

Environmental cost accounting and financial performance: The mediating role of environmental performance

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ABSTRACT

This study aims to investigate both the direct and indirect relationships between Environmental Cost Accounting (ECA), Environmental Performance (EP) and Financial Performance (FP). The samples are companies listed in the industrial sector of Amman Stock Exchange. Subjective data using questionnaire are collected to measure ECA and EP, and objective data are obtained from the companies' annual reports to measure FP. The author used structural equation modeling to analyze the data. The results showed that ECA positively affected EP and FP, also ECA positively affected EP. Moreover, the results confirmed the mediation role of EP on the direct relationship between ECA and FP. This study contributes to the management accounting literature and contingency theory by using structural equation modeling to examine the above-mentioned relationships, which have been neglected in previous studies, and by analyzing more recent data from a developing country perspective. The results will be useful for practitioners in Jordan, especially for management in the industrial companies and the Ministry of Environment.

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1. Introduction

Organizational performance has long been considered as the core interest for management accounting researchers and managers (Otley, 2016). Over the last few decades, researchers' efforts have been directed at conceptualizing and operationalizing performance management and performance measurements to provide a comprehensive framework (Franco-Santos et al., 2007). Other researchers have investigated numerous factors, from multidiscipline, which may affect the organizational performance, to help management in different types of organizations to enhance their organizational performance or at least obtain superior performance (Chenhall, 2003; Chenhall & Langfield-Smith, 2007). Even though Financial Performance (FP) indicators have been widely criticized (Kaplan & Norton, 2001, Al-Mawali et al., 2012), as this is historical and internal rather than future and externally oriented, it is still the main dimension used in evaluating organizational performance. Moreover, rapid changes in elements of the business environment have contributed to the emergence of different non-FP indicators to give a clearer picture and provide managers with non-financial information to deal with changes in the contemporary business environment. However, while previous studies give considerable attention to some of these non-financial measurements, such as customer satisfaction, learning and growth, and employees' satisfaction, some others have been neglected like environmental and ecological performance. Although the importance of Environmental Performance (EP) and the need to evaluate environmental organizational performance have been documented in many reports issued by global organizations such as the UN as well as in studies (e.g., Beer & Friend, 2005; Phan et al., 2018), limited research was given to this subject in developing countries (Al-Mawali et al., 2018).

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In parallel, due to the rapid fluctuations in the contemporary business environment, the environmental costs have also become more complicated in terms of the increasing amounts and diversity of its items (Staniskis & Stasiskiene, 2005). These changes required more sophisticated cost accounting techniques to provide more accurate information in regard to environmental costs, which traditionally were treated as overhead costs and in some cases never recorded (Beer & Friend, 2005), and thus, provide misleading information to decision makers (Deegan, 2005). To overcome the weakness of traditional costing systems in dealing with environment costs incurred, there are many calls for developing the current implemented cost systems to trace and allocate environmental costs (Taygashinova & Akhmetova, 2018) and to cope with different types of cost, including environmental costs (Phan et al., 2018). In practical terms, the implementation of Environmental Cost Accounting (ECA) in some companies (e.g. General Motors, Commonwealth Edison, and Andersen Corporation) showed its effectiveness in recusing disposable costs and bringing financial benefits through more effective resource utilization and reduced waste (Environmental Protection Agency, 2000), which, in turn, enhanced organizational performance.

However, although such costing techniques are important, inadequate research investigating the level of implementation of ECA and its effect on EP and FP exists (Phan et al., 2018; Taygashinova & Akhmetova, 2018; Henri et al., 2016; Latan et al., 2018). The current study tries to bridge this gap in the management accounting literature through investigating ECA usage effect on EP as well as FP in industrial companies in Jordan. Generally, the association between costing systems and firms' performance has been introduced and investigated in previous studies (Gosselin, 2007; Henri et al., 2016), and the contingency theory has been widely used to provide the underlying theoretical base to link these variables (Chenhall, 2003). Thus, following previous research and contingency theory assumptions, the current study developed a theoretical model to examine these relationships, at the same time distinguishing itself by investigating the relationships in Jordan, a developing country. Also, the present research introduces ECA and examine its effect on EP and FP rather than the traditional costing system and FP only. In the context of Jordan, cost accounting systems are given considerable attention. For example, a survey done by Al-Khadash and Nassar (2010) demonstrated that 25% of Jordanian industrial companies used Standard Costing, 23% used Job Order Costing, 37% used Process Costing, 9% used Activity-Based Costing (ABC), and the remaining were using other costing systems. Moreover, In 2002, Khasharmeh investigated the extent of ABC usage in 40 Jordanian businesses listed at the end of 2001. The results displayed that only 10% of the investigated firms were implementing ABC. Similarly, another study examined the effect of implementation of ABC along with other management accounting innovations, such as Just-in-Time and Total Quality Management, on FP Jordanian industrial firms registered on the Amman Exchange by 2003. Their study showed that 11% of the companies were implementing ABC (Al-Khadash & Feridun, 2006).

Nassar et al. (2009) later on showed that ABC implementation rate had increased to 56%. Whereby, Al-Khadash and Nassar (2010) confirmed that 15% of the companies were implementing ABC, 5% were in the analysis stage to implementing ABC, 12% had obtained approval for ABC implementation and 20% were in the consideration stage. Furthermore, the results showed that financial managers were aware of the benefits of ABC implementation. Based on the previous related studies, and taking in consideration the technological advancements that have been happened in the Jordanian business environment, it can be assumed that Jordanian industrial companies have a superior progress toward the implementation of modern cost accounting techniques and their updates. Thus, it is worth investigating the level of ECA implementation, as ECA expands the conventional costing systems to include and concentrate more on environmental costs.

This article is organized as follows. The second segment discusses the definition of constructs and hypotheses development. The third segment illustrates the research method. Then, the results discussions and directions for future research are presented.

2. Definition of Constructs

2.1 Environmental Cost Accounting

Although environmental costs are considered as the core component of environmental accounting, previous studies reported a lack for standards to define such costs. This deficiency in standards has extended the problem to the definition of environmental management accounting in general and ECA specifically (Beer et al., 2006; Jasch, 2002). In the middle of the 1990s, the definition of environmental cost was introduced by the Environmental Protection Agency (1996). The Agency included all costs that directly influence on organizational FP. These types of costs include costs to society, community, environment, and the individual for which the company is not considered. A report categorized the environmental costs into the following main two groups (The Environmental Protection Agency's, 1995). The first group is internal environmental costs. This group covers conventional costs related to materials, equipment, and supplies, in addition to hidden environmental costs, which refers to the consequences of assigning environmental expenses to overhead cost pools. Also, contingent costs and image costs are listed under the internal environmental costs. The contingent environmental costs refer to costs that are uncertain to happen but depending on uncertain situations that may occur. The last cost item categorized under internal environmental costs is image and association costs. By their nature these items are not intangible (Beer et al., 2005; Gale & Stokoe, 2001). The second group is external environmental costs, and this group includes environmental degradation for which organizations are not legitimately responsible, and opposing impact on people, the organizations' property and benefits that won't always

be remunerated for by legal systems (Environmental Protection Agency, 1995). Jasch (2006) defines environmental costs as “internal and external costs relate to all costs incurred in relation to environmental damage and protection”. She categorized environmental costs into four categories, namely, processing costs, deterrence and environmental management, waste and emission handling, and material purchase value of non-product output. However, understanding the types of environmental costs (i.e. internal or external) is considered as the main factor for determining the scope of the costing system (Beer & Friend, 2006). Regularly, conventional cost accounting systems assign environmental costs to general overhead pools, with the notion that managers have less motivation to decrease environmental costs and top management are often unaware of these costs extents (Beer et al., 2006). ECA provides management with extra information to determine probabilities to reduce cost (United Nations, 2001). Therefore, ECA is conceptualized in the current research as an extension to the implemented cost system to allow organizations to identify, evaluate, and correctly assign internal and external environmental costs to the final product or service.

2.2 Environmental Performance

Even though the importance of EP evaluation has been documented in previous research, there is still no clear definition of this construct (Henri & Journeault, 2010; Lord, 1996) and it has been conceptualized in many different ways (Laguir et al., 2018). Delmas and Blass (2010), specifically, categorized EP indicators into three main groups, namely environmental impact, compliance to environmental regulatory, and organization process. These categories are used by stakeholders interchangeably to define environmental performance. Management accounting researchers usually conceptualize EP as environmental impact generated in conducting the business. These environmental impacts include harmful recycled waste, pollution, toxic releases, or non-compliance with environmental laws (Al-Tuwaijri et al., 2004; Patten, 2002; Cormier & Magnan, 2011; Mobus, 2005). The present research has conceptualized and operationalized EP based on Henri and Journeault (2010) study which have theorized EP into four dimensions based on two aspects (process vs results) and (internal vs external), namely environmental influence and corporate image, monetary impact, stakeholder relations, and process and product improvements.

2.3 The relationship between Environmental Cost Accounting and FP

Henri, Boiral, and Roy (2016) linked environmental cost, as an executional cost management, with FP. They debated that the pursuing of environmental cost could enhance managers’ consciousness toward cost structure; this will enable them to manage environmental costs, enhancing their decisions and eventually the organizational FP. Moreover, integrating ECA into the organization’s conventional cost accounting system and it serving as a tool of environmental controlling, could help the organization to avoid environmental taxes, penalties, and the costs of regulating the environmental damages caused (Taygashinova & Akhmetova, 2018). Tsai, Lin, and Chou (2010) introduced a costing model based on a case done in Taiwan. They argued that the integration of ECA into ABC provides organizations with more accurate cost information, enhances the managers’ ability to understand financial information related to environmental cost and improves the decision-making process. Preceding studies have tested the influence of implementing different cost accounting systems on FP. For example, Shields (1995) affirmed that the utilization of ABC leads to better FP. These results were confirmed by McGowan and Klammer (1997). Pizzini (2006) confirmed the positive relationship between cost system design and FP in US hospitals. More recently, Hardan and Shatnawi (2013) examined the relationship between ABC implementation and FP. The results of their study confirmed the like between the two variables in the context of Jordanian telecom companies. Mijoc, Starcevic, and Moijc (2014) found a positive link between contemporary cost management methods and FP in the context of Croatian limited companies. Therefore:

H1: There is a positive relationship between ECA and FP.

2.4 The relationship between EP and FP

Earlier studies have largely inspected the link between EP and FP. The conventional assumption of bi-relationship between the two constructs has been established based on the trade-off between financial benefits and a firm responsibility to society and the environment (Al-Tuwaijri et al., 2004; Henri & Journeault, 2010). Furthermore, higher EP decreases long-term risks related to natural resource diminution, instabilities in energy prices and costs, environmental liabilities, along with pollution and waste management (Staniskis & Stasiskiene, 2005) Also, better EP offers the chance to enhance an organization’s image and increase social legitimacy (Patten, 2005), which contributes to FP. Generally, the outcomes of previous research were inconclusive and provide mixed results. The basic argument of researches which affirmed a positive relationship is that EP characterizes an innovation and operational efficiency (e.g. Hart & Ahuja, 1996; Sroufe, 2003; Tuwaijri et al., 2004; Clarkson et al., 2011; Feng et al., 2017; Ortiz-de-Mandojana, 2013), enhances competitive advantage and legitimacy of organizations (Hart, 1995), and improves management capabilities (Aschehoug et al., 2012). Whereby, other studies stated a negative association between the two constructs (e.g. Jaggi & Freedman, 1992; Blacconiere & Patten, 1994; Lu & Taylor, 2016). Notably, Deswanto and Siregar (2017) reported no relations between the two variables in the context of European firms. Moreover, Laguir, Marais, Baz, and Stekleorum (2018) investigated the effect of FP on EP in the French banking sector. The results showed that FP was associated with high environmental performance. Also, their study’s results suggested a complex bidirectional relationship between the two constructs. Muhammad, Scrimgeour, Reddy, and Abidin (2015) reported a strong positive relationship during the pre-financial crisis period (2001-2007) and such relationship did not exist during the financial crisis (2008-2010). Thus, H2 is pursued as follows:

H₂: There is a positive relationship between EP and FP.

2.5 Environmental Cost Accounting and Environmental Performance

As a main part of Environmental Management Accounting (EMA), ECA techniques are progressively being considered as comprehensive mechanisms to accomplish better EP (Phan et al., 2018; Latan et al., 2018). ECA identifies, traces, and calculates costs of consuming organizational resources or activities with possible environmental impacts. Phan et al. (2018) argued that environmental ABC could enhance the organizational EP by removing non-value-added activities and improve the accuracy of its costing system outputs through enhancing the cost management. ECA, therefore, enables the management to conduct a cost-benefits analysis relating to enhancements in environmental performance. Another way that ECA could contribute to the EP is by assisting organizations to meet their environmental responsibilities toward environment, society, and community (Ferreira et al., 2010). Latan et al. (2018), however, have established the role of EMA usage in providing the management with more accurate cost information and positively affecting the EP of Indonesian companies with ISO 14001. In sum, integrating ECA into an organizational conventional cost system will enhance its quality and accuracy outputs. Particularly, by allocating environmental costs to the right cost objects and solving the main problem of allocation to a general overhead account (Beer & Friend, 2005), this will assist the management in controlling these costs (Taygashinova & Akhmetova, 2018). Ultimately, it will enhance organizational EP (Phan et al., 2018; Latan et al., 2018; Feng et al., 2017; Muhammad et al., 2015). Thus:

H₃: There is a positive relationship between ECA and Environmental Performance.

2.6 The mediator role of EP between ECA and FP

Evidence suggests preliminary empirical support for the positive intervening role of EP regarding the association between environmental techniques and firm performance (e.g. Feng et al., 2017; Henri et al., 2016; Deswanto & Siregar, 2017). Feng et al. (2017) found that EP mediates the direct association between green supply chain management and FP in automobile manufacturers in China. Also, a study of Henri and Journeault (2010) highlights that EP mediates the relationship between eco-control and economic performance in Canadian manufacturing companies. Thus, this study proposes that ECA will have indirect implications for FP by affecting environmental performance which in turn influences FP. The following hypothesis is thus proposed:

H₄: EP mediates the relationship between ECA and FP

3. Research Methodology

3.1 Proposed conceptual model overview

Contingency theory has been widely used to provide a theoretical base for the linkage between contextual variables and management accounting techniques procedures, in addition to linking usage levels of management accounting techniques with organizational performance (Chenhall, 2003; Otely, 2016). Specifically, it is employed to examine the influence of costing techniques usage on organizational performance in many studies (Henri et al., 2016). By reflecting the core assumption of contingency theory to the costing system applied by an organization, it is assumed that there isn't a single costing system that is suitable to all organizational conditions, but organizations need to align their costing system to the surrounding business environment factors to enhance their performance. Therefore, as a company operating in a contemporary business environment faces many changes in environmental costs, in terms of the amount and items of these costs, it needs to customize its costing system to provide the management with more precise environmental costs data to support management decisions regarding pricing, goals and assessment standards and receiving feedback (Zaman, 2009; Ittner et al. 2002). Thus, contingency theory introduces a suitable underlying theoretical framework to link variables of the current study. Figure 1 illustrates the proposed theoretical framework.

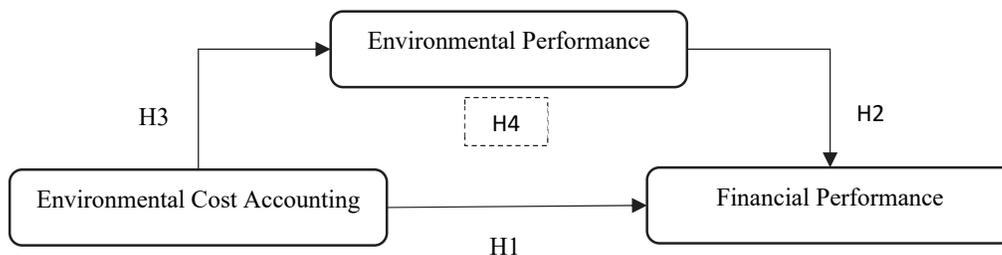


Fig. 1. Proposed Theoretical Framework

3.2 Instrument development

A survey was developed to measure two variables, ECA and environmental performance. Environmental Cost Accounting measured by an instrument developed by Beer & Friend, (2006) and Phan et al., (2018). Participants indicated the extent to which their organization's costing system identifies, assesses, and allocates the 19 environmental cost items. The environmental costs included the four main groups: prevention and environmental management, processing costs of non-product output, material purchase value of non-product output, and waste and emission treatment. The environmental costs items used a five-point Likert scale ranging from (1= to minimum extent, 5= to great extent). EP was measured using a scale established by Sharma and Vredenburg (1998). The respondents were asked to specify the degree to which the company environmental actions resulted in any of the 15 competitive advantages identified in environmental management accounting (see Henri and Journeault, 2010). The items ranged from (1= no contribution, 5= very large contribution) and covered four aspects as discussed above, which included process, results, internal and external. FP was measured by objective financial indicators (Profit Margin %, ROA, and ROE) obtained from the company's annual reports.

3.3 Sample and data collection

Due to the small population (i.e. 132 firms) and to accomplish the minimum desired sample, a survey was distributed and collected from the entire population of this research which consisted of every industrial company listed in the Amman Stock Exchange in 2017. A pre-test was first conducted by administering the survey to four Management Accounting Professors and ten managers, and minor modifications were made based on their comments. To encourage the targeted companies to participate in this research, a drop-off and pick-up technique and follow-up calls and mail-out were used. Four surveys were excluded because of substantial missing information, leading to a final sample of 42 usable surveys (32%). The Companies that participated in this research were from different industries includes; Food and Beverages (19%), pharmaceutical and medical (17%), Mining and Extraction (17%), Engineering and construction (16%), Chemical (14%), Textiles, Leathers, and Clothing (9%), and other industries (8%).

4. Results

4.1 Descriptive and measurement model evaluation results

The variables mean (i.e. M) and standard deviation (i.e. SD) are presented in Table 1.

Table 1
Descriptive and measurement model evaluation results

Variable	Item	Loading	Mean	SD	CA	CR	AVE
ECA	ECA1	0.872	3.88	1.340	0.821	0.863	0.655
	ECA2	0.821					
	ECA3	Deleted					
	ECA4	0.758					
	ECA5	Deleted					
	ECA6	0.801					
	ECA7	0.836					
	ECA8	0.778					
	ECA9	0.874					
	ECA10	0.711					
	ECA11	0.725					
	ECA12	0.798					
	ECA13	0.898					
	ECA14	0.872					
	ECA15	Deleted					
	ECA16	0.884					
	ECA17	0.973					
	ECA18	0.885					
	ECA19	0.887					
EP	EP1	0.874	4.01	1.190	0.883	0.898	0.648
	EP2	0.744					
	EP3	0.752					
	EP4	0.882					
	EP5	0.832					
	EP6	Deleted					
	EP7	0.733					
	EP8	0.866					
	EP9	0.722					
	EP10	0.759					
	EP11	0.734					
	EP12	0.747					
	EP13	0.723					
	EP14	0.754					
	EP15	0.877					

Keys: ECA= Environmental Cost Accounting, EP= Environmental Performance.

Note: SD= Standard Deviation, CA= Cronbach's Alpha, CR = Composite Reliability, AVE = Average Variance Extracted.

The descriptive results show that ECA scored an average of 3.88 out of 5.0 and SD of 1.34, and EP scored an average of 4.01 out of 5.0 and an SD of 1.19. The results from objective data obtained from companies' annual financial reports show that the mean values were 4.13, 3.30, and 6.71; also, the standard deviation values were 8.207, 4.848, and 11.928 for profit margin %, ROA, and ROE respectively. Moreover, the measurement model was evaluated by establishing validity and reliability. Two types of validity were tested, convergent validity then discriminant validity. The convergent validity of the measurement model is established by testing the loadings, average variance extracted (AVE) and also the composite reliability (CR) (Gholami et al., 2013). After deleting the following items – ECA3, ECA5, ECA15, and EP5 – as their out loadings were less than the cut-point (0.7), the results from the second-order construct evaluation show that the loadings of remaining items were higher than the cut-point, composite reliabilities values were between 0.711 and 0.973, and AVE values were also higher than 0.5. Thus, conditions suggested by Hair et al. (2014) were all met to prove convergent validity. Table 1 shows full details. For second order constructs, Table 2 shows that the VIF values for profit margin, ROA and ROE are all below the threshold of 3.33 (Diamantopoulos & Siguaw, 2006). These results therefore indicate that a multicollinearity problem is not exist

Table 2
Descriptive and Measurement model of second level constructs (formative)

Financial Performance	Weights	t values	VIF
Profit Margin %	0.246	17.341***	2.341
ROA	0.358	18.543***	2.983
ROE	0.342	18.162***	2.781

Note: ROA= Return on Assets, ROE= Return on Equity.

The discriminant validity was examined by using the heterotrait-monotrait (HTMT) ratio (Henseler, Ringle, & Sarstedt, 2015; Voorhees et al., 2016). The HTMT ratio must be less than 0.9. The results support the two assumptions of discriminant validity. Overall, both convergent and discriminant validity were proven.

4.2 Structural model evaluation

To assess the structural model, this study evaluated the R^2 , Beta, and the t -values. To obtain t -values, a bootstrapping technique with 5000 resamples was used. Besides these basic measures, it is recommended to report the predictive relevance (Q^2) and effect sizes (f^2) (Hair et al., 2014). The results are presented in Table 3. With regard to direct effects, results of path coefficients showed that ECA significantly affects FP ($\beta = 0.612$, $p \leq 0.000$, $t = 12.33$), and insignificant relationship between EP and FP ($\beta = 0.528$, $p \leq 0.000$, $t = 9.46$); thus, H1 and H2 were supported. The two predictors explained 32% of the variances in FP. The result also indicates that ECA significantly affects EP ($\beta = 0.151$, $p \leq 0.005$, $t = 6.304$) and explained 27% of the variances in environmental performance. Thus, H3 was supported. The test for indirect impact of ECA on FP via EP, this study employed the bootstrapping technique for testing indirect effects established by Preacher and Hayes (2004, 2008). Moreover, as shown in Table 3 the findings show the existence of an indirect effect with a beta of ($\beta=0.671$) and a t -value of 11.508. Furthermore, the method of Preacher and Hayes (2008) would indicate the trend, with 0.671, 95% Boot CI: [LL=0.247, UL=0.384], as not overlapping zero in-between the values that specify for mediation. Thus, this study concludes that EP mediates the relationship between ECA and FP. Consequently, H4 is confirmed as well. To evaluate the magnitude of the influence, the study utilized Cohen's (1988) recommendation, which is 0.02, 0.15, and 0.35, representing small, medium, and large impact respectively. In evaluating f^2 values, it can be concluded that all examined associations presented a substantive effect, whereby there were two associations with a medium effect size and one with a large effect size. Hair et al. (2014) also suggested that as a relative measure of predictive relevance, values of 0.02, 0.15, and 0.35 designate that an exogenous construct has a small, medium, or large predictive relevance for a certain endogenous construct. Table 3 shows that Q^2 values are more than 0 ranging from 0.195 to 0.245, proposing that the models have acceptable predictive relevance. Moreover, the variance inflation factor (VIF) is broadly utilized in measurements to determine the degree of multicollinearity present (O'Brien, 2007). Hair et al. (2017) suggested that a value exceeding 5 for the largest VIF indicates a multicollinearity problem. The VIF values in this study are between 1.020 and 1.832, which are less than 5, and therefore, a multicollinearity issue is not present in this research.

3. Discussions and Implications

This research intended to examine the direct effects of ECA usage on EF and FP in addition to the indirect effect of ECA on FP via EP in the context of industrial businesses registered in Amman Exchange. The results established that ECA usage positively effects FP, which infers that tracing of environmental costs leads to better FP. Also, findings demonstrate that ECA has positive effects on EP, which implies that the greater the usage of ECA, the better the EP. Generally, the results are supported by previous findings in the literature (e.g. Taygashinova & Akhmetova, 2018; Henri et al., 2016). The study also confirmed the positive relationship between EP and FP and is also supported by the findings of Muhammad et al. (2015). However, it is in contrast with the findings of some studies (e.g. Deswanto & Siregar, 2017; Lu & Taylor, 2016).

The results also demonstrate that ECA via EP does have indirect effects on FP. This is simply understood in the implication that higher ECA usage will provide the management with more accurate environmental costs information, to support their decisions and to gain environmental competitive benefits, which in turn enhances the EP and reduces the overhead costs, which eventually enhances the FP. These findings are supported by related studies which have applied contingency theory

and introduced EP as a mediator variable (Feng et al., 2017; Henri & Journeault, 2010). The results provide some extra clarification and confirmation for management accounting researchers about contingency theory assumptions. This application of contingency theory and EP as a mediator is one of the first efforts to do so in the Jordanian context. This contributes significantly to the accounting literature and expertise in Jordan. Moreover, the results explain the nature of and confirm the positive relationship between EP and FP as previous studies provided inconclusive results (see Deswanto & Siregar, 2017; Lu & Taylor, 2016).

The study will be useful for practitioners in Jordan, especially for the Ministry of Environment. The findings could help the ministry to enhance the related policies and take some action to motivate the companies to be greener, through tracing the environmental costs and controlling these costs. Also, management in the Jordanian industrial companies could benefit from the results of this research by identifying the environmental costs and treating these carefully, instead of considering these costs as overhead. In addition to better understanding the causality among the investigated variables.

Table 3
Results of hypotheses testing

Hypothesis	Relationship	Std Beta	Std Error	t-value	p-value	LL	UL	Decision	R ²	f ²	Q ²	VIF
H1	ECA → FP	0.612	0.032	12.33	0.000	0.543	0.625	Supported	0.32	0.487	0.245	1.020
H2	EP → FP	0.528	0.034	9.46	0.000	0.435	0.601	Supported	-	0.275	-	1.020
H3	ECA → EP	0.151	0.049	6.304	0.004	0.038	0.238	Supported	0.27	0.016	0.195	1.832
H4	ECA → EP → PF	0.323	0.032	11.508	0.000	0.247	0.384	Supported	-	-	-	-

Note: ECA = Environmental Cost Accounting, FP = Financial Performance, EP = Environmental Performance.

4. Limitations and Future Research

Although the study provides positive additional perspectives for theory and practice, it does have certain limitations. First, the study population covered only Jordanian industrial companies, so researchers may examine the relationships in other sectors. Second, as the study was cross-sectional, it might be unable to track the stages of implementing ECA. Third, the ECA and EP measurements are subjective according to the managers' perceptions. The reason behind using this method is that obtaining objective data regarding these two variables was not possible because of its nature. This might negatively affect observations in different scenarios. Therefore, the observations should be cautiously trained. Moreover, other variables (such as environmental strategy and accounting information systems) which may affect the level of ECA usage could be investigated.

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