

THE INFLUENCE OF EXTERNAL FACTORS AND MODERN MANAGEMENT ACCOUNTING TECHNIQUES ADOPTION ON ORGANIZATIONAL PERFORMANCE⁴

Since 2016, large-scale industrial operations in Jordan have declined. Modern Management Accounting Techniques (MMATs) may aid in the execution of strategic plans, the completion of tasks, and the performance of a firm. Improving firm performance may necessitate monitoring the compatibility between MMATs and contextual variables that determine performance. This study investigated the influence of external factors on MMATs and OP. It also identifies the influence of MMATs on OP and their mediating influence on the relationship between external factors and OP. The cross-sectional survey included responses from 46 different firms that are traded on the ASE. The results revealed that there are positive influence of external factors in MMATs adoption. Also, external factors have a positive influence in improve OP. In addition, MMATs adoption leads to improve OP. Furthermore, MMATs adoption is a significant mediator between external factors and OP.

Keywords: external factors; intensity of market competition; modern management accounting techniques; organizational performance; perceived environmental uncertainty

JEL: M41

1. Introduction

Modern business is characterized by a large number of variables that challenge industry, service, and commercial organizations (Chand, Sharma, 2021). Each firm and institution faces unique risks (Adu-Gyamfi, Yusheng, Ayisi, Peki, 2021). Organizations should adopt a suitable design to adapt to market competition factors (Shahzadi, Khan, Toor, Haq, 2018).

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⁴ This paper should be cited as: Alkhasawneh, S., Endut, D. E., Rashid, N. M. N. N. M. (2023). *The Influence of External Factors and Modern Management Accounting Techniques Adoption on Organizational Performance*. – *Economic Studies (Ikonomicheski Izsledvania)*, 32(6), pp. 145-168.

Increasing global competition has managers and consultants worried about Management Accounting's (MA) ability to maintain its connection and meet all changes (Cuzdriorean, 2017). These factors have led to the widespread adoption of Modern Management Accounting Techniques (MMATs), demonstrating that TMA is inadequate to serve the information needs of modern management (Hussein, 2018; Al-Bawab, 2018).

Management's interaction with external variables in organizations leads to management control system design, which -contains vital financial and nonfinancial information to enhance the organization's overall objectives (Cuzdriorean, 2017).

Today's competitive business environment requires updated, reliable, and timely accounting information (Pavlatos, 2018). An influencing MA system gives managers this information (Nartey, Poll, 2021). Ogundajo and Nyikyaa (2021) argued that industrial firms need sophisticated MAS techniques to manage resources and make short- and long-term decisions to achieve their goals. This shows how important MA is to industrial firms' performance and competitiveness. MMATs can prevent industrial firm failure (Nartey, Poll, 2021).

Few researchers have paid attention to MMATs in the past, especially in less developed regions (Ogungbade, Idode, Alade, 2016; Adu-Gyamfi et al., 2021). Nouri and Soltani (2017) emphasized the need for additional research into the relationship between external factors and MMAT usage because earlier studies did not fully explore this relationship and their findings were inconclusive. Previous research also highlighted contingency variables as key Organizational Performance (OP) drivers (Kihara, Ngugi, Ogollah, 2016; Obura, Mise, 2018). Empirical evidence shows that contingency factors lack precision and consistency, with no clear influences on OP. Alshbiel (2017), Mita, Ochie'ng, and Mwebi (2017), and Obura and Mise (2017) provide evidence (2018). Despite the long use of contingency theory in MA research, more is needed to understand potential contingency variables. Previous empirical studies were unable to describe the relationship between contingent factors, MMATs, and OP because they did not examine all factors or produce coordinated results (Alimoradi, Borzoupour, 2017; Nouri, Soltani, 2017).

Jordan's accounting limits MA is the least-used MMAT in firms of all sizes (Al-Mawali, 2015; Al-Bawab, 2018; Jbarah, 2018). Jordan's organizational difficulties have lowered industrial profitability (WB, 2016). Large-scale industrial operations in Jordan have been stagnant and losing money for five years, according to World Bank statistics (WB, 2020). Real GDP growth has been slow in recent years due to eroding productivity and a slowdown in capital accumulation, even before the COVID-19 crisis (WB, 2020). This study examines the influence of MMATs on ASE-listed industrial firms' performance. Examines external factors' influence on MMATs and OP. MMATs are examined as a mediator between external factors and the OP of ASE-listed industrial organizations. The study's objectives are:

1. Examine the influence of external factors on the utilization of MMATs by ASE-listed industrial firms.
2. Examine the influence of external factors on the OP of ASE-listed industrial firms.
3. Examine the influence of MMATs on the OP of ASE-listed industrial firms.
4. Examine the role of MMATs as mediators in the relationship between external factors and the OP of ASE-listed industrial firms.

2. Literature Review

2.1. Definitions of Management Accounting

MA helps managers manage organizations (Endenich, Brandau, Hoffjan, 2011). Internal reports help management plan, control, and make decisions for current operations by presenting accounting information at various levels (Drury, 2013). Three accounting bodies defined MA, showing its history. Institute of Management Accountants (IMA), Chartered Institute of Management Accounting (CIMA), and International Federation of Accountants (IFAC).

Institute of Management Accountant (IMA): The IMA developed MA concepts to provide advanced accounting information to management. IMA defined MA in 1981 as monitoring and evaluating firm operations, ensuring and calculating resource use by collecting, identifying, evaluating, planning, interpreting, and transferring financial information to top management. MA financial reports benefit regulators, shareholders, and creditors. IMA (2008) defined MA as a method that includes participation in decision-making, the creation of planning and performance management systems, and financial and control reports for management, all of which help design and implement business plans to achieve intended outcomes. The changes in the definition of managerial accounting show the shift in the managerial accountant's role from collecting financial information and obeying top management orders to formulating strategies through internal control and providing financial information.

Chartered Institute of Management Accounting (CIMA): According to CIMA (1987), MA is the supply of required information to management for policy-making, preparing and managing firm activities, making decisions on different courses of action, and disclosing to employees and outside agencies (shareholders and others), whereby that information has an influence on the achievement of objectives via the adoption of long-term plans and short-term plans to carry out operational activities, follow-up transaction activities, etc (statement). According to CIMA (2005), MA is one of the most important components of leadership because it clarifies, creates, presents, interprets, and uses information for adopting and disclosing business strategies, formulating short, medium, and long-term plans, defining and financing capital structure, creating strategies to reward shareholders and executives, disclosing operational decisions, and monitoring activities. CIMA definitions show that managerial accounting has simulated top management's tasks by participating in strategic planning to achieve efficiency and create value for organizations.

International Federation of Accountants (IFACs): IFACs (1989) define MA as a method for identifying, calculating, collecting, evaluating, planning, explaining, and reporting operational or financial information that management uses to prepare, analyze, monitor, and safeguard its resources. After only nine years and due to the evolution of the business environment, IFAC redefines MA as a method for managing interlocking processes in all departments of the organization. Its primary goal is to offer value to customers and organizations through the most influenceive use of resources to remain competitive (IFAC 1998). All of the above definitions have evolved from a conventional managerial perspective to one that supports top management activities, including value creation.

2.2. Modern Management Accounting Techniques

Ittner and Larcker (2002) defined MMATs as practices adopted by industrial firms to help management optimize resource use for maximum return. MA includes strategy analysis, decision-making info, performance evaluation, and budgeting (Alleyne, Marshall, 2011). Ittner and Larcker (2001) argued that modern techniques, which add value to practices, have changed the essentials of MA. Burns and Scapens (2000) cite the competitive economic environment, globalization of markets, increased competition, and revolutionary changes in information and industrial technology as drivers of MA.

Traditional MA's flaws are limited financial data and dysfunctional results. Short-term thinking, financial measure manipulation, and timely information aggregation (Lasyoud, Haslam, Roslender, 2018). MMATs provide more relevant, timely, and sensitive information (AbdelKader, Luther, 2008; Suranathakul et al., 2020). In response to accusations about the industry's inability to adapt to changing economic and commercial conditions, MA improved its focus, strategies, functions, and tasks (Mahfar, Omar, 2004; Erokhin et al., 2019). National and global markets require new types of assessments (Sleihat et al., 2012; Al Refai, Poornima, 2021). Many modern behaviours are influenceive MA tools (McLellan, 2011; McLellan, Moustafa, 2013; Al Refai, Poornima, 2021). MMATs and advanced systems also benefit the study's industrial firms (AbdelKader, Luther, 2008; Nimtrakoon, Tayles, 2010; Al-Mawali, 2015).

2.3. External Contingency Factors

External factors are external phenomena that affect the organization (Albalaki, Abdullah, Kamardin, 2019). The external business environment in which firms operate may be stable, volatile, simple, or uncertain (Amara, Benelifa, 2017). Outdoor work reflects uncertainty, according to Amara and Benelifa (2017). In an unpredictable business environment, firms need more advanced accounting management information (Shahzadi et al., 2018). The following sections detail each factor.

Perceived Environmental Uncertainty (PEU): PEU refers to top managers' perceived inability to predict an organization's external environment in a given area, for instance, supplier market actions, customer preferences, and economic changes (Shahzadi et al., 2018). Despite accounting's unpredictable environment, authors must continue to consider environmental uncertainty in models and hypotheses (Amara, Benelifa, 2017). PEU is one of the first conditional variables studied in relation to management accounting growth (Shahzadi et al., 2018). If uncertainty is low, management can make accurate market forecasts (Shahzadi et al., 2018). Environmental unpredictability influences the level of accounting management development in high-protection firms (Amara, Benelifa, 2017). Perceived environmental uncertainty affects the design of MA systems and the adoption of advanced accounting practices, according to Ayadi and Affes (2014), Ojra (2014), and Albalaki et al. (2019).

Intensity of Market Competition: Level of market rivalry affects MAPs as firms face changes in productivity, cost, quality, distribution channels, and customer satisfaction (Sarchah, Yazdifar, Pifeh, 2019). High competition helps management monitor costs and analyze manufacturing, finance, and marketing processes, according to Khandwalla (1972). Tarigan,

Devie, and Putri (2015) identified five structure forces for assessing competitive intensity: industry rivalry, threats of alternative goods, consumer negotiating power, supplier negotiating power, and new competitor threats. New competitors entering the industry pose a threat. The easier it is for new competitors to enter an industry, the greater the firm's challenge. While suppliers' negotiating power affects the firm's productivity and general well-being. Consumers' negotiating power affects the firm's productivity and well-being. The difficulty with replacement items is buyers' access to physically identical, structural and functional products with the same generic purpose. Rivalry strength is the extent to which firms in this sector engage in outwardly articulated competitive actions and reactions to gain a market advantage (Purnama, Subroto, 2016). Highly competitive markets focused on quality and customer service were key in developing and implementing the new MA system (Albu, Albu, 2012; Ahmad, Zabri, 2015; Sarchah et al., 2019).

2.4. Organizational Performance (OP)

The management literature has found that performance assessment systems show whether a corporation is successful at putting its strategy into practice through positive activities to attain its goals (Anna, 2015; Sreekumar, 2015). Practitioners and academicians have studied the antecedents, operations, and different elements that can improve OP (Lay, 2014). Due to the importance of OP in the real world, numerous researchers concentrate on this field, which allows top management to evolve and advance (Gavrea, Ilies, Stegorean, 2011). Despite being widely used in academic literature, researchers couldn't agree on how to define OP (Gavrea et al., 2011). Academics and practitioners argue about the best way to measure OP (Jusoh, Ibrahim, Zainuddin, 2008). Ittner and Larcker (2003) said performance measures can help with resource allocation, measuring strategic goals, and assessing management efficiency. Performance measurement systems assign tasks, ensure independent decision-making, formulate performance objectives, and improve performance (Lee, Yang, 2011). Murphy, Trailer, and Hill (1996) identified 71 nonfinancial and financial measures of OP. Each method of measuring firm performance has its own consequences (Hubbard, 2006). The contingency view of performance promotes evaluating both financial and non-financial OP (Ojra, 2014; Sreekumar, 2015). Environmental uncertainty boosts OP, say Bastian and Muchlish (2012). Where environmental uncertainty is high, performance benchmarks focus on non-financial external and future-oriented aspects. Market rivalry intensity boosts firm performance, according to Al-Rfou (2012). This is consistent with the statement that they produce high-quality products to attract consumers in a competitive market.

3. Theoretical Framework and Hypotheses Development

This study examines MA's mediating impact on OP using a Cartesian type and a mediation model (Chenhall 2003; Gerdin, Greve 2004). The impact of MMATs and contingent external factors on the performance of ASE industrial firms is evaluated using the mediation model and contingency approach. Relationships are discussed using this theoretical framework.

3.1. Relationship between PEU and Usage of MMATs

As firms face environmental limitations in meeting employee or top management goals, environmental uncertainty must be studied (Ayadi, Affes, 2014; Atout, 2017). Unpredictability affects MA techniques (Amara, Benelifa, 2017). AbdelKader and Luther (2008), Ayadi and Affes (2014), Amara and Benelifa (2017), Shahzadi et al. (2018), and Lucianetti, Jabbour and Gunasekaran (2018) presented evidence to support the idea that complex MAPs and environmental uncertainty are positively correlated. More sophisticated accounting information systems are needed by businesses functioning in highly uncertain environments in order to deliver superior financial, non-financial, and external data during the course of ongoing iterations. Fauzi, Hussain, and Mahoney (2011), Albu and Albu (2012), and Erserim (2012) found negative relationships between PEU and MA Systems. Given the relationship between PEU and MA techniques, the following is an assumption about the influence of PEU on MMAT use:

H1: The PEU has a positive influence on the usage MMATs.

3.2. Relationship between Intensity of Market Competition and Usage of MMATs

Contingency theorists argue that the rising demand for accounting information will lead businesses to adopt MA (Anderson, Lanen, 1999). Khandwalla (1972) and Baines and Smith (2003) both found that competition increases MA system complexity. Several studies, including those by Abdel-Maksoud et al. (2012), Albu and Albu (2012), Ahmad and Zabri (2015), Ghasemi et al. (2015), and Adu-Gyamfi et al. (2021), found that increased market competition is a significant variable in the use of sophisticated MAPs in a number of countries. Amara and Benelifa (2017), Nair and Nian (2017), Shahzadi et al. (2018), and Pham et al. (2020) found no correlation between MAPs and market competition. This leads to our research hypothesis.

H2: The intensity of market competition has a positive influence on the usage of MMATs.

3.3. MMATs Usage and OP

This section tests the third hypothesis and confirms the link between MMAT adoption and OP. MA's influence in helping firms achieve their goals is a hot topic. MAPs provide firms with relevant data. Formulating corporate strategy, preparing and tracking operations, ensuring influenceive use of resources, protecting intangible and tangible assets, decision making, maximizing value and improving performance are MA's functions (Horngren et al., 2002). Reviewing empirical evidence helps understand the influence of MA techniques on firm performance (Horngren et al., 2002). MAPs' performance influence has been quantified extensively. Modern MA techniques improve business performance, according to Hoque (2011). Baines and LangfieldSmith (2003) said modern MAPs have improved firm performance. Modern MAPs rely more on non-financial accounting information (i.e. customer satisfaction, on-time delivery, market share, employee satisfaction, and employee training) to improve firm performance. This result is consistent with those of McLellan and Abdel AL (2011), Tuanmat and Smith (2011), Ajibolade (2013), Tuan Mat and Smith (2014),

Ayedh and Eddine (2015), Al-Naser (2017), Alimoradi and Borzoupour (2017), Lucianetti et al. (2018), Alzoubi (2018), Bransah (2019) and Adu-Gyamfi, who emphasized a strong link between advanced MA methods and This research assumes an MMAT-success link. Consequently, we propose the following hypothesis:

H3: Usage of MMATs is positively correlated with OP.

3.4. Relationship between PEU and OP

Contingency theory found a link between managers' perceptions of environmental uncertainty and firm performance (Kwock, 1999; Hwang, 2005; Bastian, Muchlish 2012; Uyar, Kuzey, 2016). MA is changing to include more systems of strategies that define, assess, and manage key drivers for achieving financial and non-financial goals, according to Ittner et al. (2003). Hoque (2004) argued that environmental uncertainty affects performance indicators. When environmental uncertainty is high, firms may rely more on non-financial indicators to develop all firm divisions (Kaplan, Norton, 2001; AbdelKader, Luther, 2008).

Gordon and Narayanan (1984) found that a high PEU is associated with financial and non-financial indicator knowledge. Firms that focus on financial and non-financial indicators like sales growth and return on assets, and that face a constantly changing market environment, perform better than those that rely solely on financial measures (Ittner et al., 2003; Hall, 2011). Chenhall and Morris (1986), Gul (1991), and Hoque emphasized the positive relationship between PEU and performance metrics (200). Schulz, Wu, and Chow (2010) found a positive relationship between PEU and financial and non-financial performance metrics. Jusoh (2008) found a negative link between PEU and OP. Based on past research, we can hypothesize:

H4: PEU has a positive influence on OP.

3.5. Relationship between Intensity of Market Competition OP

Businesses often offer many products or services to compete in a crowded market. The market competition allows firms to sell new services and products at a reasonable price (Mia, Clarke 1999; Alomiri, Drury 2007). When firms face great competition, they manufacture high-quality products to drive firm performance (Chong & Rundus 2004). According to Otley (1999), maintaining a competitive edge requires high-quality and satisfied customers.

Many MA studies ignore the link between market competition density and firm performance. These works have mixed results. Mia and Clarke (1999) found a link between market competition and firm performance. Konings (1998), Brown and Earle (2000), Chong and Rundus (2004), Nickell (2006), Zhu and Sarkis (2007), and Al-Rfou (2012) revealed a strong link between market rivalry and company performance. Khandwalla (1977) and Purnama and Subroto (2016) competitiveness and performance were found to be negatively correlated. The literature is ambiguous regarding the relationship between competitiveness and performance.

H5: The intensity of market competition has a positive influence on OP.

3.6. Mediation Role of MMATs in the Relationship between External Factors and OP

Organizations can use new MA practices to generate useful resource decision-making information for dynamic management and competitive advantage (Ayadi, Affes, 2014). Abugalia (2011) said that firms should adopt modern MA techniques to provide managers with the necessary information to make rational decisions. Few studies, especially in developing countries, have explored MMATs' role in mediating external factors and OP (Ogungbade et al., 2016).

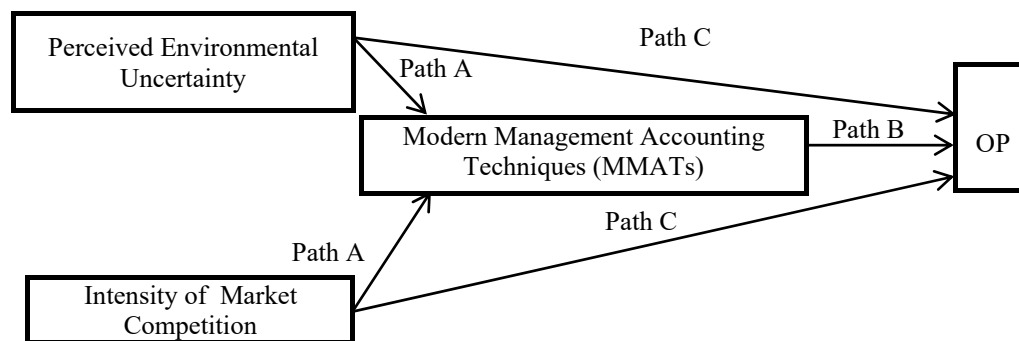
This study compares external factors, MMATs, and OP. In addition to mediating the relationship between external factors and OP, it also affects MMATs and OP. Chong and Chong (1997) tested the influence of PEU with MAS on performance. They found that PEU had a large indirect influence on performance based on how much businesses use MAS knowledge. Jusoh (2008) found that BSC mediates PEU and OP. Pavlatos (2018) noted the mediating role of strategic cost management in PEU and OP. According to Anh (2016), MAS mediates market competition intensity and OP. Albalaki et al. (2019) found that ABC adoption mediates external contingencies and OP. Wahyuni and Triatmanto (2020) noted that MA methods can mediate the link between environment and performance. Ngo (2021) found that large-scale MA systems fully mediate market orientation and performance.

H6: MMATs usage mediates the relationship between PEU and OP.

H7: MMATs usage mediates the relationship between the intensity of market competition and OP.

Figure 1 shows a model involving PEU, market competition, MMATs as a mediator, and OP.

Figure 1. Theoretical Framework



4. Methodology

The industrial sector is better for MA studies than other sectors, according to Smith et al. (2008). Due to globalization, MMATs in the industry should be studied (Chelliah et al., 2010). ASE industrial businesses provided the study's empirical data. Due to the study's complex variables and multiple correlations, the researcher focused on the industrial sector to reduce confusion in analyses and measurements (Naranjo, Hartmann, 2006). Several Jordanian studies, for instance, Nassar et al. (2011) and Alsoboa et al. (2015), investigated the adoption level of MA techniques, their results, and the factors that influence their adoption in the industry. According to the ASE website, 46 of the 192 listed firms are industrial. According to Barreiro and Albandoz (2001) and Zikmund (2003), a population of less than 500 people is considered small; in this case, it is common to adopt the entire population at 100% as the study sample or census sample, by sending questionnaires to all the population concerned in the study.

The current study analyzes Financial Business Units (FBUs) in ASE-listed industrial firms. Finance employees in the ASE-listed industrial sector are expected to examine high-quality data planned by senior management to carry out their activities and meet their objectives, for instance, financial and non-financial performance improvement. Respondents for this study include financial managers, accounting managers (chief accountants), management accountants, cost accountants, and internal auditors due to their high level of authority and expertise in the field.

Part (A) of this study's instrument collects respondent background information like education, work position, and qualifications, as well as firm information like industry, years in operation, and sales revenue. The current study used the same instrument as Al-Mawali (2015), Andesto (2016), and Alshbiel (2017), which was modified from Govindarajan (1984). PEU was measured using eight items in Part (B) of the questionnaire (B1-B8). To measure market competition, this study used a modified version of Al-Rfou (2012) and Alshbiel (2017) (1972). Part (C) of the questionnaire measured market competition with five items (C1-C5). The current study used the same instrument as Al-Bawab (2018) and Alzoubi (2018). In Part (D) of the questionnaire, 12 items measured MMATs adoption (D1-D12). The current study used a modified version of Ojra (2014) and Ahmad (2017)'s instrument to measure financial and non-financial indicators in firms (2000). In Part (E) of the questionnaire, seven items measured financial and non-financial indicators (E1-E7). The seven-point Likert scale ranged from "one" (very low extent) to "seven" (very high extent) to get participants' responses about MMATs in their firms. The participants rated previous variables on a seven-point Likert scale from "one" (very low extent) to "seven" (very high extent).

5. Analysis

The researcher hand-delivered surveys to respondents and asked them to respond within a certain timeframe. One month after the questionnaire was distributed, unfinished responses were called. From April to June 2019, data was collected. The effort yielded 128

questionnaires. 12 of 128 surveys were removed because more than 50% of questions were unanswered (Hair et al., 2010). This yields 116 valid surveys with a 76.3% response rate. Saunders et al. (2012) recommend a 30-50% response rate for self-administered business surveys. This study used SPSS and PLS to model routes.

Table 1. The Responding Industry Firms Profile (N=116)

Variables	Category	N	%
Position	FM	37	31.9
	CA	41	35.3
	MA	4	3.4
	CAcc	6	5.2
	IA	17	14.7
	Others	11	9.5
Experience in the current position	Less than 1 year	16	13.8
	1 – 5 year	22	19
	6 – 10 year	42	36.2
	11- 15 years	21	18.1
	16 – 20 years	15	12.9
	21 – 25 years	0	0.0
	More than 25 years	0	0.0
Experience in the current firm	Less than 1 year	22	19.0
	1 – 5 year	35	30.2
	6 – 10 year	20	17.2
	11- 15 years	30	25.9
	16 – 20 years	9	7.8
	21 – 25 years	0	0.0
	More than 25 years	0	0.0
field of degree	Accounting	85	73.3
	Business administration	14	12.1
	Economics	2	1.7
	Finance	15	12.9
	Other	0	0.00
Annual Sales Turnover	Less than 1M	6	5.2
	1M - 10M	30	25.9
	11M - 20M	38	32.8
	21M – 30M	8	6.9
	31M – 40M	17	14.7
	41M - 50M	0	0.0
	More than 50M	17	14.7

35.3% of respondents were chief accountants, 31.9% were financial managers, 14.7% were internal auditors, and 5.2% and 3.4% were cost and management accountants, respectively. Respondents accurately described firm practices. 36.2% of respondents had 6-10 years of job experience, 19.0% had 1-5 years, 18.1% had 11-15 years, 13.8% had less than 1 year, and 12.9% had 16-20 years. No respondent had more than 21 years of experience. The summary also shows that 30.2% of respondents have 1 to 5 years' experience in the current firm, 25.9% have 11 to 15 years' experience, 19.0% have less than 1 years' experience, 17.2% have 6 to 10 years' experience, and 7.8% have 16 to 20 years' experience. No one had 21-25 years of experience in their current firm. 87.9% of respondents have a bachelor's degree, 6.0% a master's, and 3.4% a diploma. 1.7% of respondents have accounting-specific training. This shows that the respondents are knowledgeable about their firms and the studied practices.

32.8% of respondent firms have annual sales between 11M and 20M, 25.9% have sales between 1M and 10M, and 14.7% have sales between 31M and 50M. 6.9% of respondents have 21M to 30M in annual sales, and 5.2% have less than 1M. No firm has 41M-50M in annual sales.

5.1. Descriptive Statistics

The results of the seven-point Likert scale dimensions of the constructs are shown in Table 2, and the total mean ranges from 4.70 to 5.14. This range indicates that all dimensions are reasonably high.

Table 2. Descriptive Statistics of the Constructs (N=116)

Variables	N	Mean	Std.dev
PEU	116	4.70	1.05
INMCOM	116	4.91	1.21
MMATs	116	5.14	1.04
OP	116	5.13	1.18

Both the PEU and the market competition intensity have mean values of 4.70, and their standard deviations are 1.05 and 1.21 respectively. This demonstrates that companies who react to environmental uncertainty and market competitiveness prefer to do so in a proactive manner. Taking action to address these variables can help lessen the impact of external factors on company objectives. A high standard deviation indicates that companies have varying assessments of how change-responsive they are. The manufacturing companies do not have the same resources and competencies. According to Table 2, the number of students who took the MMAT was rather high, with a mean score of 5.14 and a standard deviation of 1.04. Most responders utilize MMATs. The fact that the respondents' companies have a mean value of 5.13 and a standard deviation of 1.18 in Table 2 demonstrates that these companies are operating better than their rivals on average. This indicates that the majority of firms are prosperous and well-managed.

5.2. Quality Model Evaluation

PLS-SEM 3.0 was used in order to conduct the evaluation of the quality model (Ringle, Wende, Becker, 2014). Several researchers have used this program in accounting and strategic management (Bodoff, Ho, 2016). Advanced analyses that expand on the main PLS-SEM findings are needed to fully understand the results. The current study used a two-step procedure: first, assessing the measurement model, then assessing the structural model to test and analyze the PLS path model (Hair et al., 2014). The evaluation of the quality model, the testing of the measurement model, and the evaluation of the structural model are shown below.

5.3. Measurement Model Evaluation

As a means of guaranteeing the analytical validity and reliability of the results, PLS-SEM was used to evaluate the quality of the measurements. Before putting the model to the test, this investigation looked at its capacity to discriminate between groups, to converge on a common understanding of those groups, to be internally consistent, and to provide reliable indicator results.

5.3.1. Indicator Reliability

Utilizing the outside loadings of each measure, the indicator's reliability was evaluated, where the product loading factor must be above 0.70. (Hair et al., 2014). 4 of the 32 items were removed because their loadings were below 0.70, which are B8, H10, H11, and H12. Table 3 shows that only 28 items with loadings above 0.70 were retained for further analysis. In conclusion, the model measurements' indicator reliability was established because all the items reached 0.70 and were significant.

Table 3. Factor Loadings

Construct	Items	Loadings	Standard Error	T-value	P-value
PEU	B1	0.957	0.056	13.699	0.000
	B2	0.956	0.028	31.528	0.000
	B3	0.914	0.038	21.525	0.000
	B4	0.732	0.015	59.658	0.000
	B5	0.929	0.029	28.283	0.000
	B6	0.952	0.019	46.842	0.000
	B7	0.918	0.028	29.737	0.000
INMCOM	C1	0.880	0.028	31.568	0.000
	C2	0.793	0.039	21.585	0.000
	C3	0.816	0.032	26.095	0.000
	C4	0.813	0.021	40.966	0.000
	C5	0.892	0.03	28.012	0.000
MMATs	H1	0.752	0.031	27.628	0.000
	H2	0.882	0.03	27.432	0.000
	H3	0.855	0.034	25.486	0.000
	H4	0.774	0.031	26.949	0.000
	H5	0.764	0.044	18.756	0.000
	H6	0.803	0.029	28.86	0.000
	H7	0.871	0.038	16.294	0.000
	H8	0.788	0.038	20.648	0.000
	H9	0.887	0.043	18.562	0.000
OP	I1	0.770	0.037	22.063	0.000
	I2	0.856	0.025	33.989	0.000
	I3	0.859	0.019	47.153	0.000
	I4	0.709	0.022	40.294	0.000
	I5	0.723	0.028	29.674	0.000
	I6	0.860	0.025	34.512	0.000
	I7	0.885	0.042	18.719	0.000

PEU= Perceived Environmental Uncertainty; INMCOM = Intensity of Market Competition;; MMATs=Modern Management Accounting Techniques; OP= OP

5.3.2. Internal Consistency Reliability

Cronbach's alpha and Composite Reliability (CR) are used to measure internal consistency in studies (Peterson, Kim, 2013). Cronbach's alpha depends on the number of test items, so it tends to underestimate internal consistency. It's a conservative way to gauge internal consistency (Hair et al., 2014). Both CR and Cronbach's alpha must be 0.70 to 0.95. (Lin, Huang, Othman, Luo; 2020; Hair, Howard, Nitzl, 2020). Table 4 shows that all constructs' Cronbach's alpha values ranged from 0.904 to 0.939. All the constructions' CR values were above 0.70, which was acceptable; they ranged from 0.929 to 0.949. The internal consistency of the measurements has probably been tested and validated.

Table 4. Convergent Validity

Variables	Items	F/L	Alpha	CR ^a	AVE ^b
PEU	B1	0.957	0.926	0.940	0.693
	B2	0.956			
	B3	0.914			
	B4	0.732			
	B5	0.929			
	B6	0.952			
	B7	0.918			
INMCOM	C1	0.880	0.904	0.929	0.723
	C2	0.793			
	C3	0.816			
	C4	0.813			
	C5	0.892			
MMATs	H1	0.752	0.939	0.949	0.674
	H2	0.882			
	H3	0.855			
	H4	0.774			
	H5	0.764			
	H6	0.803			
	H7	0.871			
	H8	0.788			
	H9	0.887			
OP	I1	0.770	0.927	0.942	0.698
	I2	0.856			
	I3	0.859			
	I4	0.709			
	I5	0.723			
	I6	0.860			
	I7	0.885			

5.3.3. Convergent Validity

To determine whether or not convergent validity exists at the concept level, Hair et al. (2017) suggested employing the AVE statistic. Convergent validity requires an AVE of 0.50 or higher for each latent variable (Hair et al., 2017). Table 4 shows that each AVE value is within the range of 0.674 to 0.723, which is the range that is allowed, which is evidence of the validity of convergent measurement. Convergent validity may be attributed to the present investigation.

5.3.4. Discriminant Validity

Discriminative validity of the test was demonstrated using item cross-loadings and the Fornell-Larcker criterion. In order to measure cross-loading, the outer loading of objects must be larger on the relevant structure than on any other structure. For an item to be put on the weighing structure, it must weigh more than all the others there, but less than the structure itself (i.e. the cross-loads). Due to the fact that item loadings are much larger than cross-loads, Table 5 provides proof of discriminative validity.

Table 5. Item Loadings

Construct	Items	PEU	INMCOM	MMATs	OP
	B1	0.957	0.252	0.270	0.320
	B2	0.956	0.358	0.424	0.479
	B3	0.914	0.298	0.427	0.487
PEU	B4	0.732	0.345	0.417	0.412
	B5	0.929	0.305	0.372	0.442
	B6	0.952	0.392	0.440	0.458
	B7	0.918	0.297	0.318	0.302
	C1	0.198	0.880	0.591	0.501
	C2	0.159	0.793	0.542	0.473
INMCOM	C3	0.267	0.816	0.637	0.567
	C4	0.484	0.813	0.377	0.659
	C5	0.403	0.892	0.670	0.629
	H1	0.378	0.170	0.752	0.600
	H2	0.332	0.560	0.882	0.632
	H3	0.410	0.624	0.855	0.682
MMATs	H4	0.382	0.608	0.774	0.678
	H5	0.383	0.656	0.764	0.602
	H6	0.340	0.619	0.803	0.680
	H7	0.310	0.560	0.871	0.570
	H8	0.331	0.559	0.788	0.677
	H9	0.393	0.272	0.887	0.682
OP	I1	0.391	0.585	0.598	0.770
	I2	0.410	0.622	0.372	0.856
	I3	0.428	0.573	0.667	0.859
	I4	0.425	0.534	0.663	0.709
	I5	0.401	0.646	0.271	0.723
	I6	0.402	0.546	0.645	0.860
	I7	0.461	0.538	0.663	0.885

Table 6. Correlation

	INMCOM	MMATs	OP	PEU
INMCOM	0.848			
MMATs	0.774	0.820		
OP	0.683	0.708	0.853	
PEU	0.384	0.446	0.494	0.849

5.4. Structural Model Evaluation

In the PLS path modelling study, the structural model was tested after the measurement model (inner model). Hair et al. (2013) suggest looking at the model's (R^2) values, influence size (f^2), and predictive relevance. Bootstrapping was used to evaluate the model's predicted association's significance.

5.4.1. R-square (R^2)

PLS-SEM needs R^2 criteria to evaluate the structural model (Hair et al., 2012). The R-squared statistic can be used to estimate the proportion of the total variance in the dependent variable that can be attributed to each predictor (Hair et al., 2010). 0.75, 0.50, and 0.25 R^2 are significant, moderate, and weak, respectively (Hair et al., 2014). Figure 3 displays that the study model accounts for 97.3% of OP and 89.7% of MMATs' total variance. Acceptable R-square values were found for the endogenous latent variables in this analysis.

5.4.2. Influence Size (F^2)

According to Cohen (1988), an F^2 value of 0.35 is considered large, while 0.15 is considered medium, and 0.02 is considered small. Figure 3 shows that the research model can account for 68.3% of the total variance in OP while explaining 97.3% of the variance in MMATs. According to Hair et al. (2014), the R-square values for the latent variables endogenous were satisfactory.

Table 7. Effect of F^2

Relationships	F^2	Result
PEU → MMATs	0.244	Medium
PEU → OP	0.152	Medium
INMCOM → MMATs	1.316	Large
INMCOM → OP	0.107	Small
MMATs → OP	2.054	Large

Table 7 shows the influence size of PEU in MMATs and OP were 0.244 and 0.152 respectively. Also, the influence size of INMCOM in MMATs and OP were 1.316 and 0.107 respectively. In addition, the influence size of MMATs in OP was 2.054. According to Cohen, the influence sizes of this exogenous latent variable are large (1988).

5.4.3. Construct Cross-Validated Redundancy

Predictive relevance indicators (Q^2) include redundancy and community (Hair et al., 2014). When it comes to predicting data, it's best to employ both the structural and measurement models, therefore cross-validated redundancy is a better option than cross-validated communality (Hair et al., 2014). Hair et al. (2014) claim that a predictive research model has a cross-redundancy value over zero. As can be seen in Table 9, OP and MMAT redundancy

values have been cross-validated. The predictive ability of the model is shown by the fact that all cross-redundancy values for the two endogenous variables in the research are more than zero.

Table 9. Q² Test

Construct	SSO	SSE	C/C
OP	1044.000	429.184	0.589
MMATs	812.000	301.299	0.629

5.5. Direct Effects Testing

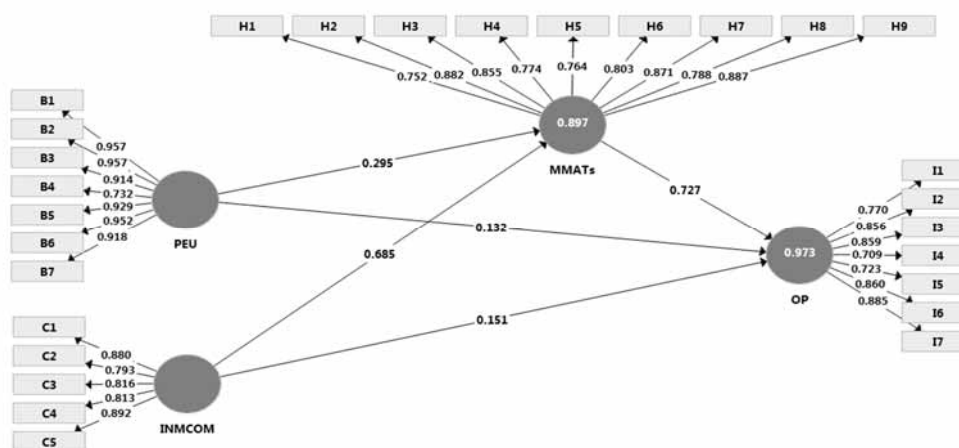
After validating the measurement and structural models, PLS-SEM route modelling tested the proposed associations. The researcher used the PLS algorithm and 5000 bootstrap samples and 116 cases to test path coefficients (Hair et al., 2014). The proposed relationship between PEU ($\beta= 0.295$, $t=2.671$, $p \leq 0.01$) and market competition ($\beta= 0.685$, $t=6.404$, $p \leq 0.01$) had a strong positive influence on MMATs, supporting H1 and H2. Table 10 shows that PEU ($\beta= 0.132$, $t=2.638$, $p \leq 0.01$) and market competition ($\beta= 0.151$, $t=2.263$, $p \leq 0.05$) had a positive and significant influence on OP, supporting H4 and H5, respectively. MMATs positively affect OP ($\beta=0.727$, $t=8.044$, $p \leq 0.01$), supporting H3.

Table 10. Direct Relationships

Hypo.	Hypothesis	Std. Beta	T-value	P-value	Decision
H1	PEU -> MMATs	0.295***	2.671	0.008	Supported
H2	INMCOM -> MMATs	0.685***	6.404	0.000	Supported
H3	MMATs -> OP	0.727***	8.044	0.000	Supported
H4	PEU -> OP	0.132***	2.638	0.008	Supported
H5	INMCOM -> OP	0.151**	2.263	0.024	Supported

Note: *** $p < 0.01$; ** $p < 0.05$.

Figure 1. The Results



5.6. The Mediating Relationships Testing

After evaluating exogenous and endogenous factors' direct influence, researchers examined mediator links (indirect influence). In evaluating the mediation influence, numerous statistical methods are available for drawing conclusions and calculating confidence intervals (CIs), for instance, Sobel's (1982) causal step, Baron and Kenny's (1986) coefficients process, and bootstrapping (Falk, Biesanz, 2016). Baron and Kenny's causal step approach neither quantifies nor allows inferential testing (Hayes, 2013). Given that indirect influence is not normally distributed, the Sobel test weakens it, requires non-standard path parameters, and lacks statistical strength, especially with small sample sizes (Hair et al., 2014). The coefficients methods conclusion is based on the assumption of normally distributed indirect influence sampling and the standard error formula, but there is no clear criterion for choosing one over the other (Hayes et al., 2011).

Bootstrapping was selected because it is more powerful and accurate than other approaches. Bootstrapping using 5000 samples and 95% CI assessed indirect impacts, following Preachers and Hayes (2008). PLS produces the CI values of the indirect impact $a*b$, and when a 95% CI excludes 0, mediation is established. Preachers and Hayes (2008) state that mediation does not need the mediator M "c" route to affect the independent variable X on the dependent variable. Mediation power should be determined by indirect impact pathways $a*b$, not path c's negligible direct effect (Zhao et al., 2010; Hayes, 2013). Zhao et al. (2010) state that mediation occurs when " $a*b$ " is substantial and "c-" is not. When a, b, and c have comparable signs, complimentary partial mediation occurs; otherwise, competing partial mediation occurs.

The study model proposes MMATs as a mediator between external factors and OP. Mediation tests were conducted to determine if MMATs mediate the relationship between external factors (PEU and market competition) and OP of ASE industrial firms. Table 11 shows the bootstrapped results of MMATs mediating the link between external factors and OP. The results show that direct influence c- is significant and the signs of paths a, b, and c- are positive, indicating that MMATs are a partial mediator (complementary) between INMCOM, PEU and OP. The indirect influence of PEU ($\beta=0.415$, 95% CI= 0.023 to 0.353) on OP does not include zero, indicating that MMATs mediate this relationship. MMATs are a partial mediator (complementary) in this relationship because their direct path c- is significant. This supports H6. In addition, the confidence interval of INMCOM on OP ($\beta=0.498$, 95% CI= 0.343 to 0.688) does not include zero, confirming that MMATs are a significant mediator in the relationship. MMATs are a partial mediator (complementary) in the relationship between INMCOM and OP because c- is significant. This supports H7.

Table 11. The Results of the Mediating

Relationships	Std.Beta	Std. Error	t-values	P-values	Indirect Influence 95% CI		Decision
					Lower	Upper	
INMCOM -> MMATs -> OP	0.498***	0.089	5.596	0.000	0.344	0.688	Partial Mediation "Complementary"
PEU -> MMATs -> OP	0.415**	0.085	2.530	0.011	0.023	0.353	Partial Mediation "Complementary"

5.7. Discussions

The study examines how external factors affect MMATs. Three hypothesis tests were shown before. All composite variables indicate external factors affect MMATs. When viewed as a composite variable, hypothesis testing doesn't support outside MMATs influence. The change increases MMATs acceptance to 89.7%. It answers the question. This study found that understanding external business influences increases MMATs adoption. External factors directly affect MMATs adoption:

5.7.1. PEU and Usage of MMATs

PEU was discovered to affect MMAT adoption. This indicates that PEU induces ASE firms to adopt MMATs. Lucianetti, Jabbour, and Gunasekaran concur with AbdelKader and Luther (2008), Ayadi and Affes (2014), Amara and Benelifa (2017), Shahzadi et al. (2018), and AbdelKader and Luther (2008). (2018). This indicates that industrial firms should prioritize PEU to increase MMAT utilization. PEU is a critical external factor that influences the design of the MA system and advanced MA techniques. The researchers Fauzi et al. (2011), Albu and Albu (2012), and Erserim (2012) discovered a negative correlation between PEU and MA practices. This may be due to the inability of top executives to predict external conditions. This indicates that PEU is essential for MMATs implementation and knowledge of supplier actions, customer demands, tastes, and preferences, as well as competitor market activities.

5.7.2. Intensity of Market Competition and Usage of MMATs

The degree of market competition affects MMAT adoption. This result empirically supports the hypothesis. Abdel-Maksoud et al. (2012), Albu and Albu (2012), Ahmad and Zabri (2015), Ghasemi (2015), and Adu-Gyamfi et al. (2012) all support this conclusion (2021). Amara and Benelifa (2017), Nair and Nian (2017), Shahzadi et al. (2018), and Pham et al. (2020) all contradicted one another. Industrial enterprises can enhance MMATs by swiftly reacting to market developments for instance price competition and the introduction of new products. Firms that perceive intense competition are more likely to implement new MA techniques to collect more data, according to studies (Albu, Albu, 2012; Shahzadi et al., 2018).

5.7.3. Usage of MMATs and OP

The first step in determining whether MMATs mediate the relationship between external factors and OP. MMATs affect the OP of industrial firms listed on the ASE. This finding is consistent with previous studies that discovered a strong relationship between the two variables in industrial businesses, for instance, Baines and Langfield-Smith (2003), Hoque (2011), McLellan and Abdel AL (2011), Tuanmat and Smith (2011), Ajibolade (2013), Tuanmat and Smith (2014), Ayedh and Eddine (2015), Al-Naser (2017), Alimoradi and Borzoupour (2017), Lucianetti et al. (2018), and Alzoubi (2021). This finding demonstrates

that MMATs can improve the performance of organizations. According to Nuhu, Baird, and Appuhami, MMATs improve processes, cost driver analysis, costs, efficiency, quality, and performance (2016). According to Huynh (2017), MA techniques are essential for businesses because they help to control expenses and improve performance. MA is a management tool that aids in the planning, organization, execution, and evaluation of business operations and firm performance (Kaplan et al., 1998). Industrial finance departments listed on the ASE should have the knowledge to enhance their organization's performance. They should be familiar with advanced MA techniques and support efforts to use MMATs influenceively in their organizations to improve performance.

5.7.4. PEU and OP

PEU is one of the external factors influencing the OP of ASE industrial firms. In line with Hwang (2005), Bastian and Muchlish (2012), Abdallah and Persson (2014), and Uyar and Kuzee (2009). (2016). To enhance OP, industrial firms should prioritize PEU. Unpredictability in business affords firms the opportunity to adapt to shifting conditions and enhance performance. A firm's competitiveness and performance can be enhanced by external documents. Unpredictable business environments influence OP (Mia & Clarke, 1999). In unpredictable business environments, managers must be knowledgeable about firm operations in order to respond swiftly to alterations. This could enhance business performance (Ajibolade et al. 2010). This demonstrates that PEU boosts OP. In contrast to Jusoh (2008), Pavlatos (2018) found no correlation between PEU and OP. This may be a result of financial employees' inability to anticipate external conditions.

5.7.5. Intensity of Market Competition and OP

Same PEU, market competition intensity affects OP. Positively, according to Konings (1998), Brown and Earle (2000), Chong and Rundus (2004), Nickell (2006), Zhu and Sarkis (2007), and Al-Rfou, market competition influences OP (2012). Anh (2016) disagreed. According to Khandwalla (1977) and Purnama and Subroto (1996), competition and performance are negatively related (2016). Given Jordan's favourable investment climate, this result is predictable. Therefore, Jordanian firms have demonstrated their ability to compete with multinationals. Firms are under pressure to provide consumers with high-quality products. Overall performance improves.

5.7.6. The Mediating Influence of MMATs on the Relationship between External Factors and OP

The bootstrapping analysis demonstrates that MMATs mediate the relationship between external factors and OP. According to Zahu et al. (2010), MMATs are a complementary (partial) mediator between external factors and OP. This study discovered that MMAT adoption awareness is a crucial link between external factors and OP. Numerous researchers have found evidence of the intervening influence of MA practices in the literature. According to the findings, PEU indirectly affects OP via MMATs. Chong and Chong (1997) found that

PEU indirectly affected OP through managers' use of comprehensive MMATs. Jusoh (2008) found that "balanced scorecard" mediates PEU and OP. Pavlatos (2018) found that strategic cost management mediates the PEU-performance relationship. Albalaki et al. (2019) found that ABC adoption mediates external contingent factors and OP. Wahyuni and Triatmanto (2020) noted that management accounting techniques can mediate environmental changes and performance.

The high PEU indicates that Jordan's environment is stable, which may be due to the market's small size. The pegged dinar, technical breakthroughs, political instability, and substantial changes in government policies and regulations may have given managers the impression that the economic environment is stable and predictable. As a result of these conditions, managers may have more access to decision-making information (as seen by the increased use of MMATs) and be able to accurately assign probabilities to decision outcomes. Given the low level of uncertainty in Jordan, managers can forecast the external environment using MMATs, resulting in improved performance. MMATs had a significant indirect (partially mediated) influence on OP as a result of market competition intensity. This result is comparable to those of Anh (2016), Rasid et al. (2011), and Ngo (2021), who discovered that MAS mediates the connection between market competition intensity and OP. MMATs are necessary to improve the performance of organizations in the modern world. MMATs can reduce market competition by increasing the competitiveness of businesses. MMATs can also increase market competition by providing a vast array of data that can result in improved decision-making and OP.

6. Conclusion

Based on relevant literature, the study developed a testable industrial model. External factors, MMATs, and performance are included. The model validates the influence of external factors on MMATs and OP. Overall, the researcher considers this study to have provided empirical evidence on MMATs adoption drivers and OP. According to this study, MMATs are the most important variables and strategies that can help firms increase performance and gain a competitive advantage. It is believed that these variables affect the performance of ASE-listed firms. The primary contribution of this study is evidence of the interaction influence of external factors and MMATs on the financial and non-financial performance of ASE-listed industrial enterprises. In the context of industrial firms listed on the ASE, the partial mediating influence of MMATs on the relationship between external factors and OP provides insight into the exploratory research, which asserts that there is no universally acceptable MAS that is applicable in all situations. The partial mediating influence of MMATs on the relationships suggests that external factors and MMATs should be combined to improve industrial firm performance, and that external factors can enhance MMAT adoption and OP. MMATs showed the indirect influences of external variables on industrial firm performance, despite their lack of absolute influence.

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