed to compare cross-industries. A comparative analysis between listed and non-listed companies can also be undertaken. Further research can be initiated to explain the scope and area of MA application in service industries.

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Appendix

Questionnaire

Name of Company: ………………………………………………

A. Personal and Professional Minutiae of the Respondent:

1. Name: …………………………………………………………...

2. Position of the respondent: …………………………………………

3. Name of Department/ Section: ……………………………………..

4. Duration of Service: Year: ………… Month: …………………..

5. Educational Qualifications: ……………………………………..

6. Age of the respondent:

Age Group (Put a tick mark)

Age Group	Respondent's Position
Below 30	
30-35	
35-40	
40-45	
45-50	
50-55	
55-60	
60 +	

7. Do you have academic background on accounting discipline?

☐Yes   ☐No

8. Professional Qualification (if any)

 a. ACA/FCA   b. ACMA/FCMA   c. ACCA   d. Other (Please specify)

B. Company's Information

9. Number of employees:

a. Below 50. b. 50 -250 c. 250-500 d. 500- 1000 e. above 1000

10. Does your product need a special preservation system (e.g. refrigeration)?

☐Yes   ☐No

11. Do you have a sophisticated production process?

 ☐Yes   ☐No

C. Perception of Respondent Regarding Factors Influencing Management Accounting Practices

(Put a tick in the appropriate box).

12. External environmental uncertainty makes the decision making process complex.

Strongly Agree (5)	Agree (4)	Agree to Some Extent (3)	Disagree (2)	Disagree (1)

 13. When my company faces uncertainty regarding production and distribute process, it requires to adopt more MA tools than usual.

Strongly Agree (5)	Agree (4)	Agree to Some Extent (3)	Disagree (2)	Disagree (1)

14. In general, companies with higher uncertainty invest more time and efforts in managerial decision-making.

Strongly Agree (5)	Agree (4)	Agree to Some Extent (3)	Disagree (2)	Disagree (1)

15. When there is an external environmental uncertainty company needs to adopt sophisticated MA tools.

Strongly Agree (5)	Agree (4)	Agree to Some Extent (3)	Disagree (2)	Disagree (1)

16. Do you think perceived environmental uncertainty influences management accounting practices? Explain please.

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……………………………………

17. In the industry our company operates include customers with high bargaining power.

Strongly Agree (5)	Agree (4)	Agree to Some Extent (3)	Disagree (2)	Disagree (1)

18. When my company deals with powerful customers it requires to adopt more MA tools than usual.

Strongly Agree (5)	Agree (4)	Agree to Some Extent (3)	Disagree (2)	Disagree (1)

19. In general, companies operating in highly competitive markets invest more time and effort in managerial decision-making.

Strongly Agree (5)	Agree (4)	Agree to Some Extent (3)	Disagree (2)	Disagree (1)

20. When there is powerful customer segment to deal with, company needs to adopt sophisticated MA tools.

Strongly Agree (5)	Agree (4)	Agree to Some Extent (3)	Disagree (2)	Disagree (1)

21. Do you think customers' power influences management accounting practices? Explain please……………………………………………………………………………………………………
………
………
………
…………………………………………

22. Competition among the firms influences a firm to invest more time and effort in strategic decision-making.

Strongly Agree (5)	Agree (4)	Agree to Some Extent (3)	Disagree (2)	Disagree (1)

23. Competition affects the decision-making process that requires the use of more MA tools.

Strongly Agree (5)	Agree (4)	Agree to Some Extent (3)	Disagree (2)	Disagree (1)

23. In general, companies which operate in highly competitive market require to adopt sophisticated MA tools.

Strongly Agree (5)	Agree (4)	Agree to Some Extent (3)	Disagree (2)	Disagree (1)

24. Do you think competition and relevant strategies influence management accounting practices? Explain please.
……………………………………………………………………………………………………
……………………………………………………………………………………………………
……………………………………………………………………………………………………
……………………………………………………………………………………………………
…………………………………

25. My company has a diversified product portfolio that requires investing more time and effort indecision making.

Strongly Agree (5)	Agree (4)	Agree to Some Extent (3)	Disagree (2)	Disagree (1)

26. Companies with diversified product portfolio requires to use more MA tools.

Strongly Agree (5)	Agree (4)	Agree to Some Extent (3)	Disagree (2)	Disagree (1)

27. Do you think product diversification influences management accounting practices? Explain please…………………………………………………………………………………………
……………………………………………………………………………………………………
……………………………………………………………………………………………………
…………………………………

28. My company management is committed to improve managerial decision making.

Strongly Agree (5)	Agree (4)	Agree to Some Extent (3)	Disagree (2)	Disagree (1)

29. My companies uses sophisticated MA tools as the management wants to make the decision within the shortest possible time.

Strongly Agree (5)	Agree (4)	Agree to Some Extent (3)	Disagree (2)	Disagree (1)

30. In general, companies with committed management invest more time and efforts in managerial decision-making.

Strongly Agree (5)	Agree (4)	Agree to Some Extent (3)	Disagree (2)	Disagree (1)

31. If there is a committed management in a company, it usually adopts sophisticated MA tools.

Strongly Agree (5)	Agree (4)	Agree to Some Extent (3)	Disagree (2)	Disagree (1)

32. Do you think management commitments influence management accounting practices? Explain please…………………………………………………………………………………………
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33. My company has a complex processing system that requires to invest more time and effort indecision making.

Strongly Agree (5)	Agree (4)	Agree to Some Extent (3)	Disagree (2)	Disagree (1)

34. In general, companies with higher complexity need to adopt sophisticated MA tools.

Strongly Agree (5)	Agree (4)	Agree to Some Extent (3)	Disagree (2)	Disagree (1)

35. Do you think complexity in processing systems influences management accounting practices? Explain please
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36. My company products are highly perishable which require special storage support that requires to invest more time and effort indecision making.

Strongly Agree (5)	Agree (4)	Agree to Some Extent (3)	Disagree (2)	Disagree (1)

37. In general, companies with perishable products need to adopt sophisticated MA tools.

Strongly Agree (5)	Agree (4)	Agree to Some Extent (3)	Disagree (2)	Disagree (1)

38. Do you think product perishability influences management accounting practices? Explain please…………………………………………………………………………………………
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39. My company uses advanced technology in the production process.

Strongly Agree (5)	Agree (4)	Agree to Some Extent (3)	Disagree (2)	Disagree (1)

40. My company uses advanced technology to facilitate better managerial decisions.

Strongly Agree (5)	Agree (4)	Agree to Some Extent (3)	Disagree (2)	Disagree (1)

41. Do you think the application of advanced manufacturing technology influences management accounting practices? Explain please.

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42. My company frequently uses MA tools for all possible purposes to become more productive.

Strongly Agree (5)	Agree (4)	Agree to Some Extent (3)	Disagree (2)	Disagree (1)

43. My company applies sophisticated MA tools to ensure product quality.

Strongly Agree (5)	Agree (4)	Agree to Some Extent (3)	Disagree (2)	Disagree (1)

44. In general, companies which use sophisticated MA tools are better and quick decision makers.

Strongly Agree (5)	Agree (4)	Agree to Some Extent (3)	Disagree (2)	Disagree (1)

45. Do you think your company applies all the relevant management accounting tools for a better decision making process?

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