مجلة البحوث المالية والاقتصادية
مجلة علمية الكترونية محكمة متخصصة في المجالات المحاسبية والمالية والإدارية والاقتصادية تصدر عن
قسم المحاسبة بكلية الاقتصاد بجامعة بنغازي

ممارسات المحاسبة الإدارية البيئية في الشركات الصناعية الليبية: من منظور النظرية الشرطية

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الملخص:

تهدف هذه الدراسة إلى تقييم مدى تبني ممارسات المحاسبة الإدارية البيئية في الشركات الصناعية الليبية. وبالاعتماد على إطار النظرية الشرطية، تسعى الدراسة إلى تحديد تأثير عوامل محددة، مثل حجم الشركة وعمرها ونظم الإدارة البيئية القائمة ونوع النشاط، على مستوى تبني هذه الممارسات. تم جمع البيانات من خلال استبيان إلكتروني موجه إلى عينة من الشركات الصناعية الليبية. أظهرت النتائج أن حجم الشركة هو العامل الأكثر تأثيرًا على تبني ممارسات المحاسبة الإدارية البيئية، بينما لم تُظهر العوامل الأخرى (مثل عمر الشركة، ونظم الإدارة البيئية، ونوع النشاط) علاقة ذات دلالة إحصائية حول مستوى تبني المحاسبة الإدارية البيئية.

الكلمات المفتاحية: المحاسبة الادارية البيئية، الادارة الموقفية، ليبيا.

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Environmental Management Accounting Practices in Libyan Manufacturing Companies: A Contingency Theory Perspective

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Abstract:

This study investigates the current adoption of Environmental Management Accounting (EMA) in Libyan manufacturing companies. Using contingency theory, the study examines how factors such as company size, age, existing environmental management systems, and business type influence EMA implementation. The data was gathered by conducting an online survey among Libyan manufacturing companies. Results show that while all EMA practices were present to some extent, overall EMA adoption is low. Although company size impacted EMA adoption, other factors like company age, environmental management systems, and business type did not significantly influence the level of EMA implementation.

Keywords: Environmental management accounting, contingency theory, Libya.

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1. Introduction

Growing environmental concerns have led to the development of environmental accounting as a specialized field within accounting (Ferreira et al., 2010; Ismail et al., 2014). This field encompasses both environmental financial accounting (EFA) and environmental management accounting (EMA). EMA, in particular, has emerged as a response to calls for improved environmental management and accounting practices, expanding upon traditional management accounting methods (Birkin, 1996). Recent research has focused on identifying the key factors driving the adoption of EMA practices within organizations.

Existing research on EMA adoption primarily employs contingency theory. While studies like Frost and Wilmshurst (2000), Frost and Seamer (2002), Qian and Burritt (2009), Ribeiro et al. (2010), Qian and Burritt (2011), Christ and Burritt (2013), and Mokhtar et al. (2016) have examine the relationship between company size and EMA adoption, the results are inconsistent. This inconsistency highlights the need for further research to clarify the impact of company size on EMA (Christ and Burritt 2013). Moreover, the role of company age in EMA adoption has been largely overlooked, with only a few exceptions (Wang et al., 2018). Similarly, the influence of Environmental Management Systems (EMS) and business type on EMA adoption has received limited attention (Mokhtar et al., 2016; Christ and Burritt, 2013).

To address these research gaps, this study examine the impact of company size, company age, EMS, and business type on EMA adoption within the Libyan manufacturing sector. By examining these contingent factors, the study aims to contribute to a deeper understanding of the factors driving EMA adoption at the organizational level.

The choice of Libya as the study context is justified by several factors. Firstly, Libya's industrial sector, while economically significant, is a major pollution source (Nassar et al., 2017). This necessitates a strong focus on environmental issues within the sector. Secondly, given international environmental regulations and Libya's legal framework for environmental protection, there is a clear need to promote EMA adoption within the country. Finally, this study addresses a significant gap in the existing literature by focusing on EMA in the Libyan industrial sector. It responds to calls made by previous studies, such as Qian and Burritt (2011) and Christ and Burritt (2013), for more research on EMA in developing countries.

To achieve the study's objectives, two research questions were explored: the extent of EMA adoption in Libyan manufacturing companies and the influence of company size, company age, EMS, and business type on this adoption. Data was collected from Libyan manufacturing companies through a questionnaire survey. This data was then analysed using factor analysis, descriptive statistics, and advanced multivariate statistical methods.

This research is expected to contribute to the existing body of knowledge in several ways. First, by conducting a study in a developing country context, it expands upon previous research, such as Christ and Burritt (2013), which primarily focused on developed economies. This provides new insights into the factors influencing EMA adoption in different economic settings. Second, unlike Mokhtar et al. (2016), this

study explicitly examines the influence of company age on EMA adoption, addressing a gap in the literature identified by Courtis (2004) and Akhtaruddin (2005). Third, while Wang et al. (2018) included company age as a control variable, this study treats it as an independent variable, allowing for a direct examination and explanation of its impact on EMA adoption.

The rest of this paper is organized as follows: the next section provides a literature review and presents the research hypotheses, the following section describes the research methodology and variable measurement, the results are then presented, and the final section summarizes the findings and concludes.

2. Literature review

2.1 Libya and the rising environmental concerns

The manufacturing sector in Libya has been identified as a primary source of environmental pollution, with various pollutants impacting the region (Nassar et al., 2017). Within this sector, the oil and gas industry stands out as a major contributor to environmental degradation (Darwesh and Hamdy, 2019). The consequences of these industries' activities are severe. For example, communities in eastern Libyan towns like Jikharra, Awjila, and Jalu, with a combined population of around 30,000, have experienced negative environmental impacts due to oil and gas activities. (Darwesh and Hamdy, 2019). These environmental damages extend beyond ecological harm, adversely affecting agriculture and the health of local residents. Numerous health issues, including cancer and severe eye inflammations, have been linked to the operations of these companies (Darwesh and Hamdy, 2019). To address these pressing environmental problems and their associated consequences, the implementation of EMA is proposed as a potential solution. By adopting EMA, companies can effectively manage their environmental performance and contribute to a healthier and more sustainable future for the region.

2.2 The emergence of EMA

Environmental Management Accounting (EMA) has gained significant attention in recent years as a tool for businesses to effectively manage their environmental and financial performance. Several factors have contributed to this growing interest. These include the introduction of stricter environmental regulations (Burrit et al., 2002), the increasing emphasis on corporate social responsibility and sustainability (Shank, 2007), the adoption of voluntary environmental standards like ISO 14000 (Gray and Bebbington, 2001), the need to improve operational efficiency and reduce costs (UNDSD, 2003), and the limitations of traditional management accounting methods in addressing environmental issues (Epstein, 1996; Bartolomeo, 2000; Burrit et al., 2002; UNDSD, 2003; Deegan, 2003; Shank, 2007; Cassells et Al., 2011; Christ and Burritt, 2013; Ismail et al., 2014). Rising costs related to raw materials, waste disposal, regulatory compliance, and potential legal liabilities have also driven the demand for EMA (Ismail et al., 2014). Furthermore, growing public concern for environmental protection has pressured organizations to adopt greener practices (UNDSD, 2003).

2.3 EMA in context

The United Nations Division for Sustainable Development (UNDSD) defines EMA as:

> The identification, collection, analysis and use of two types of information for internal decision-making: physical information on the use, flows and destinies of energy, water and materials (including wastes); and monetary information on environment-related costs, earnings and savings (UNDSD, 2001: 1).

EMA is a system used to measure and manage a company's environmental impact. It focuses on setting achievable environmental goals and tracking progress through operational efficiency, compliance with environmental regulations, and reliable reporting. EMA involves quantifying both physical and monetary aspects of environmental performance. Physical EMA tracks the use of resources like water, energy, and materials, as well as waste generation (Burritt et al., 2002; IFAC, 2005). Monetary EMA focuses on financial costs and revenues related to environmental activities, including expenses for resource consumption, pollution control, and waste management, as well as income from recycling or selling waste products (Burrit et al., 2002; Tsui, 2014; Mokhtar et al., 2016).

Environmental costs can be classified into two primary categories: internal and external (UNDSD, 2001). Internal environmental costs directly impact a company's financial performance and include expenditures on activities such as pollution prevention, waste management, and environmental compliance (Schaltegger and Burritt, 2000). These costs are typically accounted for in a company's financial statements. External environmental costs, often referred to as externalities, represent the economic damage caused by a company's operations that is borne by society as a whole rather than by the company itself. Examples of external costs include air pollution, water contamination, and climate change. These costs are notoriously difficult to quantify and are often not reflected in a company's financial records (de Beer and Friend, 2006). Given the complexities associated with identifying and measuring external environmental costs, this study focuses on internal and external costs that are within a company's control and directly impact its financial performance. While acknowledging the significance of external costs to society, this research is primarily concerned with those environmental costs that can be managed and accounted for by individual organizations.

2.4 The role of EMA

EMA is a tool designed to assist managers in making informed decisions that enhance a company's environmental performance (Christ and Burritt, 2013). While primarily used internally for decision-making, EMA data is increasingly incorporated into external reports, such as financial statements and annual environmental reports.

Implementing EMA offers numerous benefits. By encouraging research into environmentally friendly products and processes, EMA promotes innovation and sustainability (IFAC, 2005). It provides valuable data for decision-making, enabling companies to identify opportunities for waste reduction, energy efficiency, and resource optimization (Burrit et al, 2002; Adams and Zutshi, 2004; Christ and Burritt, 2013). Moreover, EMA can result in lower pollution, cost savings, and reduced environmental liabilities. (Ferreira et al., 2010).

Beyond financial advantages, EMA contributes to a company's overall reputation and competitiveness. It can improve public image, strengthen stakeholder relationships, and attract and retain employees (Adams and Zutshi, 2004). By demonstrating a commitment to environmental responsibility, companies can mitigate risks such as consumer boycotts and regulatory scrutiny (Ferreira et al., 2010). Ultimately, EMA can be a strategic tool for gaining a competitive advantage in the market (Dunk, 2007; Setthasakko, 2010).

2.5 Contingency theory

Contingency theory posits that there is no one-size-fits-all approach to organizational management. Instead, the effectiveness of organizational structures and practices depends on various factors, or contingencies, specific to each organization (Donaldson, 2001). By adopting this contingent approach, the management accounting system, as an element of the organizational structure is conditioned by these contingencies (Amara and Benelifa, 2017).

Contingency theory posits that there is no universal "best practice" in management accounting, as the effectiveness of these practices depends on the specific circumstances of an organization (Donaldson, 2001). Essentially, contingency theory suggests that organizations should tailor their management accounting systems to align with their unique circumstances, rather than adopting a standardized approach. By identifying and understanding these influential factors, managers can select management accounting practices that best support their organization's goals and objectives (Oluwagbemiga, 2015).

Contingency theory has been used by many researchers to explain the complex relationships between changes in management accounting and particular factors, so-called contingencies (Luft and Shields, 2003). Research has identified several key contingency factors that can influence the choice and effectiveness of management accounting systems, including organizational environment, technology, size, strategy, and culture (Otley, 1980; Garrison, et al., 2006). This perspective suggests that the applicability of management accounting practices is dependent on the unique characteristics and challenges faced by each organization.

The contingency perspective is used in empirical research to identify the factors that influence the choice and effectiveness of organizational structures (Bouma and van der Veen 2002). In management accounting research, contingency theory has been applied through three primary approaches: selection, interaction, and systems (Drazin and Van de Ven, 1985; Christ and Burritt, 2013; Mokhtar et al., 2016).

The *selection approach* focuses on identifying relationships between organizational characteristics (contingent factors) and specific management accounting practices, such as EMA, without explicitly considering the impact on organizational performance. In this approach, contingent factors are treated as independent variables, while EMA is the dependent variable. The *interaction approach* investigates how contingent factors influence both management accounting practices (like EMA) and organizational performance. This approach examines the interplay between these variables, exploring how contingent factors can moderate or mediate the relationship between EMA and performance. The *systems approach* takes a holistic view by

considering multiple contingent factors and management accounting practices simultaneously to understand their combined impact on organizational performance. In this perspective, both contingent factors and EMA are treated as independent variables that interact to influence performance.

Given the nascent nature of EMA research compared to the broader field of management accounting, the selection approach is deemed most appropriate for this study. This approach aligns with the need for a straightforward and focused investigation into the factors influencing EMA adoption (Christ and Burritt 2013). Unlike the interaction and systems approaches, which explore more complex relationships involving organizational performance, the selection approach allows for a clear examination of the impact of contingent factors on EMA as a dependent variable. Therefore, this study will employ the selection approach to investigate the influence of company size, company age, EMS adoption, and business type on the extent of EMA adoption among Libyan manufacturing companies.

2.6 Overview of contingency-based studies of EMA practice

Early research into the relationship between industry environmental sensitivity and the development of environmental management accounting (EMA) yielded mixed results. Frost and Wilmshurst (2000) were the first to apply contingency theory to this area but found no conclusive evidence that industry environmental sensitivity influenced the adoption of EMA. This led them to suggest that other factors might be driving EMA development.

Subsequent studies, however, presented a different perspective. Frost and Seamer (2002) discovered a positive correlation between industry environmental sensitivity, company size, and the implementation of EMS with the extent of EMA adoption. Ribeiro et al. (2010) further supported this finding by demonstrating the influence of company size and environmental management practices on EMA development in Portuguese organizations.

Research conducted in the Australian public sector has expanded upon the contingency theory framework proposed by Christ and Burritt (2013) to investigate the factors influencing EMA adoption. By examining the impact of environmental strategy, organizational structure, industry environmental sensitivity, and organizational size, this research found evidence supporting the contingency theory approach. Specifically, the study revealed significant relationships between environmental strategy, industry environmental sensitivity, organizational size, and the level of EMA adoption. These findings contribute to the broader understanding of the factors driving EMA adoption in different organizational contexts.

Recent studies have explored the relationship between corporate characteristics and the implementation of Environmental Management Accounting (EMA) using a contingency theory framework. Mokhtar et al. (2016) examined five organizational contingencies: industry environmental sensitivity, company size, ownership status, EMS adoption, and the proportion of non-executive directors. Their findings indicated that only ownership status influenced the extent of EMA implementation in Malaysian public listed companies.

Similarly, Wang et al. (2018) found no significant impact of company size, company age, ownership status, or industry environmental sensitivity on EMA adoption. These results contradict earlier findings by Christ and Burritt (2013) which suggested that organizational factors such as environmental strategy, industry environmental sensitivity, and organizational size were associated with EMA adoption levels.

However, Qian and Burritt (2011) offered a different perspective by highlighting the role of organizational context in EMA development. They found that factors such as complex waste operations, uncertainties in waste management, and strategic priorities influenced the adoption of EMA in the waste management sector.

Previous research investigating the relationship between company size and the level of EMA adoption has yielded inconsistent results. While studies conducted in Australia (Christ and Burritt, 2013), Malaysia (Mokhtar et al., 2016) and China (Wang et al., 2018) have explored this relationship, the lack of conclusive evidence highlights the need for further research in other geographic contexts, particularly oil-rich countries like Libya where environmental concerns are paramount.

Moreover, the influence of other factors such as EMS, business type, and company age on EMA adoption remains understudied. While some research has touched upon EMS and business type, the impact of company age on EMA has been largely overlooked. Even when included in studies such as Wang et al. (2018), company age has typically been treated as a control variable rather than an independent variable, limiting our understanding of its relationship with EMA adoption.

To address these research gaps, this study aims to investigate the impact of company size, company age, EMS adoption, and business type on the level of EMA adoption in the Libyan context. By examining these factors, the study seeks to contribute to a more comprehensive understanding of the determinants of EMA adoption.

The selection of company size, company age, the existence of an EMS, and business type as key variables in this study is justified by several factors.

Firstly, unlike developed countries like Australia where larger companies often dominate the industrial sector, Libya's diverse company size distribution makes it essential to examine the influence of company size on EMA adoption.

Secondly, the implementation of EMA requires specialized resources and expertise. As mature companies are more likely to possess these capabilities, company age is considered a significant factor in determining EMA adoption levels.

Thirdly, Libya's economic transition from a planned to a market-based economy highlights the potential impact of institutional factors on EMA adoption. The presence of an EMS, influenced by regulatory environments, is expected to play a crucial role in driving EMA implementation in this context.

Finally, the diverse nature of Libya's industrial sector, encompassing both oil and gas exploration companies and other manufacturing firms with varying levels of environmental impact, necessitates an investigation into the influence of business type on EMA adoption.

2.7 Contingency factors and hypothesis development

Based on the findings of previous research by Frost and Wilmshurst, Frost and Seamer, Qian and Burritt, Ribeiro et al., Christ and Burritt, and Mokhtar et al., this study investigates the correlation between the level of EMA adoption and four key organizational factors: company size, company age, the existence of an Environmental Management System (EMS), and the environmental sensitivity of the company's industry.

2.7.1 Company size

Previous research indicates a connection between company size and the adoption of advanced management accounting techniques, including EMA (Haldma and Lääts, 2002; Chenhall, 2003; Cadez and Guilding, 2008). Larger companies are often associated with greater resources and a higher likelihood of adopting EMA due to their ability to invest in the necessary systems and expertise (Leftesi, 2008; Ribeiro et. al., 2010; Christ and Burritt, 2013; Mokhtar et al., 2016). Additionally, larger companies tend to face increased public scrutiny regarding their environmental performance, potentially motivating them to adopt EMA as a means of demonstrating environmental responsibility (Mokhtar et al., 2016).

However, some studies support this relationship between company size and EMA adoption, others have found conflicting results. For example, Frost and Seamer (2002) and Christ and Burritt (2013) reported a positive association, while Ribeiro et al. (2010), Mokhtar et al. (2016), and Wang et al. (2018) found no significant impact of company size on EMA adoption.

While previous research has explored the relationship between company size and EMA adoption, the available evidence primarily comes from developed countries (Australia) and emerging economies (Malaysia, China). A gap exists in the literature regarding the impact of company size on EMA adoption in developing countries, particularly in the Middle East and Africa. Furthermore, the inconsistency in findings across existing studies necessitates further investigation in diverse contexts.

Given these research gaps and the explicit recommendation for additional research by Christ and Burritt (2013), this study hypothesizes that:

H1. *The level of adoption of EMA is positively related to the company size.*

2.7.2 Company age

Previous research suggests that older companies are more likely to adopt environmental accounting practices than younger companies (Akhtaruddin, 2005). This is attributed to factors such as the accumulation of operational experience, access to advanced information systems, and a greater understanding of the benefits of environmental accounting (Sehar et al., 2013). In this context, Courtis (2004) argues that mature companies are often perceived as having the resources and expertise to implement and sustain EMA systems. Additionally, the accumulation of environmental information over time can facilitate EMA adoption in these companies.

While previous research has suggested a potential relationship between company age and the adoption of management accounting and environmental accounting practices,

the empirical evidence on this matter is inconsistent. For instance, in India, Hossain and Reaz (2007) found that company age is an insignificant factor in explaining the level of environmental and social practices. In an Australian context, Bhattacharyya (2014) reports that company age does not have an impact on the level of social and environmental reporting. In the Libyan context, studies of Al Drugi (2013); Abdo and Al Drugi (2012); Al Drugi and Abdo (2012); and Abdo and Al Drugi (2014) found no significant difference in the level of environmental disclosure between old and new companies. Similarly, Abdillahi and Manini (2017) and Wang et al. (2018) found that firm age had no significant impact on the environmental accounting disclosure and adoption of EMA.

Although, some studies have indicated a lack of significant relationship between company age and environmental or social performance, including EMA adoption, other research has found a positive correlation. For instance, Moore (2001) discovered a positive association between company age and environmental and social performance in the UK. Similarly, Al-Hawari and Nassar (2017) found that company age influenced the adoption of managerial accounting practices in Jordanian small and medium-sized enterprises.

In spite of these studies provide valuable insights, the lack of consensus regarding the influence of company age on EMA necessitates further investigation. Given the mixed findings and the limited research in certain geographical contexts, particularly developing countries, there is a clear need to explore this relationship further. While preliminary research has been conducted in this area, a clear understanding of the relationship between company age and EMA adoption remains elusive. This study seeks to expand upon existing knowledge by delving deeper into this relationship. Thus, this study hypothesizes that:

***H2**: The level of adoption of EMA is positively related to company age.*

2.7.3 EMS adoptions

A primary goal of an EMS is to reduce a company's negative environmental impact. Research suggests a reciprocal relationship between EMS and EMA (Frost and Seamer, 2002; Qian et al., 2011). On one hand, EMA can enhance environmental management processes by providing valuable data and insights. On the other hand, EMS serves as a foundation for EMA by generating the necessary environmental information required for effective accounting practices.

While EMS and EMA are distinct concepts, they are interconnected. EMS represents a process that encompasses strategic planning, cost-benefit analysis, and the identification of environmental information needs. EMA, on the other hand, focuses on quantifying, measuring, and reporting environmental information. In essence, EMS lays the groundwork for EMA by generating the necessary data.

Previous research has indicated a correlation between the development of EMS and EMA (Ribeiro et al., 2010). However, the relationship between the two is not always straightforward, as evidenced by inconsistent findings in some studies (Mokhtar et al., 2016).

While Ribeiro et al. (2010) found a correlation between the two in Portugal, Mokhtar et al. (2016) reported inconsistent findings in Malaysia. These discrepancies may be attributed to differences in economic development and industrial sophistication between these countries. Given the potential for divergent outcomes in developing countries, further research is needed to clarify the relationship between EMS and EMA in contexts like Libya. Consequently, this study hypothesizing that:

H3: *The level of adoption of EMA is positively related to the adoption of EMS.*

2.7.4 Environmental sensitivity of the industry

The type of business operation has been identified as a potential factor influencing the adoption of management accounting practices. Research suggests that different business sectors may employ varying management accounting systems to suit their specific needs (Innes and Mitchell, 1995). For instance, a study of Australian SMEs by Holmes et al. (1988) found that business type impacted the level of management accounting practices adopted.

Given the fact that some manufacturing companies are considered more polluting than others, such as oil and gas companies and petrochemicals, the environmental pressures they face in this regard are also different (Frost and Wilmshurst, 2000). Therefore, the types of environmental pressure on different business sectors may dictate the kind of environmental procedures and policies they put in place (IFAC, 2005). Thus, EMA will generally be of greater use to companies operating in environmentally-sensitive industries (Frost and Wilmshurst, 2000).

However, empirical findings have been inconsistent. Studies by Ferreira et al., (2010) and Christ and Burritt (2013) supported the notion that business type is a key determinant of EMA adoption. However, subsequent research by Mokhtar et al. (2016) and Wang et al. (2018) challenged this perspective, finding no significant differences in EMA adoption between environmentally sensitive and less sensitive industries. These conflicting results highlight the need for further investigation into the relationship between business type and EMA adoption to clarify the extent of its influence.

Unlike previous studies conducted in Australia, Malaysia, and China, where the industrial landscape is more diversified, Libya's industrial sector is predominantly comprised of petroleum exploration companies. This unique characteristic, coupled with the fact that Libya's industrial sector is identified as the most polluting in the country (Nassar et al., 2017), underscores the importance of examining the influence of business type, on the adoption of Environmental Management Accounting (EMA). Therefore, in order to investigate the relationship between business type and adoption of EMA it is hypothesizes that:

H4: *The level of adoption of EMA is positively related to business type.*

3. Research methodology

This research adopts a positivist paradigm to examine the relationship between specific variables and the level of EMA adoption among Libyan manufacturing companies. By employing a quantitative approach, the study aims to gather numerical data that can be statistically analyzed to test the research hypotheses. This approach prioritizes objectivity and avoids subjective interpretations. The findings of this study will be based solely on the quantitative analysis of the data, rather than on the researchers' personal opinions or beliefs.

3.1 Research population

This study focuses on medium and large-sized manufacturing companies in Libya, excluding smaller enterprises. This decision is based on the assumption that medium and large companies are more likely to have established accounting systems, including sophisticated management accounting systems like EMA (Szychta, 2002; Leftesi, 2008; Boukr, 2018). This approach aligns with previous research in the field of management accounting (see for example: Leftesi, 2008; and Boukr, 2018). The sample of 97 manufacturing companies was selected from a list compiled using data from the Documentation and Information Center of Industries and Economics in Misurata and the National Oil Corporation in Libya.

3.2 Data collection instrument

To gather primary data for this study, an online survey was designed and administered to a sample of medium and large manufacturing companies operating within Libya. The target respondents for the survey were key individuals occupying senior financial positions within these companies. This included financial directors, financial managers, senior management accountants, and senior cost accountants.

Recognizing that Libya is primarily an Arabic-speaking country, a two-phase approach was adopted for questionnaire development and administration. Initially, the questionnaire was drafted in English, the lingua of research. Subsequently, the questionnaire was meticulously translated into Arabic to ensure effective communication with respondents.

To enhance the questionnaire's validity and reliability, a rigorous pretesting process was undertaken. The Arabic version of the questionnaire was circulated to a panel of five academic experts from the accounting department at the University of Benghazi. Their feedback was instrumental in refining the questionnaire's language, clarity, and comprehensiveness. Additionally, the questionnaire was piloted with five managers from industrial companies and a group of accounting professionals working in various manufacturing companies within Libya to assess its relevance, understand ability, and practicality in the Libyan context.

The questionnaire was divided into three main sections. The first section collected demographic information about the respondents. The second section gathered general company data, including size, age, the presence of an EMS, and business type. This information was crucial for analyzing the relationship between EMA and the identified contingency variables. The final section focused on assessing the current

state of EMA practices within Libyan manufacturing companies. Out of 76 questionnaires distributed online, a total of 51 usable responses were obtained.

3.3 Measurement of variables

This section will outline the operationalization of variables. It will specify how the independent variables (company size, age, EMS adoption, and business type) and the dependent variable (EMA adoption) were measured.

Company size was measured by the number of employees. This metric was chosen for its accessibility and consistency with previous research (see for example, Leftesi, 2008; Christ and Burritt, 2013, Al-drugi, 2013; Nair and Nian, 2017). Respondents were initially presented with five size categories based on employee numbers. However, due to the uneven distribution of companies across these categories, a decision was made to dichotomize the sample into two groups: medium-sized companies (50-500 employees) and large companies (over 500 employees). These categories were coded as 0 and 1, respectively, for statistical analysis.

To measure company age, respondents were presented with five age categories. The grouping companies based on certain age bands is in accordance with Wang et al (2018). However, due to an uneven distribution of companies across these categories, a decision was made to simplify the analysis by dichotomizing companies into two groups: 'new' companies (less than 12 years old) and 'old' companies (12 years or older). This categorical variable was coded as 0 for 'new' companies and 1 for 'old' companies for subsequent statistical analysis.

To determine the presence of an Environmental Management System (EMS), respondents were asked to indicate whether their company had adopted such a system. The data for EMS adoption was coded as a binary variable: 0 for companies without an EMS and 1 for companies with an EMS. This categorical variable will be used in the statistical analysis.

To classify industries as environmentally sensitive or less sensitive, this study relied on established criteria from previous research, including the work of Frost and Wilmshurst (2000) and Christ and Burritt (2013). Industries such as mining, chemicals, oil and gas, and utilities were categorized as more environmentally sensitive, while others were classified as less sensitive. Respondents were presented with a list of 12 potential business types and asked to select the one that best matched their company. For analysis purposes, these business types were dichotomized into two groups: more environmentally sensitive and less environmentally sensitive. These groups were coded as 0 and 1, respectively.

To measure the extent of EMA adoption, a list of thirteen EMA practices was incorporated into the survey (see table 1). These practices were adapted from previous research conducted by Ferreira et al. (2010), Christ and Burritt (2013) and Burritt et al. (2002).

Table 1 EMA practices

Items	Description	Reference
EMA 1	Identification of environment-related costs	Burritt et al. (2002) - Ferreira et al. (2010) - Christ and Burritt (2013)
EMA 2	Estimation of environmental-related contingent liabilities	Ferreira et al. (2010) - Christ and Burritt
EMA 3	Classification of environment-related costs	
EMA 4	Environmental life cycle costing	Burritt et al. (2002)
EMA 5	Environmental target costing	
EMA 6	Introduction or improvement to environment-related cost management	Ferreira et al. (2010) - Christ and Burritt
EMA 7	Creation and use of environment-related cost accounts	
EMA 8	Development and use of environment-related key performance indicators (KPIs).	
EMA 9	Elaboration of monetary environmental operational budgeting	Burritt et al. (2002)
EMA 10	Elaboration of monetary environmental capital budgeting	
EMA 11	Environmental life cycle budgeting	
EMA 12	Environmental life cycle and target pricing	
EMA 13	Assessment of potential monetary environmental impacts associated with capital investment decisions	Christ and Burritt (2013)

To assess the extent of EMA adoption, respondents were asked to rate the implementation level of 13 specific EMA practices on a 5-point Likert scale ranging from "does not do at all" to "does to a very great extent." This approach allowed for the quantification of EMA adoption across different practices. The measurement framework employed in this study aligns with established practices in EMA research, particularly Burritt et al. (2002), Ferreira et al. (2010), Christ and Burritt (2013), Mokhtar, et al, (2016), and Wang et al, 2018). By adopting a standardized measurement approach, the research enhances its comparability with previous findings.

3.4 Analytical approach

Linear regression analysis was employed to examine the relationship between EMA adoption and the identified independent variables. Prior to conducting the regression analysis, several preliminary checks were undertaken to ensure the data met the necessary assumptions. These checks included assessing data normality, multicollinearity, and linearity assessment. Additionally, descriptive analyses were performed to understand the response rate, respondent characteristics, and overall EMA adoption patterns.

4. Results

4.1 Response rate

Data collection for this study involved distributing questionnaires to Libyan manufacturing companies through both online and physical channels. The distribution process commenced on November 15, 2018, and continued for three months. Out of the 76 questionnaires distributed, 60 were returned, representing responses from 60 distinct companies. After excluding nine unusable questionnaires, the final usable sample comprised 51 responses, yielding a response rate of 67%. This response rate surpasses those reported in similar studies conducted by Ferreira et al., 2010 (14%); Christ and Burritt, 2013 (6.81%); Mokhtar et al., 2016 (9.7%) and is considered satisfactory based on the guidelines provided by Saunders et al. (2009) and Sekaran and Bougie (2010).

4.2 Profile of respondents

The respondents participating in this study possessed the necessary qualifications and experience to provide insightful information regarding EMA practices. A substantial majority (96.1%) held university degrees, demonstrating a high level of education among the respondents. Additionally, over one-third (37.3%) had undergone training related to environmental management or accounting, indicating a keen interest in these areas within the Libyan manufacturing sector. These findings suggest that the respondents were well-positioned to contribute valuable data to the research.

4.3 Characteristics of responding companies

Table 2 presents the characteristics of the surveyed companies. Approximately half of the respondents (50.9%) were classified as medium-sized companies, while the remaining 49.1% were categorized as large companies. In terms of age, slightly more than half (58.8%) of the companies were established for over 12 years, indicating a relatively mature sample. Nearly half of the companies (49%) had implemented an Environmental Management System (EMS), while the other half had not. Regarding industry type, a larger proportion of companies (66.7%) operated in environmentally sensitive sectors compared to those in less sensitive industries (33.3%).

Table 2 Characteristics of responding companies

Variable	N	%
Company Size:		
Medium	26	50.9
Large	25	49.1
Company Age:		
New	21	41.2
Old	30	58.8
EMS Adoption:		
Adopted EMS	25	49
Not adopted EMS	26	51
Type of Business:		
Less Environmentally Sensitive	17	33.3
More Environmentally Sensitive	34	66.7

4.4 Reliability and validity analysis

Principal Component Analysis (PCA) was employed as a statistical technique to examine the underlying structure of the EMA items and assess the construct validity of the EMA measurement scale. This approach is commonly used in management accounting research, including studies focused on EMA (Leftesi, 2008; Jalaludin et al., 2011; Christ and Burritt, 2013; Mokhtar et al., 2016; and Wang et al. 2018).

Table 3 Principal component analysis and Cronbach's Alphaon EMA

Items	EMA
EMA 1	.862
EMA 2	.869
EMA 3	.895
EMA 4	.943
EMA 5	.916
EMA 6	.799
EMA 7	.885
EMA 8 *Deleted*	.355
EMA 9	.871

EMA 10		.891
EMA 11		.936
EMA 12		.852
EMA13		.863
Percentage of variance explained	77.9	
KMO-MSA	.907	
Bartlett's test of sphericity	0.000	
Cronbach's Alpha	0.973	

Initially, PCA was conducted on all thirteen EMA items. However, one item exhibited low factor loadings, indicating a weak relationship with the other items. This item was subsequently excluded, and the PCA was performed again using the remaining twelve items (see Table 3). The resulting factor structure was evaluated using the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy, which yielded a value of .907, indicating a high degree of shared variance among the items and supporting the appropriateness of factor analysis. Furthermore, Bartlett's test of sphericity was significant (Sig. = .000), confirming that the correlations among the items were not trivial. These findings suggest that a single underlying factor explains the majority of the variance in the EMA data.

The first extracted factor, explaining approximately 77.9% of the total variance, was deemed sufficient for representing the underlying construct of EMA. Given that only one factor was retained, factor rotation was unnecessary. The reliability of the EMA scale was assessed using Cronbach's alpha, which yielded a coefficient of 0.973, indicating excellent internal consistency among the items.

4.5 The extent of EMA adoption

Table 4 presents a detailed overview of EMA practice adoption among the surveyed Libyan manufacturing companies. While all surveyed companies implemented at least some EMA practices, with a significant proportion adopting more than half of the practices examined, the overall EMA adoption level was relatively low, as indicated by an average score of 2.07 on a 5-point scale.

The findings of this study suggest that Libyan manufacturing companies exhibit lower levels EMA adoption compared to those reported in previous research conducted in other countries (see, for example, Frost and Wilmshurst, 2000; Ferreira et al., 2010; Jalaludin et al., 2011; Christ and Burritt, 2013; and Jamil et al., 2015; Mokhtar et al., 2016; and Wang et al., 2018). This indicates a potential gap in the implementation of EMA practices within the Libyan manufacturing sector.

Despite the overall low adoption level, the data suggests a positive trend, with a majority of companies implementing a substantial number of EMA practices. This suggests potential for improved environmental performance in the Libyan manufacturing sector as EMA adoption continues to grow.

Table 4 Descriptive statistics for the level of EMA adoption

Items	Adoption rate %	Mean	SD
Overall mean score		*2.07*	*1.03915*
EMA 1	56.9	2.27	1.372
EMA 2	58.8	2.25	1.278
EMA 3	58.8	2.22	1.238
EMA 4	51	2.00	1.200
EMA 5	47.1	1.92	1.181
EMA 6	64.7	2.18	1.108
EMA 7	64.7	2.20	1.184
EMA 9	54.9	2.10	1.188
EMA 10	49	1.88	1.032
EMA 11	45.1	1.96	1.216
EMA 12	47.1	1.78	.986
EMA 13	58.8	2.18	1.144

4.6Assumptions of hypotheses analysis

Prior to conducting the main data analysis, several key assumptions were assessed to ensure the reliability and validity of the results. Specifically, tests for normality, multicollinearity, and linearity were performed. Adherence to these assumptions is crucial for drawing accurate inferences from the bivariate analysis and multivariate analysis.

4.6.1 The assumption of normality

To ensure the reliability of the statistical analysis, normality tests were conducted on the EMA variables. Normality is a fundamental assumption underlying many statistical techniques, including linear regression. Given that categorical variables (dichotomous variables) do not adhere to normality assumptions (Leftesi, 2008; Field, 2009; and Garson, 2012), the focus was on the continuous EMA variables.

Two methods were employed to assess normality: visual inspection of the normal probability plot (P-P plot) and statistical evaluation of skewness and kurtosis values. The P-P plot revealed that the data points for the EMA variables closely aligned with the expected normal distribution line, indicating a satisfactory fit (see Figure 1). Additionally, the calculated skewness and kurtosis values for the EMA variables fell within the generally accepted range[1] of -2 to +2, further supporting the assumption of normality. These findings suggest that the data distribution for the EMA variables is sufficiently close to normal, allowing for the application of parametric statistical tests such as linear regression.

[1] For social sciences, the acceptable values of skewness and kurtosis should be within the range of -2 to +2 (Hair et al., 2010; Garson, 2012; and Won et al., 2017).

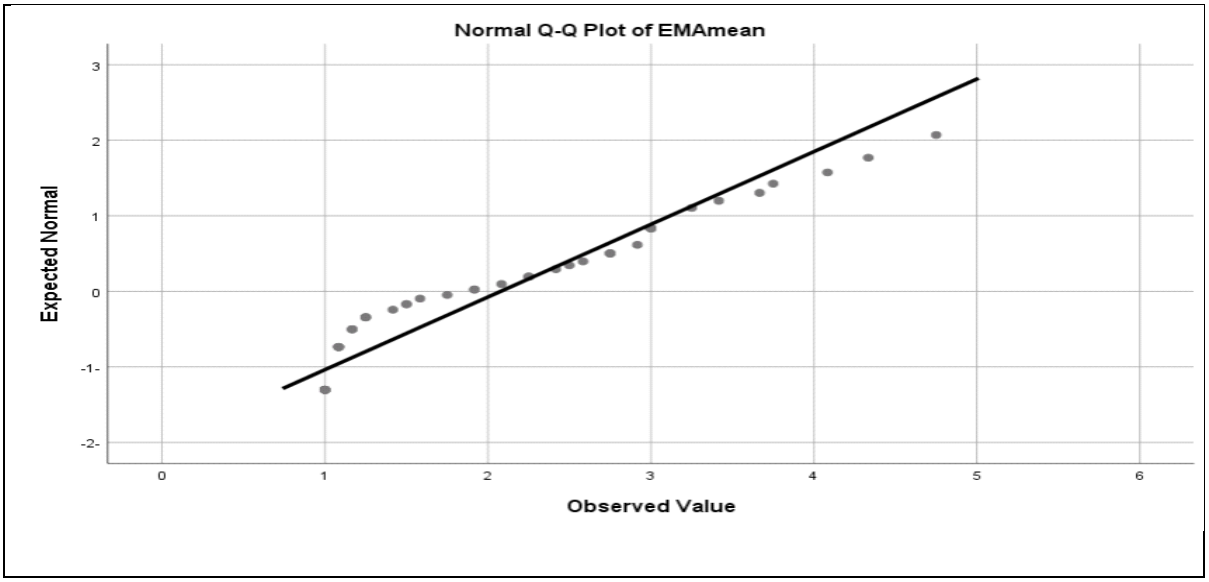


Figure 1 Normal P-P Plot of EMA variable

4.6.2 Multicollinearity assessment

To ensure the reliability and validity of the regression analysis, multicollinearity among the independent variables was assessed using two primary methods: correlation matrix and the Variance Inflation Factor (VIF).

A correlation matrix was constructed to examine the pairwise relationships between the independent variables. A correlation coefficient exceeding 0.90 typically indicates a high degree of multicollinearity (Hair et al., 2010). Additionally, the VIF statistic was calculated for each independent variable. A VIF value greater than 5 or a tolerance value (the reciprocal of VIF) less than 0.10 suggests the presence of multicollinearity (Hair et al., 2010; Garson, 2012; and Won et al., 2017).

The results of these analyses indicated the absence of multicollinearity among the independent variables in this study, as all correlation coefficients were below the 0.90 threshold and all VIF values were well below 5 (see Table 5 and 6). This suggests that the independent variables are sufficiently distinct and not highly correlated with each other, enhancing the reliability of the regression results.

Table 5 Correlation matrix between contingent variables

	Company Size	Company Age	EMS Adoption	Business Type
Company Size	1			
Company Age	.183	1		
EMSAdoption	.294	-.216	1	
Business Type	.277	.000	.610	1

Table 6 Tolerance (Tol) and VIF values of contingent variable

	Company Size		Company Age		EMSAdoption		Business Type	
	Tol	VIF	Tol	VIF	Tol	VIF	Tol	VIF
Company Size			.823	1.215	.832	1.203	.787	1.271
Company Age	.809	1.236			.905	1.105	.781	1.281
EMSAdoption	.507	1.971	.562	1.780			.674	1.484
Business Type	.601	1.664	.607	1.648	.844	1.186		

4.6.3 Linearity assessment

To ensure the appropriateness of linear regression analysis, the assumption of linearity between the dependent variable (EMA adoption) and the independent variables was assessed. An ANOVA test of linearity was conducted. As a general guideline, a non-significant F-value ($p > .05$) indicates a linear relationship (Garson, 2012). The results of the ANOVA test confirmed the linearity assumption for all independent variables in relation to the dependent variable. This finding supports the use of linear regression for analyzing the data.

4.7 Correlation Analysis:

Correlation analysis was employed to examine the relationships between the independent and dependent variables. This statistical technique quantifies the strength and direction of linear associations between variables. Correlation coefficients range from -1 to +1, with -1 indicating a perfect negative relationship, +1 representing a perfect positive relationship, and 0 signifying no relationship. A coefficient of ±0.1 represents a weak relationship, ±0.3 a moderate relationship, and ±0.5 a strong relationship (Field, 2009).

To assess the relationships between the dependent variable (EMA adoption) and the independent variables, Spearman's correlation coefficient was employed (see Table 7). The choice of Spearman's correlation was based on the dichotomous nature of the independent variables (dummy coded), which traditional Pearson's correlation less suitable (Field, 2009; and Hair et al., 2010).

Table 7 Spearman's Test between Contingent Variables and EMA

	Spearman's rho		
	EMA		
	Correlation Coefficient	Sig.	N
Company Size	.408	.001	51
Company Age	.231	.050	51
EMSAdoption	.087	.272	51
Business Type	.321	.011	51

Correlation analysis was conducted to examine the relationships between EMA adoption and the four independent variables: company size, company age, EMS adoption, and business type. As shown in Table 7, results indicate significant positive correlations between EMA adoption and company size ($r_s = 0.408$, $p < .01$), company age ($r_s = 0.231$, $p = .05$), and business type ($r_s = 0.321$, $p = .01$). While EMS adoption exhibited a positive relationship with EMA adoption, the correlation was weak and not statistically significant. These findings suggest that larger, older companies operating in environmentally sensitive industries tend to have higher levels of EMA adoption. However, it is important to note that correlation does not imply causation (Field, 2009). To further explore the predictive power of these variables on EMA adoption, regression analysis was conducted.

4.8 Multiple regression analysis:

To investigate the impact of multiple independent variables on the dependent variable (EMA adoption), a multiple regression model was employed. This statistical technique allows for the simultaneous analysis of the relationships between EMA

adoption and the four identified contingent factors: company size, company age, EMS adoption, and business type. Building upon the foundational work of Christ and Burritt (2013), the model was adapted to incorporate the specific variables and context of this study. Therefore, the relationship between the contingent factors and EMA adoption can be modelled as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + e$$

Where:

- Y = Level of EMA adoption in Libyan manufacturing companies
- β0 = Intercept
- X1 = Company size
- X2 = Company age
- X3 = EMS adoption
- X4 = Business type
- e = Error term

The regression model's ability to predict the dependent variable (EMA adoption) was assessed through the R-squared and adjusted R-squared values. As shown in table 8, the R-squared value of 0.441 indicates that approximately 44.1% of the variation in EMA adoption can be explained by the independent variables included in the model. However, the adjusted R-squared value of 0.124 suggests that only 12.4% of the variance is explained when considering the number of predictors in the model. This implies that a substantial portion of the variation in EMA adoption remains unexplained by the included variables. To assess the independence of the error terms, the Durbin-Watson statistic was calculated. The obtained value of 1.975 falls within the acceptable range of 1 to 3, indicating no evidence of autocorrelation among the residuals. This suggests that the errors in the model are independent, meeting an important assumption of linear regression.

Table 8 Summary of the Model

Model	R	R^2	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.441	.194	.124	1.16866	1.975

Table 9 shows the ANOVA analysis of the model variance. The overall significance of the regression model was assessed using the F-test. With an F-ratio of 2.771 and a significance level of 0.038, the model was found to be statistically significant, indicating that the independent variables collectively explain a significant portion of the variation in EMA adoption. This suggests that the model has predictive power and is suitable for examining the relationship between EMA adoption and the identified factors.

Table 9 Analysis of the Model Variance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	15.140	4	3.785	2.771	.038
	Residual	62.826	46	1.366		
	Total	77.965	50			

The regression analysis results, as presented in Table 10, indicate that only company size has a significant positive impact on EMA adoption. The beta coefficient for company size is 0.920, and the associated p-value is less than 0.05, suggesting a

statistically significant relationship. In contrast, company age, EMS adoption, and business type were not found to be significant predictors of EMA adoption, as their respective p-values were greater than the significance level of 0.05.

Table 10 Multiple Regression Model

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	Constant	1.523	.357		4.268	.000
	Company size and EMA	.920	.356	.372	2.580	.010
	Company age and EMA	.191	.357	.076	.537	.594
	EMS adoption and EMA	.397	.441	-.161	-.901	.372
	Business type and EMA	.536	.446	.204	1.200	.236

4.9 Hypothesis result

4.9.1 Company size and EMA

The positive and significant relationship between company size and EMA adoption supports Hypothesis 1, which posited a positive association between company size and EMA adoption. This finding suggest that larger companies are more likely to engage in EMA practices than smaller ones. Therefore, company size is a crucial factor influencing the extent of EMA implementation within the Libyan manufacturing sector. This finding supports the results of previous studies by Frost and Seamer (2002) and Christ and Burritt (2013), which also established a positive relationship between company size and EMA adoption. However, this finding contradict those of Ribeiro et al. (2010), Mokhtar et al. (2016), and Wang et al. (2018), who reported no significant influence of company size on EMA adoption.

4.9.2 Company age and EMA

Contrary to expectations grounded in previous research and contingency theory, the study found no significant relationship between company age the level of EMA adoption. Consequently, Hypotheses 2, which posited a positive association between company age and EMA adoption, were not supported by the empirical data. This finding suggest that older manufacturing companies in Libya, often characterized by advanced information systems, sophisticated communication strategies, and experienced staff, have not demonstrated a significantly higher level of EMA adoption compared to newer companies. This finding aligns with previous research conducted in the Libyan context by Al Drugi (2013) and Abdo and Al Drugi (2014), which found no significant difference in environmental disclosure levels between older and newer companies. Additionally, studies by Abdillahi and Manini (2017) and Wang et al. (2018) in other regions also reported that company age had a negligible impact on environmental accounting disclosure and EMA adoption.

4.9.3 EMS Adoption and EMA

The analysis indicates that the presence of an EMS does not significantly influence the level of EMA adoption among Libyan manufacturing companies. This finding contradicts Hypothesis 3 and aligns with the results of Mokhtar et al. (2016) but contradicts those of Ribeiro et al. (2010), which found a correlation between EMS and EMA. This implies similary on such influence among developing and emerging country but contrary to developed countries. This may be attributed to the varying

economic development levels and industrial systems in developed countries compared to developing countries.

4.9.4 Business type and EMA

The regression analysis indicates that business type, as measured by environmental sensitivity, is not a significant predictor of EMA adoption in Libyan manufacturing companies. This finding suggests that companies operating in environmentally sensitive industries are not necessarily more likely to adopt EMA practices. This contradicts previous research by Ferreira et al. (2010) and Christ and Burritt (2013) but aligns with the findings of Mokhtar et al. (2016) and Wang et al. (2018).

5. Summary and Conclusion

While the study found that manufacturing companies in Libya utilize various EMA practices, the overall level of EMA adoption remains relatively low, with an average score of 2.07 on a 5-point scale. This suggests that EMA adoption is still in its early stages within the Libyan manufacturing sector. The prevailing focus on profit maximization within traditional economic models may hinder the widespread adoption of EMA, which requires a shift towards a more holistic approach that considers environmental sustainability.

This study investigates the relationships between EMA adoption and four organizational factors: company size, company age, EMS adoption, and business type. The findings indicate that only company size has a significant positive relationship with EMA adoption. This result aligns with contingency theory, suggesting that companies tailor their practices to their specific circumstances. While previous research and contingency theory predicted a significant influence of company age, EMS adoption, and business type on EMA adoption, the empirical evidence in this study did not support these relationships.

This study offers valuable insights into the factors influencing EMA adoption among medium and large manufacturing companies in Libya. Given the significant role of company size, policymakers and civil societies in Libya should prioritize initiatives aimed at assisting medium-sized companies in adopting EMA systems. The successful implementation of EMA often requires substantial financial resources, skilled personnel, and strong management capabilities. By providing support in these areas, policymakers can foster the adoption of EMA practices within the Libyan manufacturing sector.

This study, like any survey-based research, is subject to certain limitations. Response bias and social desirability bias may have influenced the responses provided by participants. Additionally, the cross-sectional nature of the data collection means that the findings represent a snapshot of the situation at a specific point in time. Therefore, the generalizability of the results may be limited.

Furthermore, the study focused solely on internal contingencies, such as company size, age, EMS adoption, and business type. While these factors provide valuable insights, it is acknowledged that external contingencies may also play a role in influencing EMA adoption. Future research could explore the impact of external

factors to gain a more comprehensive understanding of the determinants of EMA adoption.

References

Abdillahi, U. and Manini, M. 2017. Determinants of environmental accounting disclosure among listed manufacturing and allied firms in Kenya. *Research Journal of Finance and Accounting*, 8(10), pp. 40-72.

Abdo, H and Al Drugi, A. 2012. Do companies' characteristics play key roles in the level of their environmental disclosures? *Energy Research Journal*, 3(1), pp. 1-11.

Adms, C. and Zutshi, A. 2004. Corporate social responsibility: Course handbook. *Australian Accounting Review*, 14(3), pp.31-39.

Akhtaruddin, M. 2005. Corporate Mandatory disclosure practices in Bangladesh. *International Journal of Accounting*, 40(4), pp. 399-422.

Al Drugi, A. and Abdo, H. 2012. Investigating the development of environmental disclosures by oil and gas companies operating in Libya: A comparative study. *International Journal of Economics and Finance Studies*, 4(2), pp. 1-10.

Aldrugi, A. 2013. *Environmental disclosure in the Libyan oil and gas sector*. Nottingham Trent University.

Aldrugi, A and Abdo, H. 2014. Determining the motives or reasons that make companies disclose environmental information. *Journal of Economics, Business and Management***,** 2(2), pp. 117-121.

AL-Hawari, E. and Nassar, M. 2017. The factors affecting the different management accounting practices in small and medium sized enterprises in Jordan. *International Journal of Academic Research in Business and Social Sciences*, 7(12), pp. 970-978.

Amara, T. and Benelifa, S. 2017. The impact of external and internal factors on the management accounting practices. *International Journal of Finance and Accounting*, 6(2), pp. 46-58.

Bartolomeo, M., Bennett, M., Bouma, J., Heydkamp, P., James, P. and Wolters, T. 2000. Environmental management accounting in Europe: Current practice and future potential. *European Accounting Review*, 9(1), pp. 31-52.

Boukr, A. 2018.*A study of the factors influencing the adoption of management accounting innovations in less developed countries: The case of Libya*. The University of Salford.

Bouma, J. and Van Den Veen, M. 2002. Wanted: A theory for Environmental Management Accounting. In M. Bennett, J. J. Bouma, and T. Wolters, (Eds), *Environmental Management Accounting: Informational and Institutional Developments*, pp. 291-302.

Burrit, R., Hahn, T. and Schaltegger, S. 2002. Towards a comprehensive framework for environmental management accounting - Links between business actors and environmental management accounting tool. *Australian Accounting Review*, 12(2), pp.39–50.

Cadez, S. and Guilding, C. 2008. An exploratory investigation of an integrated contingency model of strategic management accounting. *Accounting, Organizations and Society*, 33(7-8), pp. 836-863.

Cassells, S., Lewis, K. and Findlater, A. 2011. SMEs and ISO 14001 adoption: A New Zealand perspective. *Small Enterprise Research*, 18(1), pp. 19–32.

Chenhall, R. 2003. Management control systems design within its organizational context: findings from contingency-based research and directions for the future. *Accounting, Organizationsand society*, 28 (2–3), pp. 127-168.

Christ, K. and Burritt, R. 2013. Environmental management accounting: The significance of contingent variables for adoption. *Journal of Cleaner Production*, 41, pp. 163-173.

Courtis, J. 2004. Corporate report obfuscation: artefact or phenomenon? *British Accounting Review*, 36(3), pp. 91-312.

Darwesh, M. and Hamdy, N (2019). Spotlight: Residents suffer from oil, gas pollution in eastern Libya, *Xinhua (Africa)* 2019-01-29 23:16:50

Das, K. and Imon, A. 2016. A brief review of tests for normality. *American Journal of Theoretical and Applied Statistics*, 5(1), pp. 5-12.

de Beer, P. and Friend, F. 2006. Environmental accounting: A management tool for enhancing corporate environmental and economic performance. *Ecological Economics*, 58, 548-560.

Deegan, C. 2003. *Environmental management accounting: An introduction and case studies for Australia*. Sydney: Institute of Chartered Accountants in Australia.

Donaldson, L. 2001. *The Contingency Theory of Organizations*. California: Saga Publications.

Drazin, R. and Van De Veen, M. 1985. Alternative forms of fit in contingency theory. *Administrative Science Quarterly*, 30(4), pp. 514-539.

Dunk, A. 2007. Assessing the effects of product quality and environmental management accounting on the competitive advantage of firm. *Australasian accounting business and finance Journal*, 1(1), pp.28-38.

Epstein, M. 1996. *Measuring corporate environmental performance: Best practices for costing and managing an effective environmental strategy*. Chicago: Irwin ProfessionalPublishing.

Ferreira, A., Moulang, C. and Hendro, B. 2010. Environmental management accounting and innovation: An exploratory analysis. *Accounting, Auditing and Accountability Journal*, 23(7), pp.920-948.

Field, A. 2009. *Discovering statistics using SPSS*. 3rd ed. London: Saga.

Frost, G. and Seamer, M. 2002. Adoption of environmental reporting and management practices: An analysis of New South Wales public sector entities. *Financial Accountability and Management*, 18(2), pp. 103-127.

Frost, G. and Wilmshurst, D. 2000. The Adoption of environment-related management accounting: An analysis of corporate environmental sensitivity. *Accounting Forum*, 24(4), pp. 344-365.

Garrison, R., Noreen, E. and Seal, W. 2006. *Management Accounting.* McGraw-Hill.

Garson, G. 2012. *Testing Statistical Assumptions*. USA: Statistical Associates Publishing.

Hair, J., Black, W., Babin, B., Anderson, R. and Tatham, R. 2010. *Multivariate data analysis*. 7th ed. New York: Pearson Education Limited.

Haldma, T. and Lääts, K. 2002. Contingencies influencing the management accounting practices of Estonian manufacturing companies. *Accounting, Organizations and Society*, 13(4), pp. 379-400.

Holmes S. and Nicholls, D. 1988. An analysis of the use of accounting information by Australian Small Business. *Journal of Small Business Management*, 26(2) pp. 57-68.

Hossain, M. and Reaz, M. 2007. The determinants and characteristics of voluntary disclosure by Indian banking companies. Corporate Social Responsibility and Environmental Management, 14(5), pp. 274-288.

IFAC (International Federation of Accountants). 2005. *International guidance document: Environmental management accounting*. New York.

Islam, J. and Hu, H. 2012. A review of literature on contingency theory in managerial accounting. *African Journal of Business Management*, 6(15), pp. 5159-5164.

Ismail, M., Ramli, A. and Darus, F. 2014. Environmental management accounting practices and Islamic corporate social responsibility compliance: Evidence from ISO14001 companies. *Procedia - Social and Behavioral Sciences*, 145, pp.343-351.

Jalaludin, D., Sulaiman, M. and Nazli, N. 2011. Understanding environmental management accounting (EMA) adoption: A new institutional sociology perspective. *Social Responsibility Journal*, 7(4), pp. 540–557.

Jamil, C., Mohamed, R., Muhammad, F. and Ali, A. 2015. Environmental management accounting practices in small medium manufacturing firms. Procedia - Social and Behavioral Sciences, 172, pp. 619-626.

Jasch, C. 2003. The use of environmental management accounting (EMA) for identifying environmental costs. *Journal of Cleaner Production*, 11(6), pp. 667-676.

Leftesi, A. 2008. *The diffusion of management accounting practices in developing countries: Evidence from Libya*. University of Huddersfield.

Luft, J. and Shields, M. 2003. Mapping Management Accounting: Graphics and Guidelines for Theory-Consistent Empirical Research. *Accounting, Organizations and Society*, 28, pp. 169-249.

Mokhtar, N., Jusoh, R. and Zulkifli, N. 2016. Corporate Characteristics and Environmental Management Accounting (EMA) Implementation: Evidence from Malaysian Public Listed Companies (PLCs). *Journal of Cleaner Production*,136, pp. 111-122.

Moore, G. 2001. Corporate social and financial performance: An investigation in the UK supermarket industry. *Journal of Business Ethics*, 34(3), pp. 299-315.

Nair, S. and Nian,Y. 2017. Factors Affecting Management Accounting Practices in

Malaysia. International Journal of Business and Management, 12(10), pp. 177-184.

Oluwagbemiga, E. 2015. Management accounting practices in the developing economies: The case of Nigeria listed companies. *Journal of Accounting and Management*, 5(2), pp. 76-85.

Otley, T. 1980. The contingency theory of management accounting: Achievement and prognosis. *Accounting, Organizations and Society*, 5(4), pp. 413-428

Qian, W. and Burritt, R. 2009. Contingency perspectives on environmental accounting: An exploratory study of local government. *Accounting, Accountability and Performance*, 15(2), pp.39-71.

Qian, W. and Burritt, R. 2011. Environmental management accounting in local government: A case of waste management. *Accounting, Auditing and Accountability Journal*, 24(1), pp. 93-128.

Ribeiro, V., Aibar-Guzman, C. and Monteiro, S. 2010. Determinants of environmental accounting practices in local entities: evidence from Portugal. *Social Responsibility Journal*, 6(3), pp. 404-419.

Saunders, M., Lewis, P. and Thornhill, A. 2012. *Research Methods for Business Students*, 6th ed. London: Pearson Education Limited.

Schaltegger, S. and Burritt, R. 2000. *Contemporary environmental accounting issues, concepts and practice*. Sheffield: Greenleaf Publishing Limited.

Sehar, N., Bilal, S. and Tufail, S. 2013. Determinants of voluntary disclosure in annual reports; a case study of Pakistan. *Management and Administrative Sciences Review*,2(2), pp. 181-195.

Sekaran, U and Bougie, R. 2016. *Research methods for business: A skill building approach*. 7th ed. West Sussex: John Wiley and Sons Ltd.

Sekaran, U. 2003. *Research methods for business: A skill-building approach*. 4th ed. New York John Wiley and Sons Ltd.

Setthasakko, W. 2010. Barriers to the development of environmental management accounting. *EuroMed Journal of Business*, 5(3), pp. 315-331

Shank, J. 2007. Strategic cost management: upsizing, downsizing, and right (?) sizing, in Bhimani, A. (Ed.), *Contemporary Issues in Management Accounting*, Oxford: Oxford University Press, pp. 355-379.

Tsui, C. 2014. **A** literature review on environmental management accounting (EMA) adoption. *Journal of Chinese Management Review*, 17 (3), pp. 1-19.

UNDSD (United Nations Division of Sustainable Development). 2001. *Environmental management accounting procedures and principles*. New York. Available at: sustainabledevelopment.un.org/content/documents/proceduresandprinciples.pdf [Accessed: 20th Nov 2018].

UNDSD (United Nations Division of Sustainable Development). 2003. *Measurement for improved environmental and economic performance: Environmental management accounting for government.* New York. Available at: https://sustainabledevelopment.un.org/content/documents/EMAGovernment.pdf [Accessed: 20th Nov 2018].

Wang, S., Wang, H. and Wang, J. 2018. Exploring the effects of institutional pressures on the implementation of environmental management accounting: Do top management support and perceived benefit work? *Business Strategy and the Environment*, 28(1), pp. 233-243.

Won, N., Wan, C and Sharif, M. 2017. Effect of leadership styles, social capital, and social entrepreneurship on organizational effectiveness of social welfare organization in Malaysia: Data screening and preliminary analysis. *International Review of Management and Marketing*, 7(2), pp. 117-122.