Environmental orientation and firm performance: The mediation mechanism of green innovation

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ARTICLE INFO

Article history:
Received 10 August 2020
Received in rev. form 28 August 2020
Accepted 05 Sept. 2020

Keywords:
Internal Environmental Orientation, External Environmental Orientation, Green Product Innovation, Green Process Innovation, Firm Performance

JEL Classification:
Q01, Q53, Q54, Q56

ABSTRACT

This study aims to investigate the mediation effect of green product and green process innovation by focusing on the role of internal and external environmental orientation over firm performance to expand researches on environmental orientation. With this aim, a conceptual model has been recommended by unifying institutional theory and natural resource-based view. Data collected from 315 firms who have ISO14001 Environmental Management Certificate and took part in Turkey’s first and second ISO 500 Industrial Enterprises list in 2018 have been tested by using SmartPLS 3 software as part of Structural Equation Modelling. Empirical proofs show that internal and external environmental orientation has a positive effect on both green product innovation and green process innovation. Additionally, it has been concluded that internal environmental orientation has a direct positive effect on firm performance, while external environmental orientation has an indirect effect, which is through green product and green process innovation. The reason could be rooted in the ecological responsibility feeling of internal environmental orientation. External environmental orientation, though, could be limited only with fulfilling legal requirements with legitimacy acquiring desire. Firms strategically directed to the green product and green process innovation by doing more than the laws require and taking the lead could increase their firm performance. These findings contribute to theory and practice, enriching our understanding of how two dimensions of environmental orientation affect firm performance.

Introduction

Recent issues like global warming, ozone layer spoil, air and water pollution, soil erosion and desertion which are price of industrial development for a time over a century stare us in the face as global environmental problems that require urgent solutions. As environmental degradation causes innumerable risks and difficulties for society and eco-systems, to protect natural environment has turned to be one of the mostly discussed topics these days (Kim et al., 2019). Earth Overshoot Day calculated every year by Global Footprint Network show the day anthropogenic pollution exceeds the carrying capacity that the earth provides for one year. This day is always reached before the year ends and exceedance increases (Posthuma et al., 2014). Carbon and greenhouse gas emissions are one of the main propulsive forces of this exceedance (Mancini et al., 2016; Haruna & Mahmood, 2018) and large companies have always been main emitters of greenhouse gases (CDP, 2013; Heede, 2014; Qian et al., 2018; Kaplan-Hallam & Bennett, 2018; Christine et al., 2019). Global energy consumption and about one third of CO2 emissions in the world arise from manufacturing industry (Tang, et al., 2018). These greenhouse gases cause global warming, acid rain, smoke, and health problems for human and other living beings in the world. Quantity and quality suffer on natural resources with environmental degradation has induced social anxiety increase and environmental control firming of regulators on commercial activities (Menon & Menon, 1997; Banerjee, Iyer & Kashyap, 2003; Chan, 2010). Fighting with environmental degradation is a prior condition required for human to maintain their existence.

As known, reasons of Covid-19 virus burst which has been firstly found in China and later spreaded all over the world, have been reported by Worldwide Fund for Nature (2020). In the report, over nature exploitation and wild animal trade have been highlighted
and ten critical steps to fight with epidemic diseases have been listed. These ten steps underline that business world should turn towards environmentally sustainable investments (energy efficiency and renewable resources etc.), shouldn’t support investments that harm nature (consumption, pollution), and should cooperate with local authorities, governments and individuals to prevent climate change and bio-diversity loss (Gurbuz, 2020). On the other hand, OECD estimates that global population would reach 9 billion 200 million with 2 billion 200 million new inhabitants till 2050. It could be said that billions of people would consume more natural resources upon their needs, and because of this, more habitat would be destroyed, and global climate change problems would increase (Ma et al., 2018). Governments, firms, and consumers should take responsibilities to fight the epidemic diseases and environmental degradation and should attempt to reach sustainable development.

A philosophy raised just at this point provides unique opportunities for governments, firms, society, and environment to minimize all negative environmental effects. This philosophy is green innovation philosophy and practice that is based on green technologies and designs. Green innovation refers to a signification improvement in products/services and related work processes to decrease consumption and emissions (Chen Lai, & Wen, 2006; Schiederig, Tietze, & Herstatt, 2012). Firms are required to head towards green innovation to overcome environmental degradation and correspondingly climate changes, bio-diversity loss, and epidemic diseases. At this juncture, it could be said that researches about the way the green innovation would be encouraged are needed (Li et al., 2017; Albort-Morant et al., 2018). Environmental orientation described as the level the firm managers approach the importance of environmental problems is important herein. It is included in firms’ mission declarations and consists of two dimensions as internal environmental orientation and external environmental orientation (Banerjee, 2002). As environmental orientation reflects style and internal environment of a firm giving response to environmental problems which different shareholders deal with, It could be suggested as an important premise of green product and green process innovation (Huang & Kung, 2010; Chen et al., 2015; Feng et al., 2018). Besides, though the researchers consider that environmental orientation level increase of a firm would enhance its strategic reactions for environmental problems and thus its performance (Lindell & Karagözoglu, 2001), this consideration has not been confirmed in literature yet. Except the limited researches that show positive effect of environmental orientation over performance through organizational strategies (Chan, 2010), former researchers focused more on correlation between environmental orientation and organizational performance. Some researchers have reached the conclusion in their studies that environmental orientation has positive effect on organizational performance (Menguc & Ozanne 2005; Frij-Andrés et al., 2009). Besides, Aboelmaged (2018) has found with his study that effect of environmental orientation on firm performance is indirect and eco innovation mediates this relationship. Both academic world and operators discuss whether the environmental orientation offers advantage in competition or not. But there is no consensus yet (Menguc and Ozanne, 2005; Chan et., 2012). As a result of these incomplete researches, it could be said that It is necessary to clarify exactly how both internal and external environmental orientation effect green product and green process innovation and firm performance. This study aims to enrich the present literature by investigating the mechanism underlying internal and external environmental orientation – firm performance relationship. With this aim, green product and green process innovation is being suggested as mediator for the effect of internal and external environmental orientation over firm performance. This study investigates two research questions by compounding institutionalization and natural resource-based theory and designs and analyses a research model for this. Research model designed has not been found in literature. First question: Does the internal and external environmental orientation effect green product and process innovation? Second: Does the green product and green process innovation mediate the relationship between internal and external environmental orientation and firm performance? Thus, with this research that investigates the effects of internal and external environmental orientation over both green product and green process innovation, and firm performance, contributions are provided for the literature. The next section presents conceptual background and hypothesis development, followed by the research methodology design. Subsequently, we report our empirical findings. Finally, we discuss theoretical contributions and provide implications that may be useful for both researchers and managers.

**Literature Review**

**Conceptual Background and hypothesis development**

**Environmental Orientation and Green Innovation**

Environmental orientation means a firm’s being aware of its negative effect on environment and its need to minimize this effect and expresses an organizational value like organizational social responsibility. It requires respecting, caring about the environment, and being liable to external shareholders besides being organizational citizens. It is divided into two dimensions as internal and external environmental orientation. Internal environmental orientation deals with firm’s internal values, ethical behaviour standards and its loyalty level to environment protection (Shrivastava, 1995; Zeffane et al., 1995) and It is reflected by the environmental mission statements in annual reports. External environmental orientation, though, reflects the external shareholder perception of managers and their need to respond to shareholder profits. The elements making external environmental orientation could be listed as sustainable development, protecting the environment for the future generations, responsibility towards society and the need for a positive firm image (Gladwin Kennelly, & Krause, 1995; Hart, 1995; Menon & Menon, 1997).

Shareholders expect firms to balance environmental effects of a product and/or service that could show up in life cycle and resource usage in a way that would harm the environment in a minimum level. Towards these expectations, firms are required to develop their
green innovation performances (Zhang et al., 2018). According to Chen, Lai & Wen (2006), green innovation is described as energy saving, pollution prevention, waste recycle, or hardware or software innovation related with green products and processes including innovations in technologies in green product designs or organizational environment managements, and It is studied separately as “green product innovation” and “green process innovation”. Green product innovation is related with innovation of products consisting of environmentally friendly materials, packages, product recovery, recycle and eco labelling (Chen, Lai & Wen, 2006; Chen, 2008). Green process innovation, though, refers to the capability of an organization to enhance present production process and develop new processes that create saving and prevent pollution (Chen, Lai & Wen, 2006; Cheng, Yang & Sheu, 2014).

Natural resources are very limited and to neglect the natural environment could take the organizations to competitive edge shortage (Hart 1995). In this regard, Hart (1995) has suggested “natural resource-based view” with aim to include environmental subjects to management theory. As known, traditional resource-based theory dwells on the fact that firms’ valuable, rare, costly to imitate and non-substitutable resources and capabilities would provide competitive edge (Rumelt, 1984; Barney, 1991). Hart (1995) has stated that limitations biophysical environment brings would provide new capabilities to the firms and acceptance, management and usage of these natural resource limitations would consequently lead to sustainable competitive edge, and he has taken this claim a step further. Therefore, to manage “core competencies” is an important task to get competitive edge (Prahalad and Hamel, 1990).

Organizational innovation theories show that internal factors of firms are necessary for green innovation. According to resource-based view, internal factors consist of strategy, structure, and core competencies (McLean, 2005). As a not concrete resource, it is related with internal climate that supports or blocks organizational culture, organizational creativity, and innovation (Claver et al., 1998; McLean, 2005; Steiber & Alänge, 2013). Many firm managers perceive the internal environmental orientation as a kind of environmental culture and climate (Banerjee, 2001; Chan, 2010; Gabler, Richey & Rapp, 2015). According to resource-based view, organizational culture and climate could be accepted as important resources of firms that help them to get advantage in competition (Aragón-Correa & Sharma, 2003; Lin, et al., 2014; Portillo-Tarragona, et al., 2018). To perceive the organizational culture and climate as resource, could shape strategical vision of the firms and could encourage the employees to emulate on environment that is possible to be effective in application of green innovation (Chan, 2010). In that case, according to natural resource-based view, an environmentalist organization culture could increase green innovation performance (Chen, Chang & Wu, 2012). On the other hand, a badly or wrongly matched culture could affect environment management and green innovation performance of a firm in a negative way.

External environmental orientation, on the other hand, reflects the managerial perception of the need to respond to stakeholders’ concern about the environmental issues (Banerjee, 2001). According to institutional theory, firms are able to deal with restrictions of various institutions that could increase their uniformity, legitimacy and surviving possibility (DiMaggio & Powell, 1983). The institutions in this area about environmental management are accepted as important external stakeholders of the firms, who apply a number of official and unofficial rule firms should follow for the environment (Banerjee, 2001). These institutional external shareholders put pressure on organizations to be liable to natural environment. A firm’s being able to fulfil its environmental sustainability promise and respond to institutional forces are linked to level of external environmental orientation in it (Gupta & Kumar, 2013). It is said that a firm with low external environmental orientation level would have a low possibility to proactively respond to external environmentalism (Bowen & Aragon-Correa, 2014). A firm inspired from a powerful external environmental orientation, on the other hand, is considered to be able to expand its capacity to trace dynamic evolution of institutional forces on environmentalism and internalize this information through coordination between functions (Dibrell, Craig & Hansen, 2011). Therefore, environmental orientation seems possible to effect green product and green process innovation to cope with shareholder’s concerns (Huang, Ding, & Kao, 2009; Huang & Kung, 2010). Similarly, in a research made with 253 firms in manufacturing sector in China, it has been proved with empirical study that internal and external environmental orientation have positive significant effect on green product and green process innovation (Feng et al., 2018). H1a, H1b, H2a and H2b hypothesis could be derived from the above discussion:

**H1a. Internal environmental orientation has a positive effect on green product innovation.**

**H1b. External environmental orientation has a positive effect on green product innovation.**

**H2a. Internal environmental orientation has a positive effect on green process innovation.**

**H2b. External environmental orientation has a positive effect on green process innovation.**

**Environmental Orientation and Firm Performance**

Supporters of natural resource-based view highlight that environmental capabilities of a firm would have a positive effect on economic performance (Hart, 1995; Hart & Dowell, 2011). Applying the proactive environmental practices based on well described environmental strategies could improve product and service quality, delivery, cost, and general competitiveness level (Yang et al., 2010; Lai & Wong, 2012). Therefore, the capability of environmental orientation could enable firms to get competitive edge (Clarkson et al., 2011). There are few studies in the literature that draw attention to the direct effect of environmental orientation on firm performance. The literature has reported basically on relationships between market orientation, quality orientation, strategic orientation, and financial performance (Yu & Huo, 2019). Yu & Huo (2019) have stated that environmental orientation has direct positive effect on financial performance and this situation reinforces the need to form environment-oriented culture within a firm.
Environmental orientation as a work philosophy or institutional culture could lead to improvement in financial performance for a firm by helping it form an environmentally friendly image and get directed to environmental protection. In a firm with a culture liable to environment, environmental protection is included in daily routines of all. Every employee actively takes responsibility in an environment that encourages environmental protection and creates an atmosphere with full participation for environmental protection. This kind of environmental protection behaviour would help an institution to form its eco-friendly image, increase its sales and market share and eventually to earn better profits (Chan et al., 2012).

While internal environmental orientation is rooted in ecological responsibility motivation, outer environmental orientation arises from legitimacy gaining desire. Besides, inner environmental orientation is a unique resource as an environmentalist organizational culture that provides competitive edge according to natural resource-based view. On the other hand, outer environmental orientation focuses on that firms should earn their legitimacy by dealing with restrictions of various institutions to maintain their institutional existence according to institutionalisation theory. As seen, internal and external environmental orientation are fed by different motivations (Chan, 2010). Therefore, it is necessary to further investigate the related logic behind the effect of internal and external environmental orientation over firm performance. Chan et al. (2012), have found in one of their researches that internal and external environmental orientations have different effects over institutional performance. H3a and H3b hypothesis could be derived from above discussion:

H3a. Internal environmental orientation has a positive effect on firm performance.

H3b. External environmental orientation has a positive effect on firm performance.

Green Innovation and Firm Performance

One part of the literature has reported that there is a positive relationship between green innovation and firm performance (Li, 2014; Przychodzen & Przychodzen, 2014; Doran & Ryan, 2012; Kam-Sing Wong, 2012). Other part has found a negative and meaningless relationship (Trumpp & Guenther, 2015; Testa & D’Amato, 2017). Tariq, Badir and Chonglerthham (2019) tried to explain the inconsistency on former researches about green innovation and firm performance relationship. Firstly, former researches mostly did not differentiate between different innovation types (Tariq et al., 2017). Related literature shows that there are different innovation types (product, service, process, management, and business model innovation). It is probable that each innovation type has naturally different performance results (Damanpour, Walker & Avellaneda, 2009). Therefore, studies on green innovation could not create compatible findings. In order to deepen the information and get detailed results, it is an important requirement to reflect certain green innovation types (Amores-Salvadó, Martín-deCastro & Navas-López, 2014). Most of the present researches have either studied green product innovation or green process innovation or have largely evaluated green innovation without describing product and process innovation.

Findings about green product and green process innovation are not still certain (Tang et al., 2018) and are sensitive to sample selection, analysis method and empirical design (Zhang, Rong & Ji, 2019). Due to these complicated findings, relationship of green innovation and firm performance continues to be a moot point and therefore researchers call for further investigation requirement (Dangelico, 2015; Tariq et al., 2017; Tang et al., 2018). The research question of this study that is aware of the gap in present researches is how the firm performance would be created with green product innovation and green process innovation.

Despite of these complicated findings, green product innovation is accepted as one of the key factors in providing growth and environmental sustainability (Dangelico & Pujari, 2010). To invest in green product innovation could provide opportunities of developing new market opportunities and getting new green product achievement (Chiou et al., 2011; Bigliardi, Bertolini & Kam-Sing Wong, 2012). Besides, green product innovation has critical importance for developing green competence, strengthening green image and improving firm performance (Ar, 2012; Chen, Lai & Wen, 2006; Cheng Yang & Sheu, 2014; Huang & Jim Wu, 2010; Lin, Tan & Geng, 2013).

On the other hand, firms could decrease their costs with green process innovation (Ambec & Lanoie, 2008). Generally, pollution is caused by resource waste, incomplete usage of materials or energy loss (Darnall, 2009). As Porter and Van der Linde (1995) argued, pollution is an economical waste, because it is a sign that the resources in manufacturing process are used incompletely, unproductively or inefficiently. In a firm with poor process controls, there are resource inadequacies, unnecessary wastes, faulty and stocked materials. “Porter Hypothesis” argues that cost saving could easily be obtained with several prevention precautions. Researches have shown that green process innovation has positive effect over firms’ competitive advantage and sustainability (Chen, Lai & Wen, 2006; Cheng, Yang & Sheu, 2014). Consequently, with green process innovation, firms get a farther competitive advantage and a stronger green process innovation increases firm performance (Chen, Lai & Wen, 2006; Adams et al., 2016). H4a and H4b hypothesis could be derived from above discussion:

H4a. Green product innovation has a positive effect on firm performance.

H4b. Green process innovation has a positive effect on firm performance.
Mediating Role of Green Innovation in the Relationship between Environmental Orientation and Firm Performance

Delmas Hoffman and Kuss (2011) have claimed that researching the relationship between proactive environmental strategies and competitive performance independently without considering mediating effect of the other capabilities seems to investigate other edge of iceberg and to neglect the most important component in realizing the active role of environmental strategies. Environmental orientation could positively effect cost and productivity during firm’s whole value chain by fulfilling the innovations which aim to clear polluters and wastes away (Menguc and Ozanne, 2005). Firms applying the environmental strategy with aim to prevent wastes redesign the present manufacturing processes and adopt the technologies reducing new pollution. Firms could get an important cost advantages from superior waste management, usage of cheaper recycled raw material and environmental improvements like pollution prevention (Smith, 1991; Roome, 1992; Taylor & Wellford, 1993). Moreover, firms which are successful in green product development and green process improvement could also serve to niche markets of environmentally responsible customers. Additionally, as the waste prevention requires the firm members to get involved in both operational and conceptual learning, It would encourage firms’ process innovation and give way to long-term profit potential (Bansal & Roth, 2000; Porter & van der Linde, 1995). Thus, firms with environmental orientation could increase their firm performances by improving their green product and green process innovation capabilities. H5a, H5b, H6a and H6b could be derived from above discussion:

H5a. Internal environmental orientation has a positive indirect effect on firm performance through green product innovation.

H5b. Internal environmental orientation has a positive indirect effect on firm performance through green process innovation.

H6a. External environmental orientation has a positive indirect effect on firm performance through green product innovation.

H6b. External environmental orientation has a positive indirect effect on firm performance through green process innovation.

The proposed conceptual model has been shown in Figure 1.

![Figure 1: Proposed conceptual model.](image)

Research and Methodology

Participants of this research are senior managers like general manager, production manager, marketing manager, human resources manager, financial manager and environmental manager working in firms who take place on Turkey’s first and second ISO 500 Industrial Enterprises list in 2018 and who have ISO 14001 certificate. Firms with ISO 14001 certificate have been preferred for the fact that they are more worried about environmental issues and show a strong commitment to environmental responsibility. In order realize the data collection process, Istanbul Chamber of Industry was approached to receive contact details of organizations which are on first and second ISO 500 list of 2018, and these organizations were contacted. They were provided with related necessary information about the aim of the research and invited to join to research. E-mail addresses were received from the organizations who want to join to the survey and survey forms were sent. Data collection process was done between 1st of July and 31st of October 2019. Totally 381 firms provided responses. However, it has been determined that there are 315 firms with ISO 14001 certificate, therefore only 315 survey has been included in the analysis.

When the size of participating firms is considered, it is seen that % 43.8 of them is large (251-2000), % 34.7 of them is medium (1-250) and %21.6 is very large (2000 and over). When they are evaluated according to their sectors, It is observed that %41.3 is in other, %12.7 is in automotive, %11.7 in energy, %9.2 in food, %7.6 in chemistry, % 7 in textile, %3.8 household appliances, %3.5 in packaging and %3.2 in construction.

Measures and Scales

Survey form prepared for this research consists of two parts and 19 questions. In first part, questions about the department participants work in, size of firms and sector were given a place. First 8 questions in second part belong to environmental orientation variable.
By using scale clauses developed by Banerjee (2002), first four questions measured firm’s internal environmental orientation level and the other four questions measured their external environmental orientation level. Questions between 9 and 16 in survey form belong to green innovation scale and by using four-point scale developed by Chen, Lai and Wen (2006), green product innovation and green process innovation were measured. Questions between 17 and 19 belong to firm performance, with three-point scale by Seggie, Kim and Cavusgil (2006), firm performance was measured. All the indicators/items were measured through a seven-point Likert type scale (1= strongly disagree to 7= strongly agree). Every construct in this research was measured by using reflective indicators.

Data Analysis and Interpretation

In this research, in order to analyse the research model proposed basing on institutionalisation theory and natural resource-based view, SmartPLS 3 software from Partial Least Square/PLS-SEM has been preferred. Main reason to prefer SmartPLS 3 software is that all variables could be tested at once and It is a program that does not require to question whether the data scatters normally or not. In SmartPLS 3 program, statistical analysis is performed in two steps. In first step, outer/measurement model is confirmed and in second step inner/structural model relationships are calculated. Initially, for outer/measurement model confirmation, it is required to make confirmatory factor analysis. Afterwards, reliability, convergent validity and discriminant validity should be determined (Wetzels, Odekerken-Schröder & Van Oppen, 2009). After the model is confirmed, whether the relationships are statistically significant or not should be determined by calculating inner/structural model relationship factors. As all variables are reflective in this research model, analysis have been performed by “consistent PLS Algorithm/PLSc” step.

Following Table 1 shows indicators and measurement model for latent variables. Lower limit for the value of loading factors in SmartPLS has been determined as 0.70. 0.70 indicator belonging to outer environmental orientation latent variable has been taken out of analysis as It did not meet 0.70 criteria. In analysis methods based on PLS-SEM, Cronbach’s alpha, composite reliability, and rho_A values should be higher than 0.70 (Henseler, Hubona & Ray, 2017; Latan & Ghozali, 2015). It is seen that all scales meet stated statistical analysis criteria (>0,70) When the stated average variance extracted (AVE) is higher than 0.50, convergent validity is ensured. It could also be said that all scales provide the convergent validity (see Table 1).

Table 1: Measurement model results

<table>
<thead>
<tr>
<th>Indicators/Items</th>
<th>Code</th>
<th>Factor Loadings</th>
<th>Cronbach’s Alpha</th>
<th>rho_A</th>
<th>Composite Reliability</th>
<th>AVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal Environmental</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Orientation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IEO1</td>
<td>IEO2</td>
<td>0,713</td>
<td>0,843</td>
<td>0,856</td>
<td>0,895</td>
<td>0,682</td>
</tr>
<tr>
<td>IEO3</td>
<td>IEO4</td>
<td>0,847</td>
<td>0,864</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>External Environmental</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Orientation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EEO1</td>
<td>EEO2</td>
<td>0,819</td>
<td>0,707</td>
<td>0,717</td>
<td>0,836</td>
<td>0,630</td>
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<tr>
<td>EEO3</td>
<td>EEO4</td>
<td>0,742</td>
<td>0,818</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Green Product Innovation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GPT1</td>
<td>GPT2</td>
<td>0,831</td>
<td>0,901</td>
<td>0,902</td>
<td>0,931</td>
<td>0,772</td>
</tr>
<tr>
<td>GPT3</td>
<td>GPT4</td>
<td>0,893</td>
<td>0,897</td>
<td></td>
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<tr>
<td>Green Process Innovation</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GPI1</td>
<td>GPI2</td>
<td>0,823</td>
<td>0,839</td>
<td>0,840</td>
<td>0,892</td>
<td>0,675</td>
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<tr>
<td>GPI3</td>
<td>GPI4</td>
<td>0,842</td>
<td>0,813</td>
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<tr>
<td>GPI4</td>
<td></td>
<td>0,807</td>
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<td></td>
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<tr>
<td>Firm Performance</td>
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<td></td>
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<td></td>
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<tr>
<td>FP1</td>
<td>FP2</td>
<td>0,901</td>
<td>0,845</td>
<td>0,847</td>
<td>0,906</td>
<td>0,763</td>
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<tr>
<td>FP3</td>
<td></td>
<td>0,857</td>
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<td></td>
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<tr>
<td></td>
<td></td>
<td>0,863</td>
<td></td>
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</tbody>
</table>

Eventually, discriminant validity should be tested. It could be studied in three different methods. Using Fornell-Lacker criterion, heterotrait-monotrait ratio (HTMT) and cross loadings criterion, discriminant validity for all latent variables have been tested. According to first method proposed by Fornell and Larcker (1981), AVE square root of each latent variable should be greater than correlation of the latent variable with other latent variables. According to results seen on Table 2, bold and italic values are square root of AVE, and have higher value than correlation factors on horizontal and vertical columns. In this context, in this research, Fornell-Lacker criterion has been ensured. Secondly, discriminant validity has been tested by using HTMT and the results on Table 2 show that HTMT value is less than 0.90, namely meets the proposed basic rule (Henseler, Ringle & Sarstedt, 2015).
Table 2: Correlations and discriminant validity results. (n=315)

<table>
<thead>
<tr>
<th>Construct</th>
<th>Mean</th>
<th>S.D.</th>
<th>EEO</th>
<th>IEO</th>
<th>GPT</th>
<th>GPI</th>
<th>FP</th>
</tr>
</thead>
<tbody>
<tr>
<td>EEO</td>
<td>5.701</td>
<td>0.743</td>
<td>0.794</td>
<td>0.472</td>
<td>0.800</td>
<td>0.513</td>
<td>0.441</td>
</tr>
<tr>
<td>IEO</td>
<td>6.463</td>
<td>0.502</td>
<td>0.358**</td>
<td>0.826</td>
<td>0.505</td>
<td>0.776</td>
<td>0.746</td>
</tr>
<tr>
<td>GPT</td>
<td>5.965</td>
<td>0.708</td>
<td>0.643***</td>
<td>0.440**</td>
<td>0.879</td>
<td>0.517</td>
<td>0.507</td>
</tr>
<tr>
<td>GPI</td>
<td>6.138</td>
<td>0.531</td>
<td>0.393**</td>
<td>0.450**</td>
<td>0.821</td>
<td>0.701</td>
<td></td>
</tr>
<tr>
<td>FP</td>
<td>5.828</td>
<td>0.701</td>
<td>0.332**</td>
<td>0.441**</td>
<td>0.591**</td>
<td>0.574</td>
<td></td>
</tr>
</tbody>
</table>

Note: **Correlation is significant at the 0.01 level (2-tailed); Diagonal and italicized elements are the square roots of the AVE (average variance extracted). Below the diagonal elements are the correlations between the construct values. Above the diagonal elements are the HTMT values.

Finally, cross loadings criterion has been evaluated. According to it, cross loadings values on latent variable all indicators of latent variable are related with should be higher than other latent variables (Hair Jr. et al., 2016).

Table 3: Results of loadings and cross loadings

<table>
<thead>
<tr>
<th>Variable</th>
<th>IEO</th>
<th>EEO</th>
<th>GPT</th>
<th>GPI</th>
<th>FP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal Environmental Orientation</td>
<td>0.713</td>
<td>0.185</td>
<td>0.276</td>
<td>0.458</td>
<td>0.423</td>
</tr>
<tr>
<td></td>
<td>0.847</td>
<td>0.302</td>
<td>0.330</td>
<td>0.549</td>
<td>0.548</td>
</tr>
<tr>
<td></td>
<td>0.864</td>
<td>0.354</td>
<td>0.409</td>
<td>0.553</td>
<td>0.562</td>
</tr>
<tr>
<td></td>
<td>0.869</td>
<td>0.360</td>
<td>0.436</td>
<td>0.594</td>
<td>0.548</td>
</tr>
<tr>
<td>External Environmental Orientation</td>
<td>0.233</td>
<td>0.819</td>
<td>0.566</td>
<td>0.302</td>
<td>0.197</td>
</tr>
<tr>
<td></td>
<td>0.311</td>
<td>0.742</td>
<td>0.419</td>
<td>0.280</td>
<td>0.276</td>
</tr>
<tr>
<td></td>
<td>0.340</td>
<td>0.818</td>
<td>0.538</td>
<td>0.365</td>
<td>0.339</td>
</tr>
<tr>
<td>Green Product Innovation</td>
<td>0.395</td>
<td>0.510</td>
<td>0.831</td>
<td>0.417</td>
<td>0.439</td>
</tr>
<tr>
<td></td>
<td>0.409</td>
<td>0.548</td>
<td>0.893</td>
<td>0.406</td>
<td>0.370</td>
</tr>
<tr>
<td></td>
<td>0.599</td>
<td>0.606</td>
<td>0.893</td>
<td>0.407</td>
<td>0.408</td>
</tr>
<tr>
<td></td>
<td>0.359</td>
<td>0.597</td>
<td>0.897</td>
<td>0.351</td>
<td>0.337</td>
</tr>
<tr>
<td>Green Process Innovation</td>
<td>0.593</td>
<td>0.304</td>
<td>0.335</td>
<td>0.823</td>
<td>0.467</td>
</tr>
<tr>
<td></td>
<td>0.535</td>
<td>0.317</td>
<td>0.388</td>
<td>0.842</td>
<td>0.475</td>
</tr>
<tr>
<td></td>
<td>0.500</td>
<td>0.287</td>
<td>0.361</td>
<td>0.813</td>
<td>0.465</td>
</tr>
<tr>
<td></td>
<td>0.523</td>
<td>0.401</td>
<td>0.393</td>
<td>0.807</td>
<td>0.533</td>
</tr>
<tr>
<td>Firm Performance</td>
<td>0.609</td>
<td>0.308</td>
<td>0.394</td>
<td>0.517</td>
<td>0.901</td>
</tr>
<tr>
<td></td>
<td>0.548</td>
<td>0.307</td>
<td>0.403</td>
<td>0.511</td>
<td>0.857</td>
</tr>
<tr>
<td></td>
<td>0.500</td>
<td>0.282</td>
<td>0.362</td>
<td>0.524</td>
<td>0.863</td>
</tr>
</tbody>
</table>

Consequently, whether the value of loadings factor of indicators is significant or not should be tested. In order to test the significance of the relationship between latent variable and its indicators, t test is used. For this, bootstrapping analysis is performed. In bootstrapping analysis, as the latent variables in research model are reflective, analysis is performed by using Consistent PLS Bootstrapping step and by increasing subsamples number to 5000 (Hair et al., 2014; Henseler, Hubona & Ray, 2016). 0.01 level of significance of t test results obtained is 2.33 for two-tailed test. As seen on Figure 2, relationships of all indicators with their related latent variables are statistically significant. In outer/measurement model analysis, as all indicators of all latent variables meet reliability and validity criterion (see Figure 2 below), structural path analysis could be performed.

Figure 2: Evaluation of the measurement model.
In this second step, initially, collinearity of structural model should be tested. To assess collinearity, Variance Inflation Factor (VIF) value is used. To avoid collinearity problems, VIF values should be equal to 3 or less than this (Hair et al., 2019). As seen on Table 4, all VIF values are less than 3 threshold value. Therefore, it could be said that there is no collinearity problem between the variables. Afterwards, R2 value, which shows what percentage of the endogenous variable is explained by the exogenous variables, should be examined. R2 value above 0.20 could be accepted as high on some disciplines, but values between 0.25 and 0.50 are accepted as good (Latan et al., 2018). In Table 4 it can be seen that the green product innovation, green process innovation and firm performance can be explained by the exogenous variables with the value of adjusted R2 respectively by 0.461, 0.455 and 0.466.

Effect size (f2) value is small when it has 0.02, medium when it is 0.15 and large when it is 0.35 (Cohen, 1988). But, according to Sarstedt, Ringle and Hair (2017) even when f2 value is lower than 0.02, an effect could be talked about. f2 value of each exogenous variable in model changes between 0.023 and 0.550 which is included in small and large category. Q2 predictive relevance value calculated for endogenous variables is expected to be higher than 0 (Hair et al., 2019). The calculated Q2 values are seen to be within requested acceptance limits.

It is seen on Table 4 that the value of goodness of fit created with Standardized Root Mean Square (SRMR) is equal to 0.063 < 0.080 and Normative Fit Index (NFI) 0.827> 0.80, and this means that the research model fits the empirical data.

As the variables on research model are reflective, path analysis has been performed using Consistent PLS Bootstrapping method and increasing subsamples number to 5000. According to path analysis results (see table 4), internal environmental orientation has a significant positive effect on green product innovation (IEO→GPT β; 0.239, t; 4.943, p; 0.000) and in this context, H1a hypothesis has been supported. Again, green process innovation has been found to have a significant positive effect on firm performance (GPT→FP β; 0.153, t; 2.703, p; 0.007), with t are significant, a full mediation is the point in question (Cheung & Lau, 2008; Hair et al., 2016). With this, H2b hypothesis has been supported.

Similarly, it has been found that external environmental orientation has a significant positive effect on both green product innovation (EEO→GPT β; 0.556, t; 12.395, p; 0.000) and green process innovation (EEO→GPI β; 0.182, t; 4.577, p; 0.000), according to these findings, H1b and H2b hypothesis have been supported.

It is also seen that internal environmental orientation has a significant positive effect on firm performance (IEO → FP β; 0.394, t; 6.607, p; 0.000). According to this result, H3a hypothesis has been supported. When the effect of external environmental orientation on firm performance is examined, it is seen that this effect (EEO→ FP β; -0.010, t; 0.162, p; 0.871) is not significant. According to this result, H3b hypothesis has been rejected.

It has been found that green product innovation has a significant positive effect on firm performance (GPT → FP β; 0.153, t; 2.703, p; 0.007), with these finding, H4a hypothesis has been supported. Again, green process innovation has been found to have a significant positive effect on firm performance (GPI → FP β; 0.268, t; 4.374, p; 0.000) and thus H4b hypothesis has been supported.

Table 4: Hypothesis Testing on Direct Effect

<table>
<thead>
<tr>
<th>Structural path</th>
<th>Coef (β)</th>
<th>S.D.</th>
<th>T-Values</th>
<th>P-Values</th>
<th>Adj. R²</th>
<th>f²</th>
<th>Q²</th>
<th>VIF</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEO→GPT</td>
<td>0.239</td>
<td>0.048</td>
<td>4.943</td>
<td>0.000**</td>
<td>0.461</td>
<td>0.092</td>
<td>0.355</td>
<td>1.160</td>
<td>H1a Supported</td>
</tr>
<tr>
<td>EEO→GPT</td>
<td>0.556</td>
<td>0.045</td>
<td>12.395</td>
<td>0.000**</td>
<td>0.497</td>
<td></td>
<td></td>
<td>1.160</td>
<td>H1b Supported</td>
</tr>
<tr>
<td>IEO→GPI</td>
<td>0.588</td>
<td>0.048</td>
<td>12.357</td>
<td>0.000**</td>
<td>0.455</td>
<td>0.550</td>
<td>0.304</td>
<td>1.160</td>
<td>H2a Supported</td>
</tr>
<tr>
<td>EEO→GPI</td>
<td>0.182</td>
<td>0.040</td>
<td>4.577</td>
<td>0.000**</td>
<td>0.053</td>
<td></td>
<td></td>
<td>1.160</td>
<td>H2b Supported</td>
</tr>
<tr>
<td>IEO → FP</td>
<td>0.394</td>
<td>0.060</td>
<td>6.607</td>
<td>0.000**</td>
<td>0.158</td>
<td></td>
<td></td>
<td>1.847</td>
<td>H3a Supported</td>
</tr>
<tr>
<td>EEO → FP</td>
<td>-0.010</td>
<td>0.059</td>
<td>0.162</td>
<td>0.871</td>
<td>0.000</td>
<td></td>
<td></td>
<td>1.758</td>
<td>H3b Supported</td>
</tr>
<tr>
<td>GPT → FP</td>
<td>0.153</td>
<td>0.057</td>
<td>2.703</td>
<td>0.007**</td>
<td>0.023</td>
<td></td>
<td>0.355</td>
<td>1.899</td>
<td>H4a Not Supported</td>
</tr>
<tr>
<td>GPI → FP</td>
<td>0.268</td>
<td>0.061</td>
<td>4.374</td>
<td>0.000**</td>
<td>0.073</td>
<td></td>
<td></td>
<td>1.879</td>
<td>H4b Supported</td>
</tr>
</tbody>
</table>

SRMR: 0.063; NFI: 0.827

In this research, PLS-SEM, mediator analysis procedure on structural models, proposed by Zhao, Lynch and Chen (2010) has been used in order to test mediating effects. According to this approach, while mediating relationship on PLS-SEM structural models are researched, indirect effects are initially evaluated (Step 1) and then to determine the effect of mediating, significance of direct effects is checked (Step 2) Bootstrapping routines should be applied to test significance of direct effect (Nitzl, Roldan & Cepeda-Carrion, 2016). In case that the direct effect is not significant, but the indirect effect is significant, a full mediation is the point in question (Cheung & Lau, 2008; Hair et al., 2016). With the condition that both the direct and indirect effect are significant, a partial mediation is in question. Findings obtained as a result of analysis performed with this approach are presented on Table 5.

According to Path analysis results (see Table 5), it has been found that internal environmental orientation has indirect effect on firm performance (IEO→GPT→FP β; 0.037, t; 2.361, p; 0.018; IEO→GPI→FP β; 0.158, t; 4.100, p; 0.000). Internal environmental orientation has a significant positive effect on direct firm performance (IEO→FP β; 0.394, t; 6.607, p; 0.000). According to these
results, H5a and H5b hypothesis have been supported and both green product innovation and green process innovation are complementary partial mediation.

Similarly, It has been observed that external environmental orientation has an indirect effect on firm performance (EEO → GPT → FP β; 0.085, t; 2.576, p; 0.010; EEO → GPI → FP β; 0.049, t; 3.281, p; 0.018). It is seen that the effect of external environmental orientation on firm performance is not significant (EEO → FP β; -0.010, t; 0.162, p; 0.871). According to these results, H6a and H6b hypothesis have been supported, and both green product innovation and green process innovation is full mediation.

<table>
<thead>
<tr>
<th>Structural path</th>
<th>Coef (β)</th>
<th>S.D.</th>
<th>T-Values</th>
<th>P-Values</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEO → GPI → FP</td>
<td>0.037</td>
<td>0.015</td>
<td>2.361</td>
<td>0.018*</td>
<td>H5a Supported</td>
</tr>
<tr>
<td>IEO → FP</td>
<td>0.394</td>
<td>0.060</td>
<td>6.607</td>
<td>0.000**</td>
<td>Complementary</td>
</tr>
<tr>
<td>IEO → GPI → FP</td>
<td>0.158</td>
<td>0.038</td>
<td>4.100</td>
<td>0.000**</td>
<td>Partial</td>
</tr>
<tr>
<td>EEO → GPT → FP</td>
<td>0.085</td>
<td>0.033</td>
<td>2.576</td>
<td>0.010*</td>
<td>H6a Supported</td>
</tr>
<tr>
<td>EEO → GPI → FP</td>
<td>-0.010</td>
<td>0.059</td>
<td>0.162</td>
<td>0.871</td>
<td>Full Mediation</td>
</tr>
<tr>
<td>EEO → GPI → FP</td>
<td>0.049</td>
<td>0.015</td>
<td>3.281</td>
<td>0.018*</td>
<td>H6b Supported</td>
</tr>
</tbody>
</table>

**Table 5: Hypothesis Testing on Mediation**

**Implications and Conclusions**

This research makes contributions to theory and literature in different ways. First of all It contributes new views by using institutionalisation theory and natural resource based view, studying effects of internal and external environmental orientation each on firm performance, investigating mediating effect of green product and green process innovation, enriching environmental orientation and green innovation literature. Secondly, results of former researches about effect of green innovation on firm performance show inconsistency. Some of them found a positive relationship between green innovation and firm performance (Li, 2014; Przychodzen & Przychodzen, 2014; Duran & Ryan, 2012; Kam-Sing Wong, 2012). Some others observed a negative and insignificant relationship (Trumpp & Guenther, 2015; Testa & D’Amato, 2017). Reason of this is that former literature either studied green product innovation and green process innovation or It largely evaluated green innovation without describing green product and green process innovation. Therefore, studies on green innovation could not create coherent findings. This research makes contributions to discussions in green innovation literature by investigating the effect of both green product and green process innovation separately on firm performance.

Findings of the research show that internal and external environmental orientation have a significant positive effect on green product and green process innovation. Results of the study by Feng et al. (2018) support the result of this research. In a study made by Chan (2010), it has been concluded that internal and external environmental orientation have a significant positive effect on environmental corporate strategy. As addition to this, it has been found that only outer environmental orientation has a significant positive effect on environmental marketing strategy. Chan et al. (2012) have concluded in their researches that both internal and external environmental orientation have a significant positive effect on green product and customer cooperation appliance, in spite of this, only internal environmental orientation has a positive significant effect on investment recovery.

In a finding obtained as result of the research, It has been found that green product and green process innovation have a positive significant effect on firm performance and these results show conformity with present literature (Chen, Lai and Wen, 2006; Adams et al., 2016). As stated by Cheng, Yang and Sheu (2014), green process innovation could increase firm performance by using refined and advanced green technology and reducing a firm’s costs, unproductivity, and negative effects of pollution. To invest in green product innovation could enable developing new market opportunities and succeed in new green product (Chiou et al., 2011; Bigliardi, Bertolini & Kam-Sing Wong, 2012). Besides, green product innovation has a critical importance to improve green effectiveness, strengthen green image and enhance financial performance (Ar, 2012; Chen, Lai and Wen, 2006; Cheng Yang and Sheu, 2014; Huang and Jim Wu, 2010; Lin, Tan and Geng, 2013).

In another finding obtained as result of research, it has been found that internal environmental orientation has a direct positive effect on firm performance. However, while external environmental orientation has no direct positive significant effect on firm performance, it has been concluded that external environmental orientation has an indirect effect on firm performance through green product innovation and green process innovation. In another research in literature, though, while environmental marketing strategy makes mediation only for external environmental orientation-firm performance effect, environmental corporate strategy makes mediation to both internal and external environmental orientation-firm performance effect (Chan, 2010). Aboelmaged (2018) has found with his study that effect of environmental orientation on firm performance is indirect and eco innovation mediates this relationship.

As a result, it could be said that all departments and strategical levels of firms with high internal environmental orientation level adopt ecological values. These firms consider their environmental goals as nature of economic goals. External environmental orientation, though, reflects the need to meet requirements of environmental outer stakeholders (Banerjee, Iyer, & Kashyap, 2003).
It is important for the firms to firstly meet all regulatory conditions about law and regulations to minimize risks. Secondly and more importantly, they need to display a proactive stance against regulatory requirements.

This research provides several useful managerial implications. First of all, it confirms the benefits of internal and external orientation by exhibiting that both internal and external environmental orientation have a significant positive effect on green product and green process innovation. Secondly, managers should realize the difference of effects of internal and external environmental orientation on firm performance. Therefore, firms should be careful to adopt internal environmental orientation described as environmentally responsible culture. Environmental issues should be integrated in organizational culture, strategic goal determining, learning and feedback cycles and daily routines of the organization. Special feedback and learning cycles should be formed in different management levels. In order to integrate environment protection values into the firm, sufficient education support should be received. The most important thing is that It should be made possible to transfer the experience gained on operational levels to strategical and normative levels and the other way around. Besides, firm managers could increase their firm performance by doing more than required by the laws and taking the lead, improving green product and green process innovation capabilities with a strategic approach. For this, stakeholders should be included in decision making process and most importantly a long-term vision should be developed.

Findings of this research are based on Turkish context. In next researches, the differences between Turkey and the other countries should be carefully evaluated. Therefore, it could be interesting to check whether the findings could be generalized in other contexts or not, and how it could be generalized and to consider some national factors. In this study, cross-sectional design has been used to test theoretical frame. Future researchers could use longitudinal data to catch the temporary relationships and increase the efficiency of theoretical frame used in this study. At the same time, researches could be supported with qualitative studies.

Acknowledgment

This paper is developed based on the Burcu Ozgul’s Ph.D. Thesis entitled “The Relationship Between Green Innovation, Its Antecedents And Firm Performance: The Moderating Role Of Competitive Strategy” at Yildiz Technical University, Istanbul, Turkey.

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