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Environmental practices and firm performance in emerging markets: the mediating role of product quality

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ABSTRACT

Environmental practices have not received as much research attention in emerging market contexts as traditional topics like quality. However, the importance of environmental practices for a firm's production strategy has been increasing at an unprecedented level across the globe. Our research objective is, therefore, to investigate the interplay between environmental practices and quality in the pursuit of firm performance. Relying on 492 responses from Turkish manufacturers to test our hypotheses, we show that environmental practices directly improve the quality of products over and above the effect of quality management practices in emerging markets. Product quality, in turn, is important for increasing firm performance, acting as a mediator for the positive effects of environmental practices on performance. Thus, we reveal that product quality functions as an instrumental conduit between environmental practices and firm performance in emerging markets like Turkey where stakeholder pressures are weak, and regulations are often not properly enforced.

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Introduction

Environmental activists often point the finger of blame at irresponsible manufacturing for pollution, harmful emissions, and other forms of damage to the environment. At the same time, resource-constrained firms must contend with global hyper-competition, rapidly changing consumer preferences, and new technologies (Ruiz-Moreno, Tamayo-Torres, and García-Morales 2015; Teece 2014). Such intensive competition can lead firms to concentrate primarily on profit making at the expense of social and environmental sustainability. It is, therefore, relatively less likely to find manufacturers adopting environmental practices in emerging markets like Turkey (Tatoglu et al. 2014; Tatoglu, Bayraktar, and Arda 2015) where stakeholder pressures are relatively weak, regulations are not fully enforced and financial outcomes of environmental practices are perceived as marginal (Lourenço and Branco 2013). Emerging markets are, as defined by Hoskisson et al. (2013), countries where institutional development, infrastructure and factor markets lag developed countries.

Environmental practices can often be technology intensive and with high initial costs (Klassen and McLaughlin 1996; Zhu, Sarkis, and Lai 2007). Managers in emerging markets often perceive environmental practices to have marginal, if any, positive impact on performance especially in the short run (Lourenço and Branco 2013). In fact, research shows that many emerging market firms view expenditure on environmental management as a loss while viewing compliance to product quality management as a gain (Achi 2004). Quality, therefore, is often viewed as a more visible and important determinant of the success of *emerging market firms (EMFs)* (Bayazit and Karpak 2007; Zhou et al. 2008). EMFs are organizations seeking profit through economic production that operate primarily in emerging markets. That said, recent evidence suggests that EMFs do adopt environmental practices at an increasing rate (Delai and Takahashi 2013; Tatoglu, Bayraktar, and Arda 2015; Zhu and Sarkis 2004). However, little is known about what role these practices play in EMFs' performance (Lourenço and Branco 2013). Likewise, though environmental practices have received increasing research attention, less is known about the way in which these practices influence product quality and firm performance in the presence of quality management practices (QMP) (Wiengarten et al. 2017; Wiengarten and Pagell 2012). These gaps indicate the need for examining environmental practices in emerging markets together with quality to better understand their holistic role in the performance of EMFs.

In this paper, we investigate the interplay between environmental practices, QMP, and product quality in explaining firm performance in emerging markets. Subsequently, in view of the theoretical and managerial relevance of environmental practices, we seek to explore the following research question: *What is the role of product quality in the linkage between environmental practices and firm performance in emerging markets?* The central tenet of our theorization is that environmental practices can have positive spillover effects that complement QMP with regard to a holistic view of product quality and performance (Chen et al. 2014;

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Wiengarten et al. 2017). In so doing, we test whether environmental practices have a positive effect on product quality in additional to quality management and whether product quality can mediate the relationship between environmental practices and firm performance in an emerging market context. This study is timely and useful for research on environmental manufacturing as it advances the knowledge on the interplay between environmental practices and quality in predicting performance in emerging markets where the importance of quality is understood and invested in. If environmental practices can help product quality efforts then it supports the business case for environmental practices. We chose Turkey as a key emerging market with different features shaping environmental practices than developed markets. The evidence for Turkey being different than developed markets is presented in the next section on hypotheses development.

This paper makes several contributions to green/sustainable manufacturing literature. Our work shows how environmental practices indirectly affect firm performance in emerging markets by identifying an instrumental mediating variable. We offer theoretical reasons and empirical evidence for a link between environmental practices, product quality, and firm performance. We show that this positive effect on quality exists in addition to the benefits provided by QMP. In this way, we contribute to the literature on environmental practices and quality management by indicating how the two have complementary but unique effects on product quality and firm performance in emerging markets like Turkey.

Theory and hypothesis development

We present a review of the existing literature on environmental practices in emerging markets in Table 1. It can be observed from Table 1 that the link between environmental practices and performance in emerging markets is more complex than previously assumed. In support of our reading of the literature, (Golicic and Smith 2013) have noted positive and negative associations between environmental practices and firm performance in the literature on emerging markets, leaving practitioners perplexed as to what actions would be beneficial to pursue. We argue that these seemingly contradictory results can be partly resolved by looking at the indirect effect of environmental practices on performance mediated through product quality. We also explain how this effect comes about by relying on learning theory (Choo, Linderman, and Schroeder 2007), and the dynamics of exploration-exploitation (Hardwick and Stout 1991; Posen and Levinthal 2012). Below, we elaborate our arguments.

Environmental practices and quality

In line with past research, *environmental practices* refer to following environmentally-friendly approaches and integrating environmental concerns in the firm's production processes (Ryoo and Koo 2013; Tatoglu et al. 2014; Zhu and Sarkis 2004). This could mean the introduction of innovative green initiatives into existing processes within and across immediate boundaries of the firm and/or a total upheaval and redesign of such processes to reduce environmental impact and achieve true environmental sustainability. Environmental practices often involve trade-offs and innovation that make the real difference for the environment (Pagell and Shevchenko 2014). Despite the current prevalence of environmental practices, their application is a relatively recent phenomenon (Pagell and Shevchenko 2014), particularly compared to conventional production patterns. Thus, environmental practices involve varying degrees of innovative thinking and explorative approach toward existing production logics and paradigms.

In turn, *product quality* denotes the perceived superiority of the product over the alternatives (Atuahene-Gima and Ko 2001). This view is in line with recent research that promotes a more holistic definition of product quality beyond a traditional emphasis on physical attributes or meeting specifications (Achi 2004; Atuahene-Gima and Ko 2001). Such a conceptualization of product quality allows firms to differentiate themselves on its basis and fits the domain of our research where we seek a more holistic understanding of quality management, product quality and their role in firm performance.

Environmental practices assist in explorative learning that has positive effects on product quality as well as performance through several mechanisms. First, firms can leverage external resources in their pursuit of environmental outcomes (De Marchi and Grandinetti 2013). An important benefit of sustainability initiatives, like environmental practices, is their ability to integrate diverse entities from outside the firm thereby bring together complementary skills and knowledge (Zwetsloot and Van Marrewijk 2004). This is because improving environmental performance has positive externalities for others. For example, when firms reduce their carbon footprint everyone else benefits from reduced pollution as well. These positive externalities motivate external sources of knowledge such as ethical suppliers and customer firms, universities, and non-government organizations, to assists firms to acquire necessary technological capabilities. Thus, environmental practices provide access to external knowledge sources at low or no cost that also have benefits for product quality. Firms can leverage these external knowledge sources to improve their products and processes on multiple dimensions simultaneously including quality.

Second, environmental goals often force firms to redesign their products and production processes after doing a life cycle assessment of their impact on the environment (Lucato, Vieira Júnior, and Santos 2015; Melnyk, Sroufe, and Calantone 2003). Improving environmental outputs requires discovering alternative materials, altering production processes, using newer technologies to find the best environmental options (Rothenberg and Zyglidopoulos 2007). When firms try to improve on environmental outcomes, they need to update their knowledge regarding relevant product and process technologies that can improve product quality as a spillover effect (Jakobsen and Clausen 2016).

Table 1. Empirical contributions on environmental practices and performance in emerging markets.

Authors	Method and sample	Operationalization of environmental practices	Relevant findings
Gopal and Thakkar (2016)	Survey – 98 Indian managers	Sustainable supply chain practices	Sustainable supply chain practices are correlated and help in improving the supply chain performance among the industries
Laosirihongthong, Adebanjo, and Choon Tan (2013)	Survey – 190 Thai managers	Green purchasing Product-related eco-design Packaging-related Reverse logistics	Packaging-related eco-design practices are positively related to economic performance. However, pro-active environmental practices had low levels of adoption and do not have a significant impact on GSCM performance
Lee et al. (2015)	Survey – 119 Malaysian managers	Greening the supplier	Positive and significant linkages exist between green suppliers with both environmental performance and competitive advantage
Lin, Tan, and Geng (2013)	Survey – 208 Vietnamese managers	Green product innovation	Green product innovation performance is positively correlated to firm performance
Mitra and Datta (2014)	Survey – 81 Indian managers	Environmentally sustainable practices	Environmentally sustainable product design and logistics are positively related to competitiveness and economic performance of the firm
Rao and Holt (2005)	Survey - 52 Southeast Asian executives	Inbound-related environmental practices Production-related environmental practices Outbound-related environmental practices	Greening the different phases of the supply chain leads to an integrated green supply chain, which ultimately leads to competitiveness and economic performance
Wu et al. (2014)	Survey – 172 Taiwanese managers	Reactive environmental strategy Responsive environmental strategy Agile environmental strategy Proactive environmental strategy	Risk-hedging supply chain (SC) strategy should be aligned with a defensive environmental strategy; a responsive SC strategy should be aligned with an accommodative environmental strategy; and an agile SC strategy with a proactive environmental strategy to yield improved firm performance
Yang et al. (2010)	Survey – 107 Chinese and Taiwanese managers	Environmental policy and planning Employee communication	Environmental management (EM) is a mechanism through which continuous improvement (CI) and supplier management (SM) practices contribute to manufacturing competitiveness. However, the influences of SM and CI on cost and delivery performance are lessened with the presence of EM
Yang, Hong, and Modi (2011)	Survey – 309 managers from several developing and developed countries	Environmental management system Life-cycle analysis Design for environment Environmental certification	Environmental management practices are negatively related to market and financial performance. However, improved environmental performance reduces the negative impact of environmental management practices on market and financial performance
Zailani et al. (2012)	Survey – 132 Malaysian managers	Environmental purchasing Sustainable packaging	Environmental purchasing has a positive effect on three categories of outcomes (economic, social and operational), whereas sustainable packaging has a positive effect on environmental, economic and social outcomes
Zhu and Sarkis (2004)	Survey – 186 Chinese managers	Internal environmental management ISO 14001 certification External GSCM practices Investment recovery Eco-design	There seems to exist 'win-win' opportunities for Chinese enterprises implementing GSCM practices
Zhu et al. (2007)	Survey – 86 middle or higher level Chinese managers	Internal environmental management Green purchasing Customer cooperation Investment recovery Eco-design	GSCM implementation has only slightly improved environmental and operational performance, and has not resulted in significant economic performance improvement

Third, environmental practices can improve firms' capabilities for higher quality products. Studies have shown that when firms try to improve their environmental outcomes, they often have to go beyond their core competencies and develop new ones (De Marchi and Grandinetti 2013; Marshall et al. 2015). Improving technological capabilities is an important determinant of how successfully firms are able to implement environmental practices (Jakobsen and Clausen 2016). These improved technical capabilities have positive spillover benefits for product quality. Additionally, environmental practices often lead to greater integration within the firm that supports information sharing and organizational learning. Greater internal integration subsequently improves processes within the firm including those related to product quality (Zwetsloot and Van Marrewijk 2004).

Fourth, environmental practices often force a manufacturing firm to look outside the bounds of its current processes and explore unfamiliar domains. This is because most production processes have traditionally been either designed without a focus on the environment or have significant remnants of processes designed without the environment in mind (Pagell and Shevchenko 2014). Better solutions to complex problems can be reached if diverse bodies of knowledge and expertise are brought together and the search for solutions is over a wide range of possibilities (Teece 2014). In fact, higher reconfigurability of production systems are necessary for better environmental outcomes (Dubey et al. 2017). This exploration leads to discovery, challenging prevalent assumptions, and redefining fundamental production processes for the environment (Jakobsen and Clausen 2016; Shu et al. 2016). For example, environmental practices are often able to explore and find alternative materials that possess more desirable green characteristics. Incorporating such materials into the products can make noteworthy leaps in the quality of the products. Consequently, environmental practices help improve quality by increasing the scope of the search for innovative solutions and providing a more explorative and dynamic process that complements the structured well-defined approach of traditional quality improvement initiatives (Dubey et al. 2017; Molina-Castillo, Jimenez-Jimenez, and Munuera-Aleman 2011).

The product quality benefits of environmental practices mentioned above cannot be realized with QMPs alone, especially when conceptualizing product quality in a more holistic way that includes competing on quality rather than just meeting specifications. A recent study shows that the integration of quality and environmental management practices positively influences quality performance (Tatoglu et al. 2015). QMPs can be viewed as meta-routines that relies on problem-solving heuristics, techniques, and structured processes to find, evaluate, and manage improvement initiatives. They provide a standardized and structured process to solve specific quality problems (Hackman and Wageman 1995) that are both a strength and weakness. While such process provides an efficient way to find and exploit quality improvement opportunities, it can also limit the firm's explorative activities and learning (Benner and Tushman 2003; Molina-Castillo, Jimenez-Jimenez, and Munuera-Aleman 2011; Roldán Bravo, Lloréns Montes, and Ruiz Moreno 2017). Researchers have shown that quality management alone does not possess the qualities required to provide firms with sustainable competitive advantages in dynamic settings (Roldán Bravo, Lloréns Montes, and Ruiz Moreno 2017; Ruiz-Moreno, Tamayo-Torres, and García-Morales 2015), as it can lead firms to be narrow-minded, limit innovation by trapping firms in incremental improvements. Exploitative learning emphasizes efficiency and incremental steps, and can lead to sub-optimal outcomes as the full landscape of possibilities is not explored (Benner and Tushman 2003). Learning in quality management initiatives is often exploitative due to the emphasis on the structured problem-solving process and standardized tools used (Choo, Linderman, and Schroeder 2007; Roldán Bravo, Lloréns Montes, and Ruiz Moreno 2017). The structured nature of continuous improvement and total quality management (TQM) approaches involve "exploiting familiar skills in addressing known problems" (Sitkin, Sutcliffe, and Schroeder 1994, 544). Explorative learning, in contrast, is about generating innovative ideas and solutions that are not incremental. It often requires divergent thinking and assessing a wide variety of alternatives that may be radically different from current processes (Choo, Linderman, and Schroeder 2007). Environmental practices bring emphasis on explorative learning into the firm to solve complex environmental problems, and this emphasis can have positive spillover effects on product quality (Shu et al. 2016). Likewise, given their conventional focus, QMPs enhance more tangible attributes of product quality (Roldán Bravo, Lloréns Montes, and Ruiz Moreno 2017). Nonetheless, environmental practices can be more beneficial to intangible attributes that are increasingly valued by customers. Thus, we argue that environmental practices lead to improvements in product quality over and above those achieved from QMPs.

H1: Environmental practices leads to greater product quality of EMFs' products.

Environmental practices and performance

Despite the existence of divergent accounts, the majority of evidence signals an overall positive influence of environmental practices on firm performance (Molina-Azorín et al. 2009). However, the nature and strength of this relationship are argued to vary across different boundary conditions and contingent factors (Klassen and McLaughlin 1996; Molina-Azorín et al. 2009). For example, in contexts where customers are sensitive to environmental concerns, environmental practices can be an important source of differentiation from rivals and hence a source of competitive advantage (Chen et al. 2014). Likewise, increased reputation amongst customers, ability to benefit from the financial capital of ethical investors, reduction of waste, and avoiding environmental disasters that lead to bad publicity could be sources of a potentially positive link between environmental practices and firm performance (Galbreth and Ghosh 2013; Klassen and McLaughlin 1996). Furthermore, Porter and Van der Linde (1995) highlight the positive role of environmental practices in product

differentiation and innovation and ensuing competitiveness. A growing body of empirical evidence, therefore, exists for the positive effects of environmental practices on various performance outcomes in developed and increasingly in emerging markets (Luthra, Garg, and Haleem 2015; Melnyk, Sroufe, and Roger 2003; Molina-Azorín et al. 2009).

Turkey along with other large emerging markets are characterized by relatively weak institutions that do not offer sufficient support and pressure for firms to adopt principles of environmental and social responsibility (Hoskisson et al. 2013). Turkey and similar emerging markets have less stringent environmental regulations and weaker enforcement regime for environmental regulation than their developed market counterparts (Erdogan and Baris 2007; Tatoglu et al. 2014). Given the high initial costs and meager immediate returns involved with investing in environmental practices (Zhu, Sarkis, and Lai 2007), EMFs may perceive themselves to be at a competitive disadvantage if external pressure for the adoption of environmental practices is insufficient and uncommon. Hence, some of the incentives for adopting environmental practices may not apply to emerging markets (Delai and Takahashi 2013; Lourenço and Branco 2013).

An increasing number of Turkish customers are becoming environmentally conscious (Erdogan and Baris 2007). However, such consciousness may not always translate into action, as consumers who change their purchasing habits in response to corporations' environmental actions make up a minor share of the overall consumer base in Turkey (Erdogan and Baris 2007). Thus, reputation effects for ignoring environmental practices are not significant either. Given the context, we expect the performance benefits of environmental practices to be much weaker than they are in developed markets. However, it is still plausible to argue that EMFs adopting environmental practices may obtain performance through market differentiation and targeting niche market domains (Chen et al. 2014; Galbreth and Ghosh 2013). Thus, we expect to see some performance benefits of environmental practices for EMFs, and this is line with the dominant orientation of the previous literature.

H2: Environmental practices leads to greater firm performance in EMFs.

QMP, product quality, and performance

The notion of quality has been studied for decades. Extant research is in consensus that QMP, improve the quality of products and services and the financial performance of the firm (Ruiz-Moreno, Tamayo-Torres, and García-Morales 2015). However, the literature on TQM shows that fragmented quality initiatives alone are not sufficient. A holistic implementation of QMP includes supporting human resource management practices, top management commitment, and training is required to show significant quality improvements (Kaynak 2003; Sadikoglu and Zehir 2010). The positive relationship between QMPs and product quality has been well established within the context of developed countries (Flynn, Schroeder, and Sakakibara 1995). In addition, researchers have shown that in the contexts of Turkey (Bayazit and Karpak 2007) and other emerging markets (Bonaglia, Goldstein, and Mathews 2007) QMPs lead to greater product quality.

QMPs apply a structured problem-solving model, such as the Plan-Do-Check-Act (PCDA) model of TQM, in combination with statistical and analytical tools to improve production processes and quality of the outputs. They apply the data-driven approach of scientific management to the goal of improving quality (Hackman and Wageman 1995). Although the extent and nature of QMPs can vary within and across emerging markets, it is reasonable to expect that EMFs focusing on developing their quality capabilities can reap the benefits of their effort via increased quality of their products. Thus, in line with the quality literature, we hypothesize:

H3: QMPs lead to greater product quality in EMFs.

QMP is a multi-dimensional construct that measures bundles of related routines and processes (Kaynak 2003). As a whole, these practices aim to improve the quality of the firm's outputs (products or services). Although there are slight differences in how a QMP are measured, the literature largely agrees on the following dimensions or components: product design for quality, top management support (including leadership, strategic planning and vision), supplier management for quality, training, and human resource management for quality (also called quality focused culture) (Nair 2006; Sila 2007). A large body of empirical evidence exists to support the positive effects of QMPs on operational and financial performance (El Shenawy, Baker, and Lemak 2007; Flynn, Schroeder, and Sakakibara 1995; Nair 2006; Phan, Abdallah, and Matsui 2011). The European Quality Award and Malcolm Baldrige Quality Award emphasize the role of top management commitment to the quality management efforts. With a clear vision and consistent leadership, a committed top management is a strong assurance for quality initiatives within organization and contributes to establish an organization-wide quality culture. QMPs improve processes, reduce rework and waste, reduce costs through fewer defects, and reduce variability in the production system. Customer focused design processes help an organization to understand the need of the customers and design the products accordingly so that they are going to be demanded in the market highly. QMPs involve working closely with suppliers for quality to ensure that inputs are defect free, and defects are not passed from one stage of the supply chain to the next. Penetrating quality culture to all organization through human resource practices and training, QMPs emphasize the employee involvement for quality at source. This leads to greater operational efficiency and effectiveness of the organization, which in turn translates to better financial performance (Flynn, Schroeder, and Sakakibara 1995; Sila 2007). QMPs ensure that quality is considered from the perspective of the customer, so all quality improvement initiatives make the products more desirable for the customer. This leads to greater appreciation of the firm's outputs by customers and often results in increased

revenue and market share (Flynn, Schroeder, and Sakakibara 1995; Kaynak 2003; Sadikoglu and Zehir 2010).

The benefits of QMPs are not just limited to increased product quality. QMP build capabilities in the firm that support continuous improvement. Such capabilities become important means of increasing firm performance (Teece 2014). Firms that implement QMPs tend to have a higher absorptive capacity as linkages between the various functions are built, and a culture of teamwork is established. Such firms can produce more superior products that offer superior value to customers (Molina-Castillo, Jimenez-Jimenez, and Munuera-Aleman et al. 2011) and outperform firms that lack such capabilities. Likewise, quality-related action programs help improve return-on-investment, return-on-asset, and market share performance (Curkovic, Vickery, and Dröge 2000).

In the context of emerging markets, past research has found that the performance of EMFs depends on their effective implementation of QMPs (Bonaglia, Goldstein, and Mathews 2007; Sadikoglu and Zehir 2010). Indeed, QMPs could be viewed as one of the possible means for EMFs to step up in the global competitiveness ladder, which has often seen as a hallmark of developed market firms (Hoskisson et al. 2013). Therefore, we posit that QMPs enhance the firm performance of EMFs.

H4: QMPs lead to greater firm performance in EMFs.

Product quality plays a crucial role in the value offering of manufacturing firms. This notion is also valid in emerging markets where market differentiation is typically based on upstream, operational capabilities focusing on quality more so than brand equity (Hoskisson et al. 2013; Sheth 2011). Various dimensions of product quality such as product durability, conformance to specifications, and design quality are argued to be positively associated with firm performance (Curkovic, Vickery, and Dröge 2000). Quality can be an important source of competitive advantage as it differentiates the product in a very observable way from competitors (Nair 2006; Molina-Azorín et al. 2009; Sadikoglu and Zehir 2010), especially in emerging markets where customers still face an abundance of products of lesser quality matched with higher affordability (Sheth 2011). Though product quality could be seen as a qualifier to be able to enter to market in developed markets, it can make a real competitive difference in emerging markets where the marginal value of quality is higher in the eyes of customers. Accordingly, we argue in this paper that product quality results in increased overall firm performance of EMFs.

H5: Product quality leads to greater firm performance in EMFs.

Mediation effects

In addition to the direct effects hypothesized above, we also expect two indirect (mediation) effects to be significant. First, in emerging markets, we expect an indirect effect of environmental practices on firm performance that is mediated by product quality. Because environmental practices are often atypical for conventional business paradigms, they may entail mediating mechanisms of more business-centered factors (López-Gamero, Molina-Azorín, and Claver-Cortés 2009; Ryoo and Koo 2013). This notion could be even more pronounced in emerging markets where firms are just recently introduced to the unchartered territory of environmental practices (Lourenço and Branco 2013) as explained by multiarmed bandit model (Hardwick and Stout 1991) and the exploitation-exploration interplay (Posen and Levinthal 2012). In such cases, the influence of environmental practices on performance can be channeled through what has already been known and focus by EMFs. In emerging markets, environmental practices and product quality can exhibit a symbiotic relationship where environmental practices underpin product quality and product quality translates environmental practices into increased performance.

Given the particular importance of quality in emerging markets along with relative obliviousness on environmental issues (Bayazit and Karpak 2007; Demirbag et al. 2006; Lourenço and Branco 2013), improved quality of products can legitimize environmental practices in the eyes of decision makers. Likewise, product quality can facilitate unlocking the hidden value of environmental practices for improving performance (Chen et al. 2014). Accordingly, we hypothesize that product quality could be one of the important means for channeling the potential positive influence of environmental practices on EMFs' performance.

H6a: Environmental practices indirectly affect firms' performance through product quality.

We also expect an indirect effect of QMPs on firm performance that is mediated by product quality. The effect of QMPs on product quality is well established in the literature (Bonaglia, Goldstein, and Mathews 2007; Flynn, Schroeder, and Sakakibara 1995) just as the positive effect of product quality on firm performance (Curkovic, Vickery, and Dröge 2000; Nair 2006) as it can be a source of differentiation from rivals in emerging markets. In addition, we argue that product quality can complement and foster the positive effect of QMPs on firm performance as a potential intermediary factor between QMPs and performance outcomes.

H6b: QMPs indirectly affect firm performance through product quality.

The hypothesized relationships are shown in Figure 1.

Methodology

Sample and data collection

The sampling frame for Turkish firms was drawn from the website of TOBB (The Union of Chambers of Commerce, Industry, Maritime Trade and Commodity Exchanges of Turkey; http://www.tobb.org.tr), which provides an Industrial Database that contains approximately 40,000 firms that are registered with it. The names and addresses of these companies are available through the website of TOBB. Through a random sampling selection procedure, a total of 2000 firms

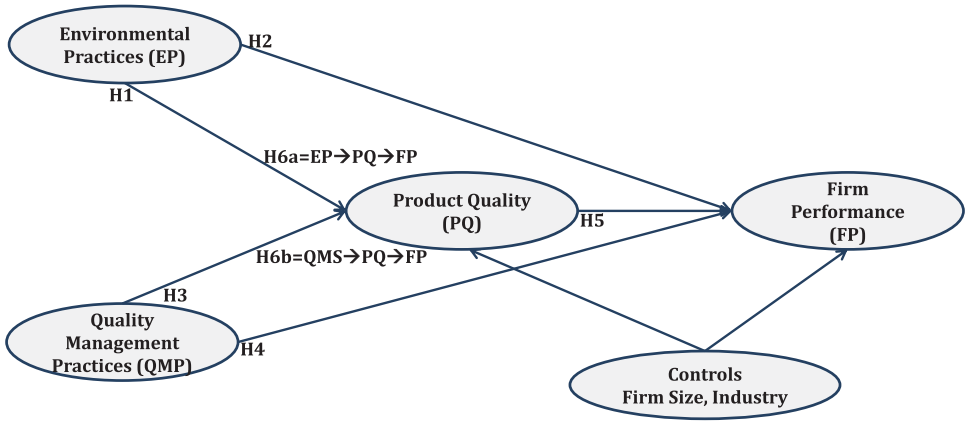

Figure 1. Summary of theoretical model.

from different sectors was generated and constituted the sampling frame for the study.

The questionnaire was mailed to the CEO of each company with a letter requesting that the CEO or his/her senior executive with knowledge of environmental issues affecting their firms should complete it. After one reminder, a total of 781 questionnaires were returned, of which 712 were complete and usable, representing an effective response rate of 35.6%, which was satisfactory. For the purposes of this study, only manufacturing firms were included in the analysis. Hence, the final sample consisted of 492 manufacturing firms.

A test for non-response bias for the postal survey was checked by using Armstrong and Overton's (1977) method of comparing the first wave of survey responses to the last wave of survey responses since late respondents to postal surveys tend to be more similar to non-respondents than early respondents are. Nearly, 50% of the surveys were randomly selected for each of the first and last waves of questionnaires received, and *t* tests were conducted on the scores across groups. The test results indicated no significant difference in the responses between early and late respondents ($p > .05$) for any of the variables used in this study. Chi-square and *t* tests were also used to compare the respondent firms with non-respondent firms across the main characteristics of the sample such as industry type, firm size, geographical location and firm age, and again showed no systematic differences ($p > .10$). Thus, no response bias was evident.

The sample of 492 firms has a mean number of employees of 552 with nearly 35.8% of the firms classified as large size (more than 250 employees). The average age of sample firms is 23.1 years. The distribution of the sample in terms of the sector of operation is as follows: industrial, automotive and electrical equipment, 19.1%; food, textile, and paper, 35.8%; metal, wood, leather and glass, 21.5%; chemical and pharmaceuticals, 11.6%; and other manufacturing, 12%.

Measurement of constructs

All constructs are measured using Likert-type scales and multiple survey items. Each question reflects the underlying latent construct, and a reflective latent factor measurement model is used for all constructs (MacKenzie, Podsakoff, and Podsakoff 2011). All measurement scales and items for the survey are extracted from an extensive review of existing literature in the area. QMPs are modeled as a second-order construct comprised of five underlying constructs adapted from earlier studies (Demirbag et al. 2006; Kaynak 2003; Sadikoglu and Zehir 2010). These constructs include product design for quality, top management support, human resource management for quality, supplier management for quality and training for quality. Process management capability of organizations and how customer focused they are for quality are intended to assess by the construct called as Product design for quality. Top management support involves leadership, strategic planning, and vision. Human resource management for quality is considered for employee involvement and for establishment of a quality focused culture. The measurement scales for environmental practices (EP) (Koh, Gunasekaran, and Tseng 2012; Seuring 2004), firm performance (FP) (Glaister et al. 2008; Kaynak 2003), and product quality (Li et al. 2006) are drawn from earlier studies as well. The survey items were examined for face validity and clarity by a panel of academics and practitioners who were closely familiar with quality management applications in academia and industry respectively. Finally, a pilot study based on a series of semi-structured interviews was conducted in two different manufacturing organizations located in Istanbul in order to give the final shape to the survey instrument. The survey items for these measurement scales along with CFA results are presented in Appendix.

Measurement model

We conducted confirmatory factor analysis (CFA) to ensure that the constructs demonstrated desirable properties of reliability and validity in our sample (Brown 2006). The results of the CFA analysis are shown in Appendix. The absolute and relative measures of fit indicated that model fit for the measurement model was adequate ($\chi^2/df = 2.0$, RMSEA = 0.046, SRMR = 0.055, CFI = 0.895, TLI = 0.89) as the fit measures were within the recommended ranges (Bollen 1989; Hu and Bentler 1999). The chi-square test for model fit was significant ($\chi^2 = 1190$, $df = 578$).

Table 2. Factor correlations.

Constructs	1	2	3	4
1. Firm performance (FP)	1.00			
2. Product quality (PQ)	0.55*	1.00		
3. Environmental practices (EP)	0.42*	0.63*	1.00	
4. Quality management practices (QMP)	0.61*	0.68*	0.72*	1.00

*$p < 0.05$.

The CFA results show acceptable levels of reliability and validity for our constructs. All of the factor loadings were significant at the 0.05 level, demonstrating the convergent validity of the survey items, i.e., that the survey items reflected their intended constructs (Anderson and Gerbing 1988). Composite reliability (CR) (Fornell and Larcker 1981), Cronbach's alpha and average variance extracted (AVE) values (Anderson and Gerbing 1988) were calculated to test for internal consistency and reliability. As shown in Appendix, all constructs have acceptable values of Cronbach's alpha, construct reliability and AVE with the exception of product design for quality (Hair et al. 2010). Product design for quality is a three item construct that has a reliability of 0.60 and AVE of 0.33. The three survey items used to measure this construct pass the face validity check and statistical validity and reliability are low due to the low number of items measuring this construct (Hair et al. 2010). We believe it is important to keep this construct for theoretical completeness of the second-order QMP construct and to align with past research.

We conducted a CFA-based comparison of two nested models to check whether the data supported the five constructs of QMPs to be reflective of a higher order construct or not (Brown 2006). The likelihood ratio test showed no decrease in the fit when a more parsimonious second-order construct model was used, supporting our conceptualization of the QMPs.

Discriminant validity was assessed via an analysis of all of the possible pairs of constructs in a series of two-factor CFA models (Bagozzi and Phillips 1982). In one model the two constructs were allowed to freely correlate, and in the second nested model, the correlation was fixed at one. The chi-square difference test was used to assess if the unconstrained model had a significantly better fit or not. Evidence of better fit in the unconstrained model shows that the two constructs are distinct and the correlation between them is less than one. For all pairs of constructs, the chi-square difference test was significant indicating the discriminant validity of the constructs. The inter-factor correlations, shown in Table 2, were in the acceptable range of 0.4 to 0.72 which shows further evidence of discriminant validity (Fornell and Larcker 1981).

Common method variance check

We took several steps to reduce common method variance (CMV) concerns. We assured respondents of confidentiality which increased their willingness to participate and give provide honest responses. The survey items were designed to not share common stems or phrases, and our independent and dependent constructs were not on the same page. Spatial separation of dependent and independent constructs and avoiding shared wording in survey items have been shown to reduce CMV concerns (Podsakoff et al. 2003). Furthermore, to test for CMV, we conducted the marker variable test to examine the value of the correlation between two theoretically unrelated variables a potential proxy for CMV (Lindell and Whitney 2001). Given that post-hoc identification of such a variable can "capitalize on chance," Lindell and Whitney (2001, p. 116) suggest using the second smallest correlation in the data set as a conservative estimate for CMV. For our survey items, the second smallest correlation was 0.000072 which is exceedingly small and shows that CMV is not a concern for our data. We also conducted Harmon's one-factor test for CMV as suggested by Podsakoff et al. (2003). The factor with the highest eigenvalue accounted for only 16% of the total variance. Principal component analysis revealed that eight eigenvalues were greater than one, which corresponds to our number of intended constructs. Thus, no single factor is salient in the data suggesting that CMV is not of great concern and is unlikely to confound the interpretations of results.

Controls

We controlled for firm size, which was measured as the log of the number of employees, and industry. As an additional check for industry effects ANOVA tests were used to see whether the two endogenous constructs, *product quality*, and *firm performance*, had different mean levels in various industries. ANOVA tests were not significant at $\alpha = 0.05$ level.

Empirical analysis and results

The path model illustrated in Figure 1 was tested using structural equation modeling (SEM) (Bollen 1989). The data showed slight levels of kurtosis violating strict multivariate normality. We used robust maximum likelihood estimation with the Satorra-Bentler correction to ensure that the p-values and fit statistics were adjusted to account for the non-normality of the data (Satorra and Bentler 2001). The results are illustrated in Table 3.

The SEM analysis showed an acceptable fit of the model to the data. Absolute fit indices ($\chi^2/df = 1.84$, RMSEA = 0.042 and SRMR = 0.056) are well below the recommended cut-off values (Hair et al. 2010; Hu and Bentler 1999). Relative fit indices also showed acceptable levels of fit (AGFI = 0.97, CFI = 0.90, TLI = 0.89) (Hair et al. 2010). We found a positive and significant effect of *environmental practices* on *product quality* supporting H1. We did not find a significant effect of *environmental practices* on *firm performance* for our emerging market context, failing to find a support for H2. However, there is a large positive and significant direct effect of *quality management practices* on *product quality* and *firm performance* supporting H3 and H4. Our results also show a positive and significant effect of *product quality* on *firm performance* supporting H5.

The mediation hypotheses were tested using bootstrapped standard errors. This is because the indirect effect

Table 3. Summary of hypotheses testing.

Hypothesis	Relationship	Path coefficient (standardized)	Level of support
H1	Environmental Practices → Product Quality	0.250**	Supported
H2	Environmental Practices → Firm Performance	0.004	Not supported
H3	QMP → Product Quality	0.513**	Supported
H4	QMP → Firm Performance	0.508**	Supported
H5	Product Quality → Firm Performance	0.224**	Supported
H6a	Environmental Practices → Product Quality → Firm Performance (Mediation test)	0.072*	Supported, full mediation
H6b	QMP → Product Quality → Firm Performance (Mediation test)	0.176**	Supported, partial mediation

*$p < 0.05$, **$p < 0.01$.

does not, in general, follow the normal distribution, and this necessitates using resampling methods like bootstrapping to generate unbiased standard errors or confidence intervals (MacKinnon, Lockwood, and Williams 2004). We used 1000 bootstrap samples to obtain p-values for H6a and H6b. The indirect effect of *environmental practices* on *firm performance* (H6a) was 0.072 with a bootstrapped p-value of 0.039, and the indirect effect of QMPs on *firm performance* was 0.176 with a bootstrapped p-value of 0.009. Thus, empirical testing supports both mediation hypotheses, with the indirect effects being significant at $\alpha = 0.05$ level.

Discussion and conclusions

Theoretical contributions

The dominant narrative on environmental practices relies on the stakeholder theory and on evidence from developed countries. This line of theorization posits that firms do not necessarily view environmental practices as financially viable (Achi 2004) but develop their environmental strategy as a response to pressure from various stakeholders including government, customers, non-profit organizations, and advocacy groups (Zhu, Sarkis, and Lai 2007). Nevertheless, this perspective has an important and often ignored boundary condition: it typically applies in contexts where stakeholder and regulatory pressures are salient. When we look outside developed markets however, we are left with challenges to explain the environmental practices by firms who face weaker stakeholder pressures. This paper fills this gap by testing a plausible alternative explanation of product quality as a linking pin between environmental practices and firm performance and thus justifying the adoption of environmental practices by EMFs.

Based on our findings from a large-scale survey from Turkey, results for hypotheses H2 and H6a offer alternative explanations to the dominant view of sustainability literature, as they show that environmental practices lead to improved product quality which in turn leads to improved firm performance. Product quality fully mediates the relationship between environmental practices and firm performance acting as a pivotal conduit between the two important concepts. This finding highlights the notion that exploration-driven environmental practices complement exploitation-driven QMPs in enabling product quality, which in turn channels the positive influence of environmental practices on firm performance in emerging markets.

The lack of support for the direct effect of environmental practices on performance (H2) appears to differ from the findings of some existing studies (Gopal and Thakkar 2016; Zhu and Sarkis 2004). However, our results are in fact complementary. Our model includes an indirect path between environmental practices and firm performance in emerging markets that shows that environmental practices impact performance through their effect on product quality. Thus, this new pathway explains that the effect of environmental practices on performance is mediated through product quality in emerging markets. Trying to improve the environmental performance of products and manufacturing processes increases the search space over which alternatives are considered. This leads to exploring technologies, materials and manufacturing processes that were not part of firms' original thinking. The improvement of product quality does matter in EMFs. In emerging markets where market sophistication lags behind that of developed markets, the differential effects of product quality on performance appear to be very pronounced. H6a shows that environmental practices do have a positive even if indirect effect on firm performance. Thus, product quality act as a critical conduit through which environmental practices benefit performance. These results provide an important rationale for EMFs to implement environmental practices, even though the direct effects of such practices on performance are not significant. They also show that EMFs have another intrinsic incentive to implement environmental practices due to their positive influence on quality.

Furthermore, this study makes new contributions to the existing literature on quality and environmental practices. Existing research has focused on the moderating role of operational practices like just-in-time (JIT), and lean on the environmental management and performance relationship (Wiengarten and Pagell 2012; Zhu and Sarkis 2004). In this paper, we show a completely different and complementary relationship between environmental practices and QMPs in driving product quality. Environmental practices have a direct and complementary effect on product quality in the presence of QMPs. To the best of our knowledge, the direct effect of environmental practices on product quality has not been explored before. This direct effect shows how learning for environmental performance leads to knowledge that can be used for multiple purposes including improving product quality. It also adds to the growing body of literature that explores potential synergy between quality and environmental practices (Molina-Azorín et al. 2009; Wiengarten et al. 2017; Wiengarten and Pagell 2012).

Implications for practice

What conveys the benefits of environmental practices in emerging markets when external drivers are not sufficient to make a case for their adoption? Our research speaks to managers who seek to develop an internally driven case for environmental practices and make a difference to both environmental sustainability and firm performance in emerging markets. International agreements like the Paris Climate accord and the Comprehensive Economic and Trade Agreement between Canada and the European Union (CETA) are placing greater emphasis on sustainability and environmental protection. It is likely lack of environmental practices could be a barrier in future for EMFs to expand into foreign markets, even if they face minimal pressure for developing environmental practices at home. Our research shows that environmental practices may accrue noteworthy benefits to product quality that are in addition to the quality improvements that come from QMP. This increase in quality allows firms to improve their competitive position. Thus, it is essential for management professionals in EMFs to build a case for the adoption of environmental practices. Evidence of immediate quality benefits can strengthen such a case and contribute to the long-term health of firms in emerging markets. EMFs managers can utilize environmental practices as an innovative leeway and auxiliary force to improve product quality further while simultaneously reducing their environmental footprint.

The product quality benefits of environmental practices accrue based on greater learning that happens. Accordingly, managers first should be cognizant of fostering integration and knowledge sharing within their organizations to realize the spillover benefits of environmental practices. They are advised to aim to improve the absorptive capacity of their firms to reap the greatest benefits possible. Environmental practices allow QMPs to go beyond their conventional boundaries and open up new ways of product and process design, unlocking further possibilities of improving product quality. Managers can, therefore, expect to find improvements in performance quality, the life-cycle value of products, and reduced environmental footprint of products making them have higher quality attributes and more appealing to quality and environmentally conscientious consumers. Thus, managers of EMFs, especially those involved in production, are advised to allow cross-functional teams greater leeway in examining all aspects of products and processes when implementing environmental practices. Managers should use cross-functional teams for quality and environmental issues in the firm, to ensure there is knowledge sharing between quality initiatives and environment focused activities.

In some emerging markets like Turkey, it is understandable that the direct link between environmental practices and firm performance is not highly pronounced and clear-cut. The results of this study show that environmental practices have an indirect positive influence, mediated through product quality, on firm performance in EMFs. Therefore, we advise those managers of EMFs not to discount environmental practices purely based on the lack of evidence of immediate and strong positive performance returns. Instead, we suggest that environmental practices deserve further exploration by production managers in EMFs, even if the external pressures are insignificant and short-term financial incentives are lacking.

Limitations and future research

This study focused on Turkey as an example of an emerging market country. The external validity of our findings should be tested in other emerging markets and potentially in developed countries. Hence, further research to test the core premises of this research across developed and emerging markets could reveal interesting insights.

The learning theory arguments that explain how environmental practices could improve product quality, also imply that this effect would be greater in dynamic business environments. Future research can study the moderating role of environmental dynamism on this relationship to see if the quality improving benefit of environmental practices is enhanced under certain conditions or not. Similarly, this effect may also depend on the position of the firm in the supply chain. For suppliers making standardized components that are used by downstream firms in their manufacturing, only conformance-based quality performance might be relevant. For such suppliers' environmental practices may not have a salient effect on increasing quality performance. However, for firms making complex products sold to end consumers a strong effect is expected. Additional studies are needed to test these moderating variables to identify the boundary conditions for the findings of this paper. An important organizational attribute that is essential for the learning-based spill-over effects of environmental practices is absorptive capacity. Future research should examine if absorptive capacity is a pre-requisite or moderator of the environmental practices to product quality relationship.

From a methodological angle, we used perceptual measures of firm performance in this research. Prior research has found that perceptual measures of firm performance are closely correlated with objective measures with high reliability (e.g., Fugate, Mentzer, and Stank 2010; Venkatraman and Ramanujam 1986). Still, future research may complement perceptual measures with that of objective ones.

Disclosure statement

No potential conflict of interest was reported by the authors.

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Appendix: Appendix survey items and CFA results

Construct	Std. loading	*t*-Value	R^2
Environmental practices (alpha = 0.77, CR = 0.78, AVE = 0.47)			
We request our suppliers to conform certain environmental regulations, e.g. ISO14001, WEEE, RoHS.	0.66	11.00	0.44
We place increasing emphasis on improving eco-efficiency in our production.	0.80	14.69	0.64
We reuse/recycle waste materials.	0.52	10.96	0.27
There is a culture for green/environmental operations.	0.74	12.61	0.54
Product quality (alpha = 0.89, CR = 0.89, AVE = 0.66)			
We are able to compete based on quality.	0.78	11.54	0.61
We offer products that are highly reliable.	0.85	13.37	0.72
We offer products that are very durable.	0.78	16.52	0.61
We offer high quality products to our customer.	0.85	14.72	0.71
Firm performance (alpha = 0.86, CR = 0.86, AVE = 0.50)			
Our market share has increased.	0.79	13.16	0.62
Our return on investment has increased.	0.72	14.75	0.51
Our sales have grown.	0.82	15.44	0.67
Profit margin on sales has increased.	0.53	13.65	0.28
Overall competitive position has improved.	0.65	13.85	0.42
QMP: Product design for quality (alpha = 0.60, CR = 0.6, AVE = 0.33)			
Degree to which quality is emphasized in design process vis-a-vis cost or schedule objectives.	0.60	14.62	0.36
Extent to which manufacturability is considered in the product design process.	0.62	14.62	0.38
Inclusion of customer attributes in product design through quality function deployment (QFD).	0.52	14.62	0.27
QMP: Top Management Support (alpha = 0.84, CR = 0.85, AVE = 0.48)			
Extent to which top management clearly communicates quality goals.	0.69	12.59	0.48
Extent to which top management emphasizes quality through a well-defined quality policy.	0.76	12.10	0.58
Extent to which top management focuses on customer quality requirements to establish strategy.	0.75	13.98	0.56
Extent to which top management provides resources to carry out quality improvement.	0.70	13.09	0.49
Management's efforts to recognize and reward quality improvements.	0.65	10.57	0.42
QMP: Human resource management for quality (alpha = 0.77, CR = 0.78, AVE = 0.42)			
Degree to which company environment is conducive to employee well-being and growth.	0.62	9.67	0.38
Degree to which divisional top management is evaluated based on quality performance.	0.62	18.26	0.39
Degree to which employees throughout organization are evaluated on quality results.	0.62	16.59	0.39
Extent to which human resources management is affected by quality plans.	0.68	10.88	0.46
Responsiveness of employees in making suggestions regarding quality improvement.	0.67	8.49	0.45
QMP: Supplier management for quality (alpha = 0.81, CR = 0.82, AVE = 0.43)			
We have helped our suppliers to improve their product quality.	0.61	11.73	0.37
We have continuous improvement programs that include our key suppliers.	0.67	14.56	0.45
We certify our suppliers for quality.	0.75	16.62	0.56
Our company has a quality-assurance program for our supplier's manufacturing process.	0.78	17.86	0.61
Our manufacturing personnel regularly visit our supplier's facility.	0.65	13.61	0.42
QMP: Training for quality (alpha = 0.83, CR = 0.82, AVE = 0.50)			
Amount of training in quality awareness provided to hourly employees.	0.71	15.08	0.50
Amount of training in quality awareness provided to managers and supervisors.	0.72	14.58	0.51
Amount of training in basic statistical techniques such as histograms and control charts.	0.81	23.43	0.66
Amount of training in advanced statistical techniques (design of experiments and regression).	0.73	19.34	0.53
Quality department plays an active role in providing specific training (e.g. statistical process control)	0.55	11.35	0.31