The Influence of Environmental Commitment and Innovation on Export Intensity: Firm-Level Evidence from Tunisia

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Abstract

This study utilizes structural equation modeling (SEM) to analyze the extent to which environmental commitment and innovation increase the export intensity of Tunisian firms. Relying on firm-level data from the World Bank Enterprise Survey conducted in 2020, we empirically test how environmental commitment increases export intensity through innovation. This study distinguishes between two types of innovation; product innovation and process innovation. We show that environmental commitment is useful in stimulating both product and process innovation. We find that environmental commitment and product innovation drive exports. Yet, process innovation does not affect exports. Moreover, our results highlight that quality certification interacts with the relationship between environmental commitment and process innovation. The results can help decision-makers understand how environmental commitment represents an important strategy for companies to be more innovative and oriented towards export.

Keywords: Product innovation. Process innovation. Environmental Commitment. Export intensity. Quality certification. Tunisian firms.

Introduction

The entire world is facing enormous pressures, not only from economic challenges related to environmental protection but also from organizations and stakeholders whose primary concern is the reduction of environmental damage. To overcome this challenge, more companies are shifting priorities by using business intelligence to become environmentally aware. They will devote more efforts to abatement technology and implement ecological sustainability strategies by promoting environmentally friendly activities and technologies, especially the energy-saving ones. According to Bansal (2005) and White (2009), economic development, environmental protection, and social responsibility are three factors that achieve corporate sustainability. Environmental protection is an ecological innovation taking the form of environmental commitment. Indeed, the environmental commitment concept has received increasing attention from academics and practitioners. It has many variations in its definition

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and terminology in the literature. It refers to how organizations engage in policies, practices, and strategies to improve their environmental performance (Sarkis et al., 2010; Vu and Dang, 2020; Haddoud et al., 2021). Carrillo-Higueras et al., (2018) define environmental commitment as "*the organizational engagement with environmental practices oriented to prevent and diminish waste and pollution burdens caused by the organization*". In other words, environmental commitment is considered a green innovation. Chen et al., (2006) indicate that green innovation incorporates innovation in technologies involved in energy saving, pollution prevention, waste recycling, green product design, or corporate environmental management.

Currently, environmental responsibility is becoming a necessity for the whole world. It has made remarkable progress in pollution reduction technologies, and a significant number of countries have committed themselves to ending all emissions. According to the Environmental Performance Index in 2022 (EPI)[2], Denmark tops the list of the most environmentally friendly countries in the world with a score of 82.5. The small European country of Luxembourg is ranked the second-most environmentally friendly with a score of 82.3, followed by Switzerland with a score of 81.5. The EPI indicates that Tunisia, our case study, is at the top of the most ecological Arab countries list. Tunisia ranks 96th with a score of 40.7 points.[3] It moves away from Egypt by 30 points, from Algeria by 59 points, and from Morocco by 64 points. Based on this information, Tunisia remains a little further from first place in the world in terms of environmental protection. For that reason and to ensure more sustainable development, the Tunisian government has announced, in 2020, an environmental protection strategy to promote environmental action. This strategy revolves around several points. Among these points, we can mention these most crucial priorities. First, strengthening the legal and institutional framework for environmental protection (such as environmental law enactment, an upward revision of the penalty threshold for environmental crimes, development of a framework law on biodiversity...etc.). Second, strengthening environmental control (such as developing environmental control means and mechanisms, providing the environmental authority with mechanisms that allow the temporary or permanent closure of polluting companies). Finally, implementing environmental protection policies and programs (such as reducing pollution from major industrial activities by adopting environmental requirements and promoting a corporate social responsibility approach within public and private bodies).

The study of the role of corporate environmental commitment has been the subject of diversified empirical investigations. Many works have examined the association between environmental commitment and firm performance (Hirunyawipada and Xiong, 2018; Seth et al., 2018; Clarkson et al., 2011; Dowell et al., 2000; Zhu and Sarkis, 2004; López et al., 2007). The results of these analyses are divergent. Some find a positive relationship (Clarkson et al., 2011; Dowell et al., 2000; Zhu and Sarkis, 2004) while others find a negative association (Cordeiro and Sarkis, 1997: and López et al., 2007). Moreover, the literature provides evidence of the impact of environmental commitment levels on environmental performance (Carrillo-Higueras et al., 2018; Xing et al., 2019; Wang et al., 2021). Other studies have emphasized the role played by customer pressure in promoting green innovations (Doran and Ryan, 2012; Hojnik and Ruzzier, 2016; Guoyou et al., 2013).

[2] The Environmental Performance Index (EPI) is a statistical method of computing the collective environmental impact of all of a country's policies combined. It ranks 180 countries across 32 performance indicators related to environmental health and ecosystem vitality.

[3] For more details, see https://epi.yale.edu/epi-results/2022/component/epi

Despite the abundance of literature on the importance of commitment to environmental strategies, the analysis of the relationship between innovation and environmental commitment remains a notable issue. Empirical studies on this relationship are quite limited for developing countries, Tunisia in particular. Therefore, it is necessary to empirically study the hypothesis that environmental commitment can stimulate innovation and increase the export intensity of Tunisian firms. The scope of this article is then to analyze the extent to which environmental commitment improves innovation (process or product), which in turn accentuates or attenuates export intensity for Tunisian companies.

To address this issue, we organize our paper as follows. In the second section, a theoretical analysis is presented and seven research hypotheses are proposed. In the third section, we describe the research method, including the data source and sample, and variable measurement. In the fourth section, the reliability of the construct, the factor analysis, and the results and structural model are shown. In the fifth section, we mention the conclusions, implications, and future research.

Theoretical Analysis and Research Hypothesis

The environmental commitment

A company's main concern is to produce new products that meet consumer expectations and therefore acquire a leadership position in the market. To do this, the firm must adopt new strategies and develop new practices to achieve this concern. According to Chang (2011), investing in environmental activities has become one of the most important strategic tools to achieve sustainable development in manufacturing industries. For some researchers, engaging in environmental strategies is an important way to increase a company's efficiency and, therefore, its profitability (Sharma, 2000). These strategies can improve not only the image of the company as an environmentally responsible organization (Utomo et al., 2019), but it helps companies to obtain a better strategic positioning compared to their competitors.

The link between environmental commitment and innovation

Innovation is considered a key driver for the development and success of any business. There is a sizeable body of studies that focuses on the innovation topic. According to OECD (2005), innovations are classified into four categories: product innovation, process innovation, organizational innovation, and marketing innovation. Product innovation is the introduction of some significant changes in product characteristics. Process innovation represents significant changes in methods of both production and distribution. Organizational innovation is defined as the new management forms adopted by firms. The marketing innovation takes the form of carrying on new commercialization methods (for instance, changes in the product design, and the product pricing method). Innovation has been widely studied in the economic literature. Some empirical studies discussed the relationship between innovation and the strategic commitment to environmental issues. It is argued that being eco-responsible can encourage companies to innovate more. In the case of manufacturing industries, Chang (2011) shows that firms' environmental commitment has a direct positive effect on green product innovation performance. Similarly, Walley and Whitehead (1994) indicate that commitment to environmental strategies represents a catalyst for constant innovation, new market opportunities niche, and wealth creation. In turn, Chang and Chen (2013) show that there is a positive relationship between the adoption of environmental strategies and innovation. In addition,

Suasana and Ekawati (2018) indicate that environmental commitment has a positive and significant effect on the success of new products. For instance, in the silver industry in Bali, the authors show that the higher the entrepreneurs' commitment to the effort to keep the environment in business activities, the more successful new products. Schaltegger and Wagner (2011) argue that firms with an environmental mission are more likely to create new environmentally friendly products. More recently, Haddoud et al., (2021) use a sample of 409 family firms in Poland to study the impact of the strategic commitment to environmental issues on product and process innovation. The authors show that commitment to environmental issues encourages process innovation but not product innovation. Based on the discussion above, we propose the following hypotheses:

***H_1**. Environmental commitment is positively related to product innovation.*

***H_2**. Environmental commitment is positively related to process innovation.*

Environmental commitment issues and export intensity

Exports are the most common way to access foreign markets. The factors that influence the success of a product on the foreign market are: (i) the improvement of the physical quality of the product, (ii) the competitiveness of the company on the international market (i.e., offering a better-quality product at a lower price) and, (iii) the consumer's knowledge of the product itself, its physical quality, location, and price. Due to the drastic changes in consumer awareness of environmental concerns, companies should also engage in not only social but also environmental strategies. The relationship between environmental commitment and exporting has long been studied and discussed. This literature has generally shown a positive relationship between environmental commitment and firm export intensity. Cole et al., (2006) show a positive impact of exports on the environmental performance of Japanese companies. Martín-Tapia et al., (2010) analyze whether environmental protection strategies can help Spanish SMEs to internationalize through exports. They find a positive relationship between advanced environmental strategies and export intensity. In the case of Spanish food companies, Galdeano-Gómez (2010) argued that environmental performance and exports are positively linked. Similarly, Haddoud et al., (2021) demonstrate that strategic engagement on environmental issues affects export activity. The authors suggest that environmentally friendly companies are more likely to increase their presence in foreign markets. Thus, successful access to foreign markets can be associated with generally environmentally friendly innovation. In light of what has been previously discussed, the hypothesis on the link between environmental commitment and export intensity can be formulated as follows:

***H_3**. Environmental commitment is positively related to export intensity*

Innovation and export intensity

Innovation is considered a key driver of economic growth in any country (Romer, 1994; Cameron, 1996; Lederman, 2010). There is a significant number of empirical studies that have focused on the effect of innovation on exports. The majority of them mention a positive link between innovation and export performance. Rodil et al., (2016) find a positive relationship between innovation and exports. Using a sample of Dutch firms, Wagner (1996) finds a positive impact of the introduction of new products on exports. In the same context, using data from the Manheim Innovation Panel, Ebling and Janz (1999) study the impact of innovations on exports.

They find that there is a positive and significant effect of innovations on exports. Similarly, D'Angelo (2010) and Tavassoli (2018) confirm that product innovations are positively related to firms' export intensity. On the other hand, empirical work confirms the link between process innovation and export intensity. For example, Cieslik and Michalek (2018) indicate that process innovation is positively related to the probability of exporting. Other work has focused on the influence of product and process innovation on exporting. Sikharulidze and Kikutadze (2017) reveal that the introduction of both types of innovation is an important driver of export intensity. In turn, Rodríguez and Rodríguez (2005) confirmed that product and process innovation promote export intensity. Recently, Edeh et al., (2020) and Haddoud et al., (2021) indicate that process innovation increases export intensity, while product innovation does not. Thus, the introduction of new products can have a direct impact on exports. Indeed, product differentiation allows innovative companies to increase their competitiveness and therefore increase their chances of penetrating the competitive export market. Based on the above analysis, we propose the following hypotheses:

H4. *Product innovation is positively related to export intensity*

H5. *Process innovation is positively related to export intensity*

Role of the quality certification

Quality certifications are an intangible investment. Each company deploys considerable efforts in terms of R&D to improve the quality of its product. Thus, this product must meet consumer requirements and comply with international standards. In the context of family firms, Haddoud et al., (2021) show that the influence of strategic commitment to environmental issues on product innovation is significantly and positively moderated by the possession of quality certification. Following Haddoud et al., (2021), we try to test the extent to which the quality certification strengthens or weakens the effect of strategic engagement on environmental issues on the innovation of Tunisian companies. This leads us to draw the following hypotheses:

H6. *Quality certifications moderate the relationship between environmental commitment and product innovation.*

H7. *Quality certifications moderate the relationship between environmental commitment and process innovation.*

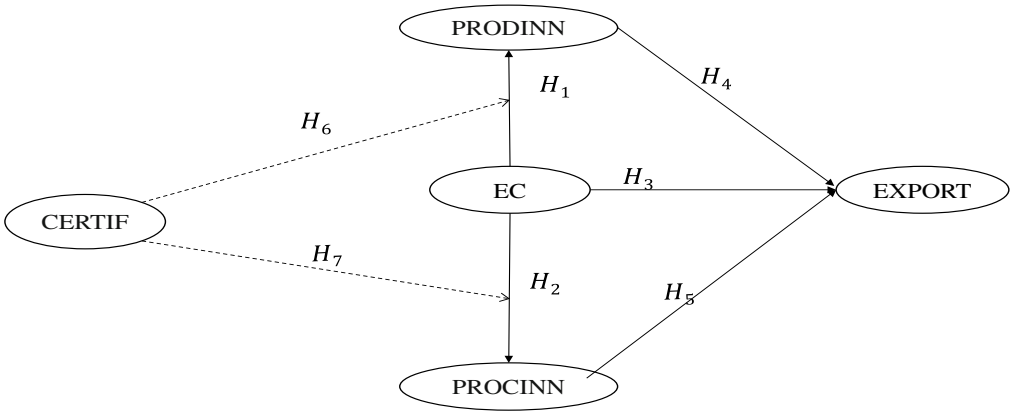

Figure 1: Proposed research model

Research methodology

Data source and sample

To test the aforementioned hypotheses, we used the Enterprise Survey data carried out by the World Bank in 2020. The data were collected in partnership with the European Bank for Reconstruction and Development (EBRD) and the European Investment Bank (EIB). The World Bank Enterprise Survey (hereafter WBES) is carried out on firm-level surveys to a representative sample of firms. To warrant the representativeness of the sample, the WBES data are collected through a stratified random sampling by using the industry, region of establishment location, and establishment size.[4]

The questionnaire used for the survey offers a wide range of data. Apart from general information on the firm's characteristics, the questionnaire includes several sections such as access to finance, competition, labor, formal institutions, informal institutions, innovation, environmental or climate change issues, etc. In this paper, we dropped the missing responses as well as the "Do not know" and "Does Not Apply" responses from the dataset. Due to the missing values for variables, the sample size is reduced to a total of 521 Tunisian firms.

Measures of variables

Environmental commitment. This indicator (EC) is constructed from two binary items. The first item is an answer to the question: *In the last fiscal year, did this firm have any strategic objectives that mention environmental or climate change issues* (EC1)? The second item is an answer to the question: *In the last fiscal year, did this establishment have a manager responsible for environmental and climate change issues* (EC2)?

Innovation. In the literature, innovation was measured in different ways. In this paper, according to Barasa et al., (2017) and Sdiri and Ayadi (2021), we use two innovation indicators. **Product innovation** is a dummy variable equal to 1 if the establishment has introduced new or significantly improved products or services and 0 otherwise (PRODINN). **Process innovation** is another dummy variable that takes the value 1 if the firm has introduced any new or significantly improved methods of manufacturing products or services and 0 otherwise (PROCINN).

Export intensity. In this paper, we use the information provided by the survey about the percentage of the national establishment's sales. We define exports as a continuous variable that corresponds to the percentage of a firm's sales outside the country (EXPORT).

Quality certification. It is a binary (CERTIF) which takes the value of 1 if a firm has an internationally recognized quality certification like ISO 9000 or 14000, or HACCP and 0 otherwise.

Sector and region variables. The sample comprises firms from the manufacturing, retail, and service sector (SECTOR). Our study controls for sector heterogeneity since sector-specific effects may influence exports. Also, we control for differences across the four regions: North East, Centre East, North West & Centre West, and South East & South West (LOCATION).

[4] For more details, see http://www.enterprisesurveys.org/Methodology/

Descriptive Statistics

The summary statistics relating to our sample show that the largest number of firms (59.89%) were in the manufacturing sector (that includes food, textile and garments, and other manufacturing). The rest of the firms were in wholesale and retail, and other services (40.1%). Table 1 shows that the shares of firms in different regions are very close. Indeed, statistics show that North East has a large number of firms (32.16%) followed by Centre East (27.39%), Northwest and Centre West (22.26%), while the South East and South West regions have a low number of firms (only 18.2%). In terms of size of the firm, the majority of firms (46.11%) employed less than 20 workers, 36.93% employed between 20 and 99, and 16.96 % employed more than 99 employees.

Table 1: Characteristics of the sample

	Number	Percentage
Location of the firm		
North East	182	32.16
Centre East	155	27.39
North West & Centre West	126	22.26
South East & South West	103	18.20
Industry of the firm		
Food	103	18.20
Textile & Garments	119	21.02
Other manufacturing	117	20.67
Wholesale & retail	118	20.85
Other services	109	19.25
Size of the firm		
Small (5-19)	261	46.11
Medium (20-99)	209	36.93
Large (>99)	96	16.96
N	**566**	

Analysis Approach

To test the above hypotheses, we used Partial Least Squares Structural Equation Modeling (PLS-SEM). The latter has become a standard approach for analyzing the complex relationships between both observed and latent variables. In this paper, we used PLS-SEM because it facilitates the construction of the theory (Hair et al., 2011). To do this, we used a multivariate statistical analysis software WarpPLS version 7.0 (Kock, 2020). To evaluate the structural model, we used the warp3 algorithm of WarpPLS 7.0 for inner model tests. The warp3 algorithm for inner model testing estimates parameters, such as the path coefficient and associated *p-values*, while identifying and accounting for nonlinear relationships in the structural model (Kock, 2014).

Reliability and validity of the EC construct

Before starting the analysis, we need to check the reliability and validity of the EC latent construct. We use the composite reliability (CR) and Cronbach's Alpha (α) to check the reliability and the average variance extracted (AVE) to check the EC validity (Chin, 2010; Kock

2014). We also used the variance inflation factor (VIF) to verify the multicollinearity of all the variables used in this study. All values are shown in Table 2 below. Table 2 also provides each variable's means and standard deviations.

Table 2 indicates that Cronbach's Alpha (α) is well above the conventional threshold of 0.7. The construct reliability is assessed using the CR coefficient. In this paper, we find that the CR is equal to 0.895 which is greater than 0.7. Furthermore, we use the AVE to verify the convergent validity. The AVE of the construct should be higher than 0.5 (Chin, 2010; Hair et al., 2011). Our analysis confirms that the AVE of the construct is equal to 0.811 and higher than 0.5. Therefore, the measurement model's convergent validity is acceptable. In addition to the above tests and according to Hair et al., (2011), the values of the individual VIF are greater than 5; which indicates a multicollinearity problem. In our context, we notice that the VIF of each variable is inferior to 5. According to this result, it is proven that there is no multicollinearity problem between the variables used in this study. Thus, all the values presented in Table 2 respect the thresholds.

Table 2: Summary statistics

Variables		Mean	Std. Dev.	VIF	Reliability & Validity
EC	EC 1	-0.033	0.946	1.654	$\alpha = 0.766$, AVE=0.811 and CR=0.895
	EC 2				
PRODINN		0.111	0.314	1.162	
PROCINN		0.047	0.213	1.178	
EXPORT		19.03	36.14	1.075	
CERTIF		0.286	0.452	1.157	
SECTOR		3.019	1.385	1.072	
LOCATION		2.265	1.097	1.115	
CERTIF*EC		0.101	0.737	1.565	

Analysis and Discussion

In this paper, seven hypotheses were constructed. Among them, five were direct hypotheses, and two were proposed for the moderating effect. As indicated in Figure 2 and Table 3, the first direct hypothesis H_1 is related to the influence of environmental commitment (EC) on product innovation. The results show that EC has a positive and statistically significant effect on product innovation with a coefficient value of β=0.09, t=2.471, and $p\text{-}value$ =0.007<0.05. The hypothesis results are consistent with those found by Chang (2011) and Schaltegger and Wagner (2011) but differ from Haddoud et al., (2021). This result can be justified by the fact that the companies which can maintain practices aiming at protecting the environment are also supposed to be urged to ensure further trust for their clients. This can be achieved by assigning more importance to improving the physical quality of their final product.

The second direct hypothesis H_2 is related to the influence of environmental commitment (EC) on process innovation. The results reveal that EC positively and significantly impacts process innovation with a coefficient value of β=0.258, t=6.893, and $p\text{-}value$ <0.001. This result may be explained by the fact that being eco-responsible translates into a production process that induces cost-efficiency. The latter is achieved by saving materials and reducing energy

consumption. This result is also obtained by Haddoud et al., (2021) in the context of Polish family firms.

Regarding hypothesis H_3, we show that EC has a direct positive effect on export intensity with a coefficient value of β=0.114, $t = 3.045$, and $p\text{-}value = 0.001 < 0.01$. A similar result was found by Haddoud et al., (2021) and Martín-Tapia et al., (2010). It indicates that the environmental strategies are positively related to firms' export intensity. Martín-Tapia et al., (2010) explain that the offer of differentiated ecological products can allow the company to obtain a good reputation which facilitates its access to international markets.

To verify H_4 and H_5, we find that only product innovation is positively and significantly associated with export intensity (β=0.06, $t = 1.792$, and $p\text{-}value = 0.037 < 0.05$). The results suggest that product innovation was a significant driver of export intensity. Offering new high-quality products could generate a competitive advantage in national and international markets. Our finding was also found by D'Angelo (2010) and Tavassoli (2018). Thus, H_3 and H_4 are supported but H_5 is not. The mediation analysis did not indicate any significant indirect effect of EC on export intensity.

H_6 and H_7 are constructed to test the moderation effects. The findings indicate that quality certification has a statistically significant moderating effect on the relationship between EC and process innovation with a negative coefficient value of β=-0.114, $t = -3.067$, and $p\text{-}value = 0.001 < 0.05$. In the current context of Tunisian firms, the influence of the EC on the process innovation is moderated by the possession of quality certification. Yet, the interaction between EC and product innovation is not significant. Thus, H_6 is supported but H_7 is not.

Regarding the control variables, we find that location and sector have a significant influence on export intensity. In our case, based on the R^2, we show that the full model accounts for 29% of the variation in export intensity.

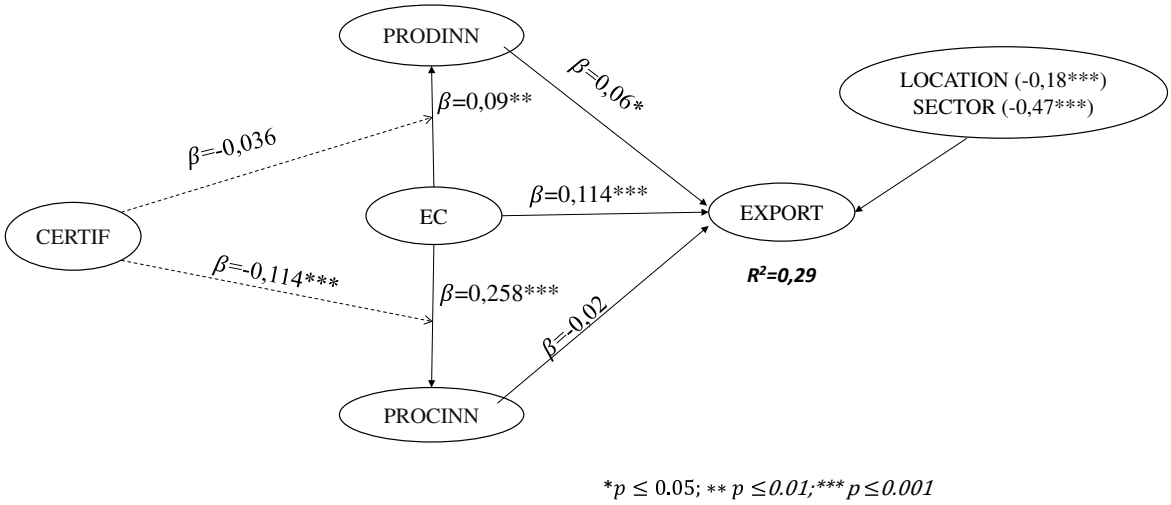

Figure 2: Results obtained from the structural model

Table 3: Path coefficients and hypothesis testing

Hypothesis	Relationship	Path coefficient	*t-value*	*p-value*	Decision
Direct effect					
H1	EC→ PRODINN	0.093	2.471	0.007**	Supported
H2	EC→ PROCINN	0.258	6.893	<0.001***	Supported
H3	EC→EXPORT	0.114	3.045	0.001***	Supported
H4	PRODINN →EXPORT	0.067	1.792	0.037*	Supported
H5	PROCINN →EXPORT	-0.019	-0.514	0.304	Not supported
Moderating effect					
H6	CERTIF*EC → PRODINN	-0.036	-0.970	0.166	Not supported
H7	CERTIF*EC → PROCINN	-0.115	-3.067	0.001**	Supported

$^{*}\ p \leq 0.05,\ ^{**}\ p \leq 0.01,\ ^{***}\ p \leq 0.001$

Conclusions, Implications, and Future Research

While an increasing number of studies have examined the link between green activities and innovation, little attention was given to the relationship between environmental commitment, innovation, and exports for developing countries, Tunisia in particular. This paper aims to analyze the impact of environmental commitment on product and process innovation, and in turn, the influence of innovation on the export intensity of Tunisian firms. To test our hypotheses, we use the world bank enterprise survey conducted in 2020. Regarding the impact of the environmental commitment, we can deduce that EC is useful to stimulate both forms of innovation. Moreover, the EC has a positive direct association with firms' export intensity. We also find that, in the Tunisian context, the EC enhances product innovation which, in turn, stimulates exports. It is also observed that quality certifications interact with the relationship between environmental commitment and process innovation.

Our paper contributes to the literature on the relationship between environmental commitments, product and process innovation, and export intensity by generating results whose interpretation deserves the attention of Tunisian policymakers. The present paper delivers numerous interesting policy implications. First, our results suggest that the firm should change its strategic vision in terms of environmental behavior and environmental commitment to boost both product and process innovation. In this sense, Tunisian decision-makers are called upon to encourage non-environmentally friendly companies to engage in strategies aimed at protecting the environment. Nevertheless, decision-makers should implement an innovation policy that helps environmentally friendly companies to improve their capacity for innovation in environmental protection. This can be done by integrating economic and financial dimensions as success factors of the environmental protection strategy: *(i)* encourage initiatives in favor of the transition to the green economy and develop an integrated strategy and an action plan for the priority sectors, *(ii)* develop environmental financing methods and promote specific ecological environmental financial resources and strengthen ecological taxation and (iii) carry out the principles and processes of sustainable development at the level of public policies and regional plans. This study makes important contributions to understanding the relationship between environmental commitment and export intensity. Through this study, we recommend that the public decision-makers should pay more attention to the utility of environmental

engagement in boosting corporate exports in the future. This can be done by *(i)* giving subsidies to SMEs, *(ii)* simplifying corporate taxation and bringing it back to a more incentive system for investment and export, *(iii)* encouraging green product innovation and the digital and ecological transitions of the industry, and *(iv)* developing a strategy to raise awareness of the most environmentally friendly products and services.

Despite the interesting results, some limitations of this study should be highlighted. First, in this article, we have primarily focused on companies in the Tunisian context; the results may not be generalizable to other countries. Second, due to limited data availability, we used a concept to measure EC. Two binary variables measure this construct. Third, in this analysis, we have distinguished only two types of innovation: product innovation and process innovation. Finally, in this article, we have only analyzed the effect of the EC on innovation and exports. However, other factors can influence the company's environmental strategy, such as consumers' demand, state pressure, … etc.

In light of these limitations, the following research perspectives are suggested. First, to test whether the hypotheses can be generalized, future studies could select other countries for comparison with this study. Second, future studies could include another measure of EC based on a set of items that can better synthesize the information. Third, other types of innovation- for example, eco-innovation, open innovation, and green innovation- should be included in future analyses. Finally, it would be interesting to take into account, in future studies, the influence of government pressure as well as consumer pressure on the firm's strategy in terms of environmental protection.

References

Bansal, P. (2005). Evolving Sustainably: A Longitudinal Study of Corporate Sustainable Development. *Strategic Management Journal*, 26, 197-218.

Barasa, L., Kimuyu, P., Vermeulen, P., Knoben, J., and Kinyanjui, B. (2017). Institutions, resources, and innovation in developing countries: A firm-level approach. *Research Policy*, 46, 280–291.

Becker, S.O., Egger, P.H (2013). Endogenous product versus process innovation and a firm's propensity to export. *Empirical Economics.* 44, 329–354. https://doi.org/10.1007/s00181-009-0322-6

Cameron. G. (1996). Innovation and economic growth. Discussion paper N° 277 available from https://eprints.lse.ac.uk/20685/1/Innovation_and_Economic_Growth.pdf

Carrillo-Higueras, F., Prajogo, D., and Smith, L. (2018). Environmental commitment and its drivers in the Australian wine industry: a behavioral approach. *Australasian Journal of Environmental Management*, 1–20. doi:10.1080/14486563.2018.1460630.

Chang, CH. (2011). The Influence of Corporate Environmental Ethics on Competitive Advantage: The Mediation Role of Green Innovation. *Journal of Business Ethics*. 104, 361–370. https://doi.org/10.1007/s10551-011-0914-x.

Chen, Y. S., Lai, S. B., & Wen, C. T. (2006). The influence of green innovation performance on corporate advantage in Taiwan. *Journal of Business Ethics*, 81(3), 531–543.

Chen, Y. and Chang, C. (2013). Towards green trust: The influences of green perceived quality, green perceived risk, and green satisfaction. *Management Decision*, Vol. 51 No. 1, pp. 63-82. https://doi.org/10.1108/00251741311291319.

Chin. W (2010) How to write up and report PLS analyses. In: Vinzi V, Chin W, Henseler J, et al. (eds) *Handbook of Partial Least Squares: Concepts, Methods and Applications*. Heidelberg: Springer-Verlag Berlin Heidelberg, pp. 655–690.

Cieślik, A., & Michałek, J. J. (2018). Firm-level determinants of direct and indirect exports: empirical evidence for C.E.E. and M.E.N.A. countries. *Economic Research-Ekonomska Istraživanja*, 31(1), 982–996. doi:10.1080/1331677x.2018.1436452.

Cieślik, A., Michałek, J.J., & Szczygielski, K. (2016). Innovations and Export Performance: Firm-level Evidence from Poland. *Entrepreneurial Business and Economics Review*, 4(4), 11-28, DOI: http://dx.doi.org/10.15678/EBER.2016.040402.

Clarkson, P.M., Li, Y., Richardson, G.D. and Vasvari, F.P. (2011). Does it really pay to be green? Determinants and consequences of proactive environmental strategies. *Journal of Accounting and Public Policy,* Vol. 30 No. 2, pp. 122-144.

Cole. M.S, Bruch. H and Vogel. B. (2006). Emotion as mediators of the relations between perceived supervisor support and psychological hardiness on employee cynicism. *Journal of organizational behavior*. 27, 463–484.

Cordeiro, J.J. and Sarkis, J. (1997). Environmental proactivism and firm performance: evidence from security analyst earnings forecasts. *Business Strategy and the Environment*, Vol. 6 No. 2, pp. 104-114.

D'Angelo. A (2012). Innovation and export performance: a study of Italian high-tech SMEs. *Journal of Management & Governance*. 16(3), pages 393-423.

Doran, J. and Ryan, G. (2012). Regulation and firm perception, eco-innovation and firm performance. *European Journal of Innovation Management*, Vol. 15 No. 4, pp. 421-441. https://doi.org/10.1108/14601061211272367.

Dowell, G., Hart, S. and Yeung, B. (2000). Do corporate global environmental standards create or destroy market value? *Management Science*, Vol. 46 No. 8, pp. 1059-1074.

Ebling G, Janz N (1999). Export and innovation activities in the German service sector. Empirical evidence at the firm level. *ZEW discussion paper* no. 99–53, Zentrum fur Europäische Wirtschaftsforschung, Mannheim.

Edeh, J. N., Obodoechi, D. N., and Ramos-Hidalgo, E. (2020). Effects of innovation strategies on export performance: New empirical evidence from developing market firms. *Technological Forecasting and Social Change*, 158, 120167. doi:10.1016/j.techfore.2020.120167.

Fornell, C. and Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of marketing research*, 39-50.

Galdeano-Gómez, E. (2010). Exporting and Environmental Performance: A Firm-level Productivity Analysis. *World Economy*, 33(1), 60–88. doi:10.1111/j.1467-9701.2009.01188.x .

Guoyou, Q., Saixing, Z., Chiming, T., Haitao, Y., and Hailiang, Z. (2011). Stakeholders' Influences on Corporate Green Innovation Strategy: A Case Study of Manufacturing Firms in China. *Corporate Social Responsibility and Environmental Management*, 20(1), 1–14. doi:10.1002/csr.283.

Haddoud. M.Y, Onjewu, A-K E, Nowiński. W. (2021). Environmental commitment and innovation as catalysts for export performance in family firms. *Technological Forecasting & Social Change* 173 121085.

Hair, J., Ringle, C., Sarstedt, M., (2011). PLS-SEM: Indeed a silver bullet. *Journal of Marketing theory and Practice* 19 (2), 139–152.

Hirunyawipada, T. and Xiong, G. (2018). Corporate environmental commitment and financial performance: moderating effects of marketing and operations capabilities, *Journal of Business Research,* Vol. 86, pp. 22-31.

Hojnik, J., and Ruzzier, M. (2016). What drives eco-innovation? A review of an emerging literature. *Environmental Innovation and Societal Transitions*, 19, 31-41. doi:10.1016/j.eist.2015.09.006.

Kock, N., (2014). Dichotomous variables. [Weblog] WarpPLS blog. May 22, 2014. Available from. http://warppls.blogspot.com/search/label/dichotomous%20variables.

Kock, N., (2020). *WarpPLS User Manual*: Version 7.0. ScriptWarp Systems, Laredo.

Lederman. D (2010). An international multilevel analysis of product innovation. *Journal of International Business Studies.* 41 (4), pp. 606-619.

López, M.V., Garcia, A. and Rodriguez, L. (2007), Sustainable development and corporate performance: a study based on the Dow Jones sustainability index, *Journal of Business Ethics,* Vol. 75 No. 3, pp. 285-300.

Martin-Tapia. I, J. Aragón-Correa. A and Rueda-Manzanares. A (2010). Environmental strategy and exports in medium, small and micro-enterprises. *Journal of World Business*, vol. 45, issue 3, 266-275.

OCDE (2005). La mesure des activités scientifiques et technologiques. Manuel d'Oslo, Principes directeurs pour le recueil et l'interprétation des données sur l'innovation, 2005.

Rodil Ó.M, Vence. X and Carreira. M. C. S (2016). The relationship between innovation and export behavior: The case of Galician firms. *Technological Forecasting and Social Change* 113:248–265. DOI: 10.1016/j.techfore.2015.09.002

Rodríguez, J., Rodríguez, R., (2005). Technology and export behavior: A resource-based view approach. *International Business Review* 14 (5), 539–557

Romer, Paul M. 1994. The Origins of Endogenous Growth. Journal of Economic Perspectives, 8 (1) : 3-22.

Sam Tavassoli, (2017). The role of product innovation on export behavior of firms: Is it innovation input or innovation output that matters? *European Journal of Innovation Management*. Vol. 21 No. 2, pp. 294-314. https://doi.org/10.1108/EJIM-12-2016-0124.

Sarkis, J, Gonzalez-Torre, P and Adenso-Diaz, B (2010). Stakeholder pressure and the adoption of environmental practices: the mediating effect of training, *Journal of Operations Management*, vol. 28, no. 2, pp. 163‑176.

Schaltegger. S and Wagner. M (2011). Sustainable Entrepreneurship and Sustainability Innovation: Categories and Interactions. *Business Strategy and the Environment* 20(4):222 – 237.

Sdiri, H and Ayadi, M (2022). Does Innovation Foster or Mitigate the Corruption Obstacle? Firm-Level Evidence from Tunisia. *Journal of the Knowledge Economy***,** 13, 367–386 (2022).

Seth, D., Rehman, M.A.A. and Shrivastava, R.L. (2018). Green manufacturing drivers and their relationships for small and medium (SME) and large industries. *Journal of Cleaner Production,* Vol. 198, pp. 1381-1405.

Sharma. S. (2000). Managerial Interpretations and Organizational Context as Predictors of Corporate Choice of Environmental Strategy. *The Academy of Management Journal*, Vol. 43, No. 4 pp. 681-697

Sikharulidze. D and Kikutadze. V (2017). Innovation and Export Competitiveness: Evidence from Georgia Firms. *European Journal of Economics and Business Studies.* DOI:10.26417/EJES.V8I1.P131-137.

Suasana. I and Ikawati. Ni. W. (2018). Environmental commitment and green innovation reaching success new products of creative industry in Bali. *Journal of Business and Retail Management Research* 12(04).

Tavassoli, S. (2018). The role of product innovation on export behavior of firms: Is it innovation input or innovation output that matters? *European Journal of Innovation Management*. 21(2), pp. 294-314. https://doi.org/10.1108/EJIM-12-2016-0124.

Teng, M.-J., Wu, S.-Y., and Chou, S. J.-H. (2013). Environmental Commitment and Economic Performance - Short-Term Pain for Long-Term Gain. *Environmental Policy and Governance*, 24(1), 16–27. doi:10.1002/eet.1634.

Utomo. M. N, Cahyaningrum. W and Kaujan (2019). Does Green Business Improve Corporate Image and Firm Value? *International journal of scientific and technology research*, 8, 12.

Vu, T. T., and Dang, W. V. T. (2020). Environmental commitment and firm financial performance: a moderated mediation study of environmental collaboration with suppliers and CEO gender. *International Journal of Ethics and Systems*.

Wagner J (1996). Export performance, human capital, and product innovation in Germany: a micro view. *Jahrbuch für Wirtschaftswissenschaften / Review of Economics*. 47: 40–45.

Walley, N., and Whitehead, B. (1994). It's not easy being green. *Harvard Business Review,* 72(3), 46–51.

Wang H, Khan MAS, Anwar F, Shahzad F, A du D and Murad M (2021). Green Innovation Practices and Its Impacts on Environmental and Organizational Performance. *Frontirts. Psychology*. 11:553625. doi: 10.3389/fpsyg.2020.553625.

White, P. (2009). Building a sustainability strategy into the business. *Corporate Governance*, Vol. 9 No. 4, pp. 386-394. https://doi.org/10.1108/14720700910984936.

Xing, Liu, Wang, Shen, and Zhu. (2019). Environmental Regulation, Environmental Commitment, Sustainability Exploration/Exploitation Innovation, and Firm Sustainable Development. *Sustainability*, 11(21), 6001. doi:10.3390/su11216001.

Zhu, Q. and Sarkis, J. (2004). Relationships between operational practices and performance among early adopters of green supply chain management practices in Chinese manufacturing enterprises. *Journal of Operations Management*, Vol. 22 No. 3, pp. 265-289.