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Article

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Environmental Management Accounting Information and Environmental Performance, the Mediating Effect of Environmental Decision Quality

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ABSTRACT

In recent times, there has been a heightened focus from both governments and societies towards evaluating Organisations' Environmental Performance (OEP). Environmental Management Accounting (EMA) is pivotal in elevating OEP as it offers a holistic perspective to elucidate the environmental impacts and associated costs of diverse business activities. This research delves into the dynamic interplay between EMA information and the OEP. The study entails the administration of a questionnaire to Jordanian organisations listed on the Amman Stock Exchange. The research adopts the Resource-Based View Theory. The study establishes statistically significant positive connections between these variables by employing partial least square structural equation modelling (SEM) for data analysis. Central to this investigation is identifying Environmental Decision Quality (EDQ) as a mediating capability. This capability is the mechanism for translating the relationship between EMA information and OEP. This finding underscores the pivotal role of in-formed decision-making in converting such information into tangible improvements in environmental performance. The research makes a notable contribution by expanding the understanding of EMA, highlighting its informational value beyond merely the practice considerations. Moreover, findings provide invaluable guidance for policymakers and regulatory bodies striving to promote sustainable business practices, especially pertinent in the context of developing nations.

Keywords: Environmental Management Accounting Information, Environmental Decision Quality, Environmental Performance
JEL Classifications: M410; L250; D820

1. INTRODUCTION

A discernible shift, marked by intensified attention from governments and societies, has recently unfolded toward Organizations' Environmental Performance (OEP) (Imran et al., 2021; Matuszewska-Pierzynka, 2021; Wijethilake et al., 2017). This transformation has cast a more pronounced spotlight on organisations, compelling them to heighten their commitment to environmental responsibility (Frempong et al., 2021; Ning et al., 2017; Qian et al., 2018). Neglecting environmental considerations in operational practices poses a significant risk to long-term sustainability (Qian et al., 2018; Xue et al., 2020), necessitating a strategic approach to resource utilisation that mitigates environmental impacts and ensures operational continuity (Huang et al., 2023; Silva and Oliveira, 2020). Consequently, a strong impetus has emerged to enhance OEP through relentless efforts to improve material efficiency, curb energy water consumption, and optimise waste and emissions during production and service activities (Rae et al., 2015; Zhang et al., 2020).

Barney's (1991) seminal work on the Resource-Based View (RBV) Theory posits that achieving competitive advantages and elevating performance hinges upon an organisation's adept utilisation of its unique resources and capabilities. These resources, encompassing tangible and intangible assets, are inherently challenging to replicate (Lin et al., 2020). Correspondingly,

capabilities refer to the skilful deployment of these assets to affect product and service innovations that align with environmental imperatives (Kipyegon et al., 2018). Accordingly, this research seeks to enhance OEP by harnessing the latent value embedded in environmental management accounting (EMA) information as intangible resources and leveraging environmental decision quality (EDQ) as a capability to amplify OEP.

EMA is pivotal in elevating OEP (Qian et al., 2018; Solovida and Latan, 2017; Susanto and Meiryani, 2019). EMA offers a holistic perspective to elucidate the environmental impacts and associated costs of diverse business activities. Such transparency empowers organisations to uncover concealed environmental costs, paving the way for strategic cost reductions while concurrently minimising ecological footprints (Bresciani et al., 2023; Ferreira et al., 2010). Thus, EMA information is a potent instrument for performance evaluation and benchmarking. With accurate EMA information, organisations can monitor progress over time and compare it against industry benchmarks, fostering ambition in setting sustainability targets and adopting efficiency-enhancing practices (Jasch, 2006; Saeidi et al., 2018; Schaltegger and Burritt, 2000).

Furthermore, the impact of EMA information extends to decision support, enabling informed choices that balance economic and environmental considerations (Vinayagamoorthi et al., 2012). By quantifying the environmental implications of decisions, decision-makers can prioritise eco-friendly practices in product design, process adaptation, and material selection. Integrating environmental factors into decision-making fosters resource conservation and pollution reduction (Hicks and Dietmar, 2007; Jasch and Stasiskiene, 2005). EMA information also kindles innovation and research by identifying avenues for eco-friendly product development and process optimisation (Agustia et al., 2019; Masanet-Llodra, 2006).

While previous studies have examined EMA as practices or activities that potentially enhance OEP (Latan et al., 2018; Mohd et al., 2019; Susanto and Meiryani, 2019), a gap persists in understanding the pivotal role of EMA's informational value and its potential to foster informed decision-making within OEP. This study aims to transcend procedural considerations, advocating for a comprehensive perspective that underscores the influential role of EMA's informational value, regardless of collection method, in impacting OEP and amplifying organisations' environmental initiatives.

In contexts like Jordan, a developing country grappling with persistent environmental challenges arising from business activities (Aladwan, 2018; Fallah and Mojarrad, 2019; Islaih et al., 2020), the urgency to address these concerns is evident (Bany-Yasin, 2019; Combaz, 2019). Heightened societal and governmental concern about OEP is rooted in the prominent role of the business sector in environmental degradation (Abdallah and Al-Ghwayeen, 2020; Abu Hajar et al., 2020). Nevertheless, research on OEP in developing countries like Jordan remains limited (Mokhtar et al., 2016). Notably, prevailing studies on OEP within amman stock exchange (ASE)-listed organisations in Jordan have predominantly focused on sustainability or corporate social responsibility reports (Abu Qa'dan and Suwaidan, 2019; Altarawneh, 2015; Bani-Khalid et al., 2017; Haddad et al., 2015; Jebreel et al., 2020; Noorhayati and Amosh, 2018). However, these reports, although disclosed to external stakeholders, might not entirely reflect organisations' actual environmental performance, leading to a "transparency gap" for various reasons (Higgins et al., 2020; Vigneau and Adams, 2023). Specifically, these reports tend to accentuate positive aspects while overlooking harmful practices, potentially distorting the truth of the actual situation (Kühn et al., 2014).

Additionally, information within these reports might be shaped by marketing strategies rather than accurately depicting actual environmental impacts (Amran et al., 2014; Dando and Swift, 2003). Moreover, specific organisations may lack rigorous monitoring and measurement practices, introducing inaccurate information (Boiral and Henri, 2017; Thoradeniya et al., 2015). Given these limitations, this study aspires to offer a more precise appraisal of OEP. This matter will be accomplished through targeted questionnaire surveys aimed at decision-makers in Jordanian organisations. By engaging with these decision-makers, this approach promises a comprehensive evaluation of environmental practices, unveiling nuanced factors possibly overlooked in prior studies efforts.

Consequently, this study delves into the unexplored nexus between EMA information and OEP, mediated through EDQ, as applied to ASE-listed organisations. The empirical insights garnered by this research have valuable implications for policymakers and regulatory bodies striving to augment environmental regulations (Bany-Yasin, 2019). The findings hold the potential to shape contextually relevant policies that encourage organisations to prioritise EMA and EDQ, fostering a more sustainable business landscape. Hence, the study seeks to lay a solid foundation for well-informed environmental decisions within organisational practices, promising substantial contributions to addressing environmental challenges in Jordan and beyond.

2. LITERATURE REVIEW

2.1. Environmental Performance

The notion of an Organization's Environmental Performance (OEP) is explicitly defined by the International Organization for Standardization (ISO) 4031 as the "measurable results of an organisation's management of its environmental aspects" (ISO, 2013, sec. 3.9). Nevertheless, Dragomir (2018) has pointed out that this concise definition lacks specificity and introduces some ambiguity. The crux of this concern lies in environmental aspects, which possess an open-ended meaning, making comprehensive quantification challenging. Consequently, this lack of precision surrounding the terminology impedes the attainment of a consensus among researchers concerning the precise dimensions encompassed within this framework.

Existing research has explored OEP from various vantage points. Certain studies have pinpointed environmental influences and adherence to standards (Lisi, 2015; Pérez et al., 2007), while others have delved into pollution and waste (Journeault,

2016). Furthermore, scholars have noted that OEP signifies an organisation's ability to cultivate robust relationships with diverse stakeholders invested in environmental concerns (Henri and Journeault, 2010). Some researchers have underscored the importance of integrating environmental considerations into production systems to mitigate pollution and bolster product quality (Song et al., 2018). Similarly, Tam and Fernando (2018) highlighted the utility of OEP in evaluating the environmental ramifications of polluting activities. Correspondingly, De Burgos-Jimenez and Céspedes (2001) outlined that OEP's central objective is mitigating detrimental environmental impacts stemming from corporate operations.

Al-Ghwayeen and Abdallah (2018) pointed out that assessing OEP poses a challenge due to the abstract nature of environmental issues. As a result, OEP becomes a complex and intricate variable, given the lack of a unanimous agreement on its measurement criteria (Banerjee, 2002). However, commonly observed indicators in the literature often include factors such as reducing resource usage in production processes, mitigating hazardous waste and emissions (Rae et al., 2015), and minimising environmental costs (Phan et al., 2018; San et al., 2018).

2.2. Environmental Management Accounting Information

The concept of EMA is expounded upon by the International Federation of Accountants (IFAC), which defines it as "…the management of environmental and economic performance by developing and implementing appropriate environment-related accounting systems and practices, including reporting auditing in some companies" (2005, p. 19). Bennett and James (1998) provide another interpretation, describing EMA as "the generation, analysis, and use of financial and non-financial information to optimise corporate environmental and economic performance and to achieve sustainable business." San et al. (2018) define EMA as a mixed system that provides non-financial and financial information for the smooth operation of the production process, aiming to reduce environmental impact and enhance production process efficiency. These diverse definitions collectively position EMA as an environmental information resource capable of furnishing the requisite environmental, financial, and non-financial data for making informed decisions.

Elaborating with more precision, scholars such as Burritt et al. (2002), Asiaei et al. (2021), Ferreira et al. (2010), and Solovida and Latan (2017) assert that EMA offers both physical and financial environmental information that has a direct impact on OEP. Physical environmental information encompasses energy flows, waste generation, material usage, water consumption, and emissions, typically quantified by environmental or engineering departments (Burritt, 2004). IFAC (2005) subdivides this information into three categories: product-related, material input-related, and non-product output-related. Simultaneously, financial information pertains to environmental costs (Burritt et al., 2002). Environmental costs revolve around environmental protection and damage, encompassing internal and external costs (Ayes, 2010). IFAC (2005) outlines six categories of environmental costs: materials costs linked to product outputs, materials costs tied to non-product outputs, expenses related to waste and emission control and treatment, costs associated with environmental management and prevention, expenditures on research and development activities, and intangible costs.

2.3. Environmental Decision Quality

Gough (1997) elucidated that EDQ is characterised by adeptness in making environmentally conscious decisions that demonstrate efficiency and effectiveness. The notion of effectiveness in decision-making embodies the interplay between well-suited decision processes and good outcomes stemming from those decisions. Keren and De Bruin (2005) emphasise the expected association between bad outcomes and suboptimal decisions, while positive results are typically attributed to successful decision-making. Regarding decision quality, scholars have identified two primary dimensions: effectiveness and efficiency (Hershey and Baron, 1992; Keren and De Bruin, 2005). The lens of decision effectiveness is based on the aftermath of a decision, spotlighting the achievements and consequences brought about by the choice made. Aligning with this, Bettman et al. (1998) propose that a decision can be deemed high quality if it resonates with organisational objectives, effectively guiding managerial actions. Consequently, evaluating decision quality necessitates that decision-makers delve into the potential implications of their choices, encompassing a holistic comprehension of both the immediate and long-term ramifications.

The complementary perspective of decision efficiency delves into the very process of decision-making itself. This matter encompasses aspects such as the calibre of information utilised, the minimal allocation of resources in the decision-making process, and the expeditious nature of decisions addressing environmental challenges (Kaltoft et al., 2014; Shamim et al., 2019; Vidgen, 2014). Other scholars advocate for the systematic acquisition of information from reliable sources and the judicious utilisation of that information within decision-making processes as a conduit for bolstering decision effectiveness (Lerner and Tetlock, 1999; Loewenstein, 2001; Sanfey, 2007; Tetlock, 2002; Yates et al., 2012). Nonetheless, the nuanced notion of decision quality remains an ongoing inquiry without a definitive resolution. Consequently, a call to action for further empirical studies is warranted to establish a more comprehensive understanding of this pivotal concept's intricate facets (Allwood and Salo, 2014).

This research contributes significantly to academic discourse and practical EMA, EDQ, and OEP applications. The study provides a holistic perspective on the informational value of EMA, emphasising its influential role regardless of collection methods and transcending procedural considerations. By delving into the mediating role of EDQ, the research offers depth to existing knowledge, highlighting the intricate interplay among EMA information, EDQ, and OEP. On a practical level, the study underscores the strategic importance of EMA information for organisations, encouraging its strategic integration into operations for improved environmental outcomes. Moreover, the research identifies EDQ as critical in informing organisational leaders about enhancing decision-making processes aligned with sustainability objectives. Policymakers and regulatory bodies can leverage the

findings to shape contextually relevant policies, encouraging organisations, particularly in developing countries like Jordan, to prioritise EMA and EDQ. The study's insights have broader implications for addressing environmental challenges globally by emphasising well-informed environmental decisions to mitigate impacts from business activities. Methodologically, the research employs a systematic approach, including a pilot study and targeted questionnaire surveys, enhancing the credibility of the study's findings. The detailed demographic and organisational profiles provided in the analysis offer a nuanced understanding of the study's context, guiding future research endeavours and providing a valuable baseline for comparative studies. In essence, this research enriches the existing body of knowledge, setting the stage for further exploration and application in the dynamic landscape of environmental sustainability.

3. CONCEPTUAL FRAMEWORK

By establishing a dynamic framework, EDQ is positioned as the mediator, shedding light on the underlying mechanisms shaping the fluctuations observed in OEP. Simultaneously, EMA information is the driving force, providing the impetus for understanding the variances in EDQ.

Figure 1 vividly portrays the intricate interconnections among EMA information, EDQ, and OEP. Within this paradigm, EMA information assumes the role of the independent variable, while EDQ occupies the intermediary position, and OEP is positioned as the dependent variable. This matter underscores the fact that any alteration in EMA information triggers a corresponding adjustment in EDQ, which, in turn, reverberates to initiate changes in OEP. This intricate relationship showcases the dynamic interplay among these critical variables and underscores the central role of EDQ in mediating the relationship between EMA information and OEP outcomes. Based on this framework, this study suggested the following hypotheses:

H_1: There is a positive significant relationship between EMA information and OEP.
H_2: There is a positive significant relationship between EMA information and EDQ.
H_3: There is a positive significant relationship between EDQ and OEP.
H_4: EDQ mediates the relationship between EMA information and OEP.

It's important to highlight that the mediation outcomes can materialise in two distinct manners: either through complete mediation or partial mediation, concepts that have been elaborated upon by Hair et al. (2014). The scenario of complete mediation unfolds when the mediator effectively mitigates the influence exerted by the independent variable on the dependent variable, essentially acting as an intermediary channel through which the effect is transmitted. In contrast, the landscape of partial mediation materialises when the mediator significantly reduces the impact of the independent variable, thus serving as a moderating factor that tempers its effect (Baron and Kenny, 1986; Hayes, 2009).

In essence, within the context of EDQ, a scenario of partial mediation implies that its role is supplementary and complementary to the influence of EMA information on OEP. In this capacity, EDQ enhances and strengthens EMA information's impact on OEP, accentuating the intricate connection between these variables. The subsequent analysis section will delve into a comprehensive exploration and evaluation of these mediating mechanisms, shedding light on the nuanced dynamics that underlie the relationships among EMA information, EDQ, and OEP.

This article strives to illuminate the intricate interconnections among EMA information, EDQ, and OEP by employing this well-defined conceptual framework and comprehending the intricate dynamics of mediation. This effort contributes to a deeper and more nuanced understanding of the complex relationships between these variables, thereby enhancing the existing body of knowledge in the field and facilitating a more comprehensive grasp of the underlying mechanisms that drive environmental management within organisations.

4. RESEARCH METHODOLOGY

4.1. Methodology

The research methodology employed in this study embodies a systematic approach to scrutinising the intricate relationships among EMA information, EDQ, and OEP. A pilot study was initially conducted to ensure the robustness of the research instruments and the effectiveness of the data collection process. This preliminary phase aimed to fine-tune the questionnaire, refining its content and structure based on participant feedback, thus enhancing the reliability and validity of the final research tool. Following the pilot study, the data was collected with a questionnaire distributed to ASE-listed organisations. This thorough process extended for about five months, starting mid-June and concluding in mid-December of 2022.

4.2. Measurement Scales

The survey questionnaire employed in this study was meticulously structured into four distinct sections, each serving a specific purpose in capturing essential data about organisations. The initial section of the questionnaire was designed to gather relevant information, laying the foundation for contextual insights and analysis. The subsequent three sections were dedicated to probing the study's focal variables, which encompass EMA information, EDQ, and OEP, thereby facilitating an in-depth exploration of their interrelationships.

Figure 1: Proposed conceptual framework

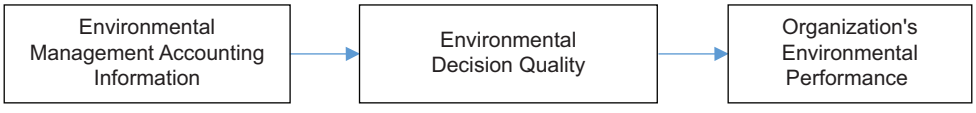

Table 1 shows the measurements of EMA information, encompassing a comprehensive set of ten items. These items were thoughtfully adapted from renowned scholarly works to ensure the questionnaire's reliability and alignment with existing research. Specifically, the sources included studies conducted by Asiaei et al. (2021), Ferreira et al. (2010), and Solovida and Latan (2017).

Table 2 shows EDQ's measurements, comprising ten items thoughtfully curated from scholarly literature. These items were sourced from seminal works by Aydiner et al. (2019), Phan et al. (2018), and Ghasemaghaei (2019).

Table 3 shows OEP's measurements, which included ten items derived from authoritative works in the field. The items were thoughtfully extracted from studies by Henri and Journeault (2010), Phan et al. (2018), Latan et al. (2018), Lisi (2015), and Spencer (2013).

4.3. Response Rate

Out of the initial distribution of 169 questionnaires to the entire roster of organisations registered on the ASE, a notable response was achieved, with 125 questionnaires returned. Following meticulous data screening procedures, four questionnaires were excluded due to instances of missing or incomplete data. Consequently, the final dataset selected for comprehensive analysis comprised 121 valid cases. This carefully curated sample size holds particular significance as it meets the requisite criteria for employing advanced analytical techniques, specifically structural equation modelling (SEM) and partial least squares (PLS-SEM). This matter aligns seamlessly with Hair et al. (2014) recommended sample size range, underscoring the study's robustness.

Table 1: Environmental management accounting information measurement

Item	Statement
EMA1	Our EMA information facilitates physical tracking of the amount of energy used in the production process of our products and services.
EMA2	Our EMA information facilitates physical tracking of the amount of water used in the production process of our products and services.
EMA3	Our EMA information facilitates physical tracking of the amount of materials used in the production process of our products and services.
EMA4	Our EMA provides information on environmental costs.
EMA5	Our EMA information facilitates physical tracking of the emissions extracted from the firm's processes.
EMA6	Our EMA information facilitates physical tracking of the waste extracted from the firm's processes.
EMA7	Our EMA information helps estimate environment-related contingent liabilities (e.g., environmental fines).
EMA8	Our EMA information utilises the environmental-related investment decision evaluation.
EMA9	Our EMA information helps us discover environmental problems.
EMA10	Our EMA information helps us make suitable environmental decisions.

5. DATA ANALYSIS

5.1. Descriptive Analysis

The organisational profiles are delineated based on fundamental attributes: sector, specialisation, age, and size. This comprehensive overview yields valuable insights into the diverse composition and characteristics of the included organisations, shedding light on their varying backgrounds and contributing factors.

Table 4 meticulously elucidates the demographic makeup of participating organisations, unveiling significant patterns across several vital characteristics. It initiates by distributing organisations across different sectors, showcasing a diverse landscape. Notable figures include 24.8% of organisations operating within the industrial sector, 26.4% in the services sector, and a substantial 48.8% in the financial sector. This sectoral diversity mirrors the intricate and varied nature of the study's participants.

Examining organisations' distribution based on specialisation reveals a spectrum of industries, including pharmaceuticals, medical fields, chemicals, food and beverages, mining, and extraction. This diverse representation emphasises the sample's heterogeneous nature, underscoring the study's inclusivity.

Table 2: Environmental decision quality measurement

Item	Statement
EDQ1	Our environmental decision is supported by comprehensive information.
EDQ2	Our environmental decision is supported by reliable information.
EDQ3	Our environmental decision is supported by correct information.
EDQ4	Our environmental decision leads us to use water efficiently.
EDQ5	Our environmental decision leads us to use energy efficiently.
EDQ6	Our environmental decision leads us to use materials efficiently.
EDQ7	Our environmental decision leads us to minimise waste.
EDQ8	Our environmental decision leads us to minimise carbon emissions.
EDQ9	Our environmental decision leads us to minimise environmental costs.
EDQ10	Our environmental decision improves our firm's compliance with environmental regulations.

Table 3: Environmental performance measurement

Item	Statement
OEP1	Our firm has used energy efficiently.
OEP2	Our firm has used water efficiently.
OEP3	Our firm has used resources efficiently.
OEP4	Our firm has decreased the level of waste.
OEP5	Our firm has decreased the level of carbon emissions.
OEP6	Our firm has recycled its waste.
OEP7	Our firm has reduced the cost of energy, water, and materials due to its efficiency in using those resources.
OEP8	Our firm has decreased the liabilities associated with environmental damage.
OEP9	Our firm has improved its relationships with local communities, regulators, and environmentally friendly organisations.
OEP10	Our firm has better complied with environmental regulations such as emissions and waste disposal.

Table 4: Descriptive analysis of organisations

Characteristics	Frequency	Percentage
Organization's Sector		
Industrial	30	24.8
Services	32	26.4
Financial	59	48.8
Organisation's Specialist		
Pharmaceutical and Medical Industries	3	2.5
Chemical Industries	4	3.3
Food and Beverages	8	6.6
Tobacco and Cigarettes	1	0.8
Mining and Extraction Industries	7	5.8
Engineering and Construction	3	2.5
Electrical Industries	2	1.7
Textiles, Leathers, and Clothing	1	0.8
Health Care Services	4	3.3
Educational Services	4	3.3
Hotels and Tourism	7	5.8
Transportation	6	5.0
Technology and Communication	1	0.8
Utilities and Energy	4	3.3
Commercial Services	5	4.1
Banks	10	8.3
Insurance	11	9.1
Diversified Financial Services	18	14.9
Real Estate	22	18.2
Organisation's Age		
<16 years old	29	24.0
From 16 years to 30 years	49	40.5
More than 30 years	43	35.5
Organisation's Size		
<100 employees	62	51.2
From 100 to 500 employees	38	31.4
More than 500 employees	21	17.4

Regarding the age distribution of organisations, a well-balanced spread is observed. Specifically, 24.0% of the organisations are <16 years old, 40.5% fall within the 16-30-year range, and 35.5% surpass 30 years of age. This variance in organisational ages reflects the dataset's breadth of experience and longevity.

Likewise, the size distribution of organisations provides valuable insights into the spectrum of organisational sizes. Significantly, 51.2% of the organisations have <100 employees, 31.4% encompass 100-500 employees, and 17.4% boast more than 500 employees. This diverse range of sizes contributes to a holistic understanding of the participating organisations, effectively highlighting the intricate contextual backdrop of the study.

5.2. Structural Equation Modelling Analysis

To analyse both the measurement and structural models in this study, SmartPLS 4.0.8.7 was utilised. Hair et al. (2014) highlighted the importance of assessing the reliability and validity of the measurement model before conducting hypothesis testing. This preliminary evaluation is essential to establish the credibility of the underlying constructs within the model. According to their recommendations, a valid measurement model should exhibit factor loadings greater than 0.40 for all examined items within their respective constructs. When an item's outer loading falls between 0.40 and 0.70, its removal is considered if it significantly enhances the Average Variance Extracted (AVE) and the Composite Reliability (Hulland, 1999). Following these rules, 28 elements surpassed the acceptable loading threshold, while two items were excluded to enhance the model's overall quality.

6. RESULTS

6.1. Assessment of Measurement Model

Assessment of the measurement model includes testing the results of factor loadings, Cronbach's α, Composite Reliability, and AVE values for EMA information, EDQ, and OEP variables.

Table 5 demonstrates that the EMA information variable notably exhibited strong factor loadings ranging from 0.657 to 0.802, indicating a robust association between the items and the underlying construct. The Cronbach's α values for EMA information, EDQ, and OEP were 0.905, 0.895, and 0.875, respectively, suggesting high internal consistency reliability within each variable. The Composite Reliability values for EMA information, EDQ, and OEP were also notably high, ranging from 0.899 to 0.910, reinforcing the reliability of the constructs. Additionally, the AVE values ranged from 0.516 to 0.541, indicating that the constructs account for a substantial proportion of the variance in their respective items. These findings collectively underscore the robustness and reliability of the measurement model and provide confidence in the validity of the study's constructs (Fornell and Larcker, 1981; Hair et al., 2014).

Table 6 presents Fornell and Larcker's (1981) criterion, which assesses the discriminant validity among EMA information, EDQ variables, and OEP. The diagonal elements represent the square roots of the AVE values for each construct, while the off-diagonal elements illustrate the correlations between the constructs. Notably, the diagonal AVE values are higher than the corresponding inter-construct correlations, indicating discriminant validity (Fornell and Larcker, 1981). These results provide evidence that the constructs are distinct and accurately capture their respective underlying dimensions, supporting the discriminant validity of the measurement model (Fornell and Larcker, 1981; Hair et al., 2014).

6.2. Assessment of Structural Model

The path coefficient provides a comprehensive overview of the path coefficients and statistical significance of the relationships within the proposed model.

Table 7 and Figure 2 indicate that all three hypotheses have garnered substantial support. Firstly, the path from EMA information to OEP reveals a positive and significant coefficient of 0.453 ($t = 4.110$, $P < 0.01$), underscoring the excellent impact of enhanced EMA information on OEP. Secondly, the path from EMA information to EDQ demonstrates a noteworthy coefficient of 0.654 ($t = 8.705$, $P < 0.01$), substantiating the pivotal role of EMA information in fostering improved EDQ. Lastly, the path from EDQ to OEP exhibits a significant coefficient of 0.257 ($t = 2.456$, $P < 0.01$), indicating that higher EDQ is associated with enhanced OEP. These results corroborate the theoretical

Table 5: Factor loadings, Cronbach's α, Composite Reliability, and AVE of Variables

Variables	Items	Factor loading	Cronbach's α	Composite Reliability	AVE
(1) EMA information	(1) EMA1	0.802	0.905	0.910	0.541
	(1) EMA10	0.685			
	(1) EMA2	0.761			
	(1) EMA3	0.657			
	(1) EMA4	0.676			
	(1) EMA5	0.744			
	(1) EMA6	0.773			
	(1) EMA7	0.688			
	(1) EMA8	0.783			
	(1) EMA9	0.768			
(2) EDQ	(2) EDQ1	0.730	0.895	0.899	0.516
	(2) EDQ10	0.720			
	(2) EDQ2	0.763			
	(2) EDQ3	0.662			
	(2) EDQ4	0.666			
	(2) EDQ5	0.727			
	(2) EDQ6	0.716			
	(2) EDQ7	0.732			
	(2) EDQ8	0.676			
	(2) EDQ9	0.778			
(3) OEP	(3) OEP1	0.813	0.875	0.885	0.533
	(3) OEP2	0.799			
	(3) OEP3	0.707			
	(3) OEP4	0.624			
	(3) OEP5	0.706			
	(3) OEP7	0.779			
	(3) OEP8	0.705			
	(3) OEP9	0.688			

Table 6: Fornell and Larcker's criterion

Variables	(1) EMA information	(2) EDQ	(3) OEP
(1) EMA information	0.735		
(2) EDQ	0.654	0.718	
(3) OEP	0.621	0.553	0.730

underpinnings of the study and provide empirical evidence for the proposed relationships between EMA information, EDQ, and OEP.

The coefficients of determination (R-squared) provide insights into how the independent variables in the model can explain the variation in the dependent variables (Hair et al., 2014). Table 8 shows that the R-squared values for EDQ and OEP are noteworthy. The R-squared value of 0.428 for EDQ suggests that approximately 42.8% of the variability in the dependent variable (EDQ) is explained by the independent variables included in the model. Similarly, the R-squared value of 0.424 for OEP indicates that the independent variables account for about 42.4% of the variability in the dependent variable (OEP). These values suggest that a substantial portion of the variability in the dependent variables can be attributed to the factors considered in the model result, suggesting that the independent variables included in the analysis contribute significantly to explaining the variations in EDQ and OEP. The results align with the underlying theory and empirical findings, reinforcing the relationships established in the study (Porter et al., 1993).

6.3. Assessment of Structural Model

In the context of testing the hypothesis related to indirect or mediating effects, the findings for hypothesis H4, which examines the mediating effect of EDQ on the relationship between EMA information and OEP, are presented.

Table 9 shows that the original sample data reveals an observed coefficient of 0.168, indicating a significant mediating effect of EDQ in the relationship between EMA information and OEP. The t-statistic of 2.094 corresponds to a P-value of 0.018, less than the typical significance levels, signifying statistical significance at the 0.05 level. Therefore, the findings support hypothesis H4, suggesting that environmental decision quality partially mediates the relationship between EMA information and OEP. These results provide empirical evidence that the impact of EMA information on OEP is influenced, at least in part, by its effect on enhancing EDQ (Hair et al., 2014).

Table 10 quantifies the indirect relationship between EMA information and OEP utilising the mediator, EDQ. Following the framework suggested by Hair et al. (2014), we utilise Variance Accounting For (VAF) to determine the extent of the mediating effect between the variables. Table 10 offers an insightful analysis of the mediation effect of EDQ between EMA information and OEP. This result implies that around 27% of the total effect on OEP through EMA information is mediated by EDQ. VAF in this mediation model is 27%, underscoring the meaningful role of EDQ as a mediator. These findings reveal that while EDQ partially mediates the relationship between EMA information and OEP, a substantial proportion of the total effect still

Figure 2: Structural model

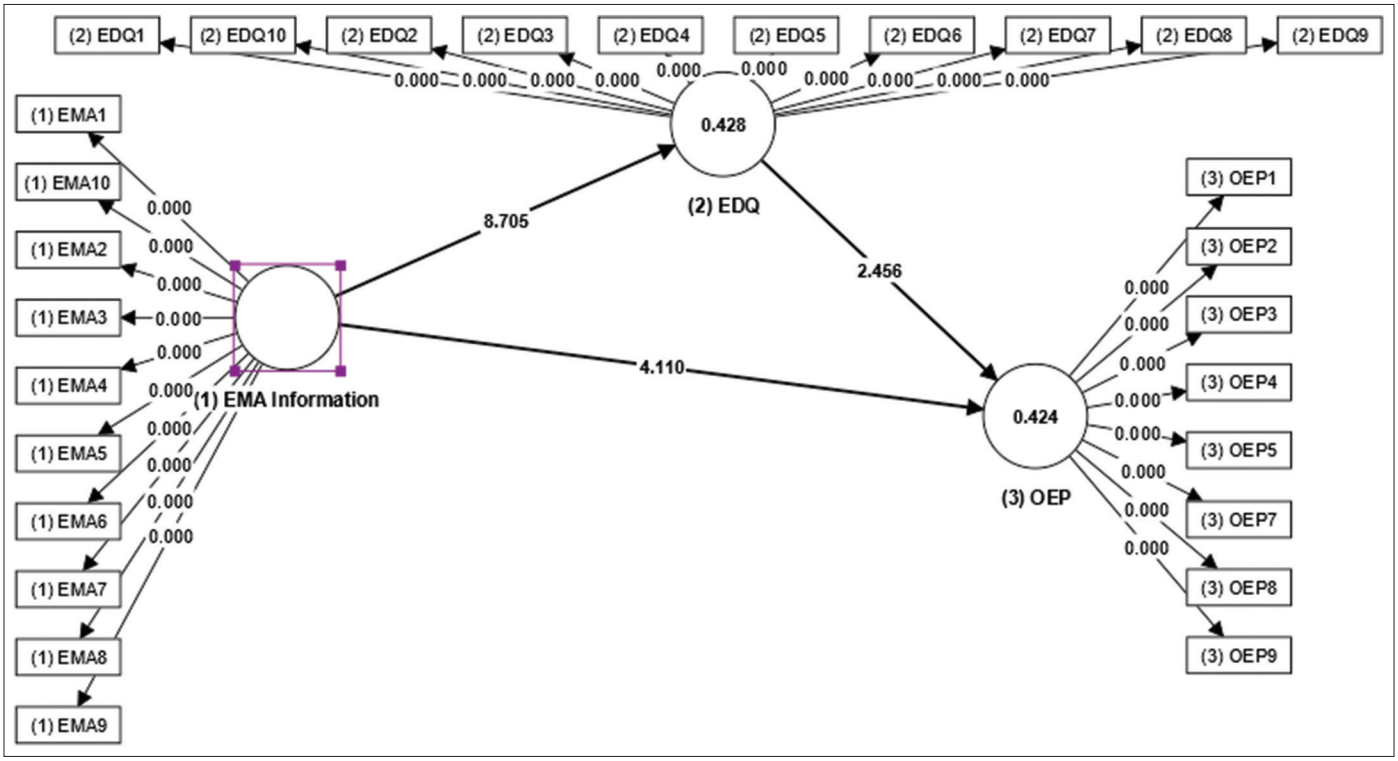

Table 7: Results of path coefficient

H	Variables	Original Sample	Sample Mean	Standard Deviation	T Statistics	P Values
H1	(1) EMA information → (3) OEP	0.453	0.440	0.110	4.110	0.000
H2	(1) EMA information → (2) EDQ	0.654	0.665	0.075	8.705	0.000
H3	(2) EDQ > (3) OEP	0.257	0.274	0.105	2.456	0.007

Table 8: Coefficient of determination (R-Square)

Variables	R-square
(2) EDQ	0.428
(3) OEP	0.424

operates through other channels. This outcome provides a nuanced understanding of how environmental decision quality contributes to translating environmental management accounting information into improved OEP. This result stated that while EDQ plays a significant role in mediating the relationship between EMA information and OEP, other factors may influence the degree of mediation that needs to be investigated.

6.4. Discussion

This study delved into the unexplored nexus between EMA information, EDQ, and OEP within ASE-listed organisations. The empirical insights from systematic research methodologies provided valuable implications for policymakers, regulatory bodies, and organisations striving to address environmental challenges. The findings of this study have the potential to shape contextually relevant policies that encourage organisations to prioritise EMA and EDQ, ultimately fostering a more sustainable business landscape.

The identified associations between EMA information, EDQ, and OEP yield practical implications for Jordanian organisations and potentially for other organisations facing similar circumstances. Firstly, organisations are encouraged to invest in developing and acquiring robust EMA information. Such information equips decision-makers with valuable insights to guide informed choices, ultimately contributing to improved EDQ and enhanced OEP. Secondly, organisations should prioritise strategies and practices that enhance EDQ, recognising its intermediary role in translating EMA information into tangible environmental improvements. This matter could encompass initiatives aimed at refining decision-making processes, enhancing the quality of available data, and fostering a culture of decision-making aligned with sustainability objectives.

Furthermore, the study's findings suggest that organisational leaders and policymakers should contemplate designing interventions reinforcing the link between EMA information and EDQ, indirectly leading to improved OEP. These interventions might involve implementing training programs, workshops, and efforts to disseminate information. These initiatives would enhance decision-makers understanding of their choices.

Table 9: Testing of indirect effect (mediating effects) hypothesis

H	Variables	Original sample	Sample Mean	Standard deviation	T Statistics	P values	Result
H4	(1) EMA information → (3) OEP	0.168	0.185	0.080	2.094	0.018	Supported**

Table 10: Calculate the mediation effect of EDQ Between EMA information and OEP

Path a	Path b	Path c (Direct effect)	Indirect effect	Total effect	VAF	Decision
EMA information→EDQ	EDQ→OEP	EMA information→OEP	(a*b)	(Direct Effect + Indirect Effect)	(Indirect Effect/ Total Effect)	Partially Mediating
0.654	0.257	0.453	0.168	0.621	27%	

7. CONCLUSION, LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

In conclusion, this study has navigated the complex landscape of EMA information, EDQ, and OEP within Jordanian ASE-listed organisations. The research unfolded against the backdrop of heightened attention to environmental responsibility, emphasising the pivotal role of EMA information in enhancing OEP through the mediating effect of EDQ.

The findings underscore the significance of EMA information as a potent resource for organisations, offering transparency into environmental impacts and associated costs. This information facilitates performance evaluation and benchmarking and empowers decision-makers to make informed choices that balance economic and environmental considerations. The study contributes valuable insights into the less-explored nexus between EMA information, EDQ, and OEP, shedding light on the intricate interconnections among these variables. Furthermore, it supports the RBV theory by concentrating more on all elements of this theory, resources and capabilities to get competitive advantages reflected finally on OEP.

The empirical evidence supports the proposed hypotheses, affirming positive and significant relationships between EMA information and OEP, EMA information and EDQ, and EDQ and OEP. The study also revealed that EDQ partially mediates the relationship between EMA information and OEP, emphasising the role of decision quality in translating EMA information into tangible environmental improvements.

The study's practical implications extend to policymakers, regulatory bodies, and organisational leaders in Jordan and beyond. The emphasis on developing robust EMA information, enhancing EDQ, and designing interventions to reinforce the link between EMA information and EDQ can contribute to a more sustainable business landscape. However, the study acknowledges its limitations, including the focus on ASE-listed organisations and the cross-sectional nature of the research design, urging further exploration across diverse industries and regions and through longitudinal or experimental approaches.

This research lays a foundation for well-informed environmental decisions within organisational practices, offering substantial contributions to addressing environmental challenges in Jordan and potentially serving as a blueprint for similar contexts globally.

The limitations of this study are worth considering for a comprehensive understanding of its implications. First and foremost, the research focuses on ASE-listed organisations. While this provides valuable insights into a developing country's context, the findings' generalizability to other settings or types of organisations might be limited. Replicating the study across various industries and regions could enhance the applicability of the results.

Furthermore, the study's focus on the mediating role of EDQ between EMA information and OEP raises questions about potential alternative mediators that might contribute to this relationship. Decision quality is undoubtedly an essential factor, but other variables, such as organisational culture, leadership, and technological capabilities, could also play a role in influencing the impact of EMA information on OEP. Investigating these potential mediators could provide a more comprehensive understanding of the underlying mechanisms.

Another limitation stems from the cross-sectional nature of the study design. While the study provides valuable insights into the relationships between EMA information, EDQ, and OEP at a specific point, it cannot establish causality or capture potential changes over time. Longitudinal studies or experimental designs could offer a more dynamic perspective on these relationships.

Additionally, while common in research, the study's use of a Likert scale for measurement might not capture the full complexity of respondents' perceptions. Qualitative approaches or mixed-methods research could provide deeper insights into the underlying factors influencing the relationships under investigation.

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