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Green business strategy and ecoinnovation in manufacturing companies; effects on environmental performance

Estrategia de negocios sustentable y ecoinnovación en empresas manufactureras; efectos en rendimiento ambiental

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Abstract

In response to an increasing responsibility to safeguard the environment, the business world has developed strategies and innovations that mitigate the harmful effects of its activities. The Green Business Strategy (GBS) emerges as an imperative need to address such effects, with eco-innovation collaborating to achieve environmental goals. The present empirical and cross-sectional research asserts that GBS maintains significant relationships

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on types of ecoinnovation, encompassing products, processes, and organizational practices, contributing to enhanced environmental performance for Mexican manufacturing companies. A survey was administered to 300 managers within the manufacturing sector with a Likert scale. The collected data was analyzed using structural equations and the SMART PLS-SEM program. The results reveal a significant impact of the GBS on eco-innovations in products, processes, and the organization, as well as on environmental performance. While process eco-innovation significantly influences environmental performance, product and organizational eco-innovation do not demonstrate a similar impact. Additionally, eco-innovation in processes mediates the relationship between GBS and environmental performance. This study highlights the pivotal role of GBS as a facilitator of eco-innovation practices in the manufacturing sector. In addition, its implementation contributes to protecting and caring for the environment. Therefore, decision-makers within companies and governmental bodies are encouraged to support and promote the adoption of GBS and eco-innovation.

Keywords: Green strategy; Products; Processes; Organization; Sustainability.

Resumen

En respuesta a la responsabilidad creciente para proteger y cuidar el medio ambiente, el mundo empresarial ha desarrollado estrategias e innovaciones que mitigan los efectos adversos de sus actividades. La Estrategia de Negocios Sustentable (ENS) surge como una necesidad imperiosa para contrarrestar tales efectos, en colaboración con la ecoinnovación para lograr objetivos ambientales. Esta investigación empírica y transversal afirma que la ENS mantiene relaciones significativas sobre los tipos de ecoinnovación abarcando actividades en productos, procesos y en la organización, contribuyendo al logro del rendimiento ambiental dentro de la industria manufacturera Mexicana. Se administró una encuesta a 300 gerentes del sector manufacturero de escala tipo Likert. Los datos fueron analizados por medio de ecuaciones estructurales y el programa SMART PLS-SEM. Los resultados revelan un impacto importante de la ENS sobre ecoinnovaciones en productos, procesos, y en la organización, también en el rendimiento ambiental. Por otro lado, las ecoinnovaciones en procesos permiten obtener rendimiento ambiental pero no así las ecoinnovaciones en productos y en la organización. Además, se encontró que la ecoinnovación en procesos media la relación entre la ENS y el rendimiento ambiental. Este estudio enfatiza el rol esencial de la ENS como facilitador de las actividades de ecoinnovación en la industria manufacturera. Además, al implementar una ENS se contribuye a la protección y cuidado del medio ambiente. Por lo tanto, se alienta a los tomadores de decisiones dentro de las empresas y organismos gubernamentales a apoyar y promover la adopción de la ENS y de la ecoinnovación en la industria.

Palabras Clave: Estrategia verde; Productos; Procesos; Organización; Sustentabilidad.

1. Introduction

In the current global landscape, urgent and significant challenges are surfacing, with environmental issues taking the forefront. The visible threats of climate change, extreme weather, and biodiversity loss are just not distant possibilities but stark realities that demand immediate action (McLennan *et al.,* 2022). Moreover, business models that excessively consume natural resources pose a long-term risk to the well-being of the global population (UN, 1992). The manufacturing industry alone accounts for a staggering 40% of global energy consumption from fossil resources (IEA, 2021). This underscores the pressing need for companies to understand their activities' impact and contribute to global sustainability through environmental strategies and innovations (GRI *et al.,* 2015; Janahi *et al.,* 2021).

In this context, GBS is implemented in the manufacturing sector to integrate environmental issues from management to company departments and units. GBS promotes a framework oriented towards natural resource conservation by enhancing environmental regulations (Olayeni *et al.,* 2021). It is in contrast to traditional business strategies that may not prioritize environmental concerns. Eco-innovation, on the other hand, provides environmental benefits (Kemp and Pearson, 2007; OECD, 2009). It maximizes resource utilization compared to wastage (Kemp and Pearson, 2007). Currently, there are studies on environmental strategies that companies in highly polluting industries adopt (Leonidou *et al.,* 2015; Olayeni *et al.,* 2021; Saether *et al.,* 2021) and the benefits of eco-innovation (Soewarno *et al.,* 2019; Janahi *et al.,* 2021), as well as their mutual relationship (Dangelico *et al.,* 2016; Tang *et al.,* 2018). However, the impact of GBS on types of eco-innovation (product, process, and organizational) has yet to be fully addressed in the manufacturing industry (Hojnik *et al.,* 2018; Sanni, 2018), but only in an isolated and partial manner.

This research holds promise as it analyzes the influence of GBS on eco-innovation activities in the Mexican manufacturing

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sector, focusing on products, processes, and organization. It also examines the impact of GBS and each type of eco-innovation on environmental performance. Its implementation's environmental benefits are theoretical and a potential solution to the uncertain environmental scenario we face today (Janahi *et al.,* 2021). The sample consists of 300 observations, analyzed using a structural equation modeling approach with the SMART PLS-SEM program. The analysis reveals that GBS has a significant positive influence on product, process, and organizational eco-innovation activities, as well as on the environmental performance of manufacturing companies. It also confirms that environmental performance is derived from process eco-innovations rather than product and organizational ones. Additionally, it was found that process eco-innovation mediates the relationship between GBS and environmental performance, offering a tangible pathway to more sustainable production.

The analysis carries significant implications for strategic management and sustainability in manufacturing companies. GBS fosters eco-innovation practices and objectives, enabling them to align with environmental policies and regulations (OECD, 2009; Saether *et al.,* 2021) and enhance competitiveness (Olayeni *et al.,* 2021). Therefore, this research contributes to knowledge in the following areas: first, there is a dearth of literature on the effect of GBS on eco-innovations in products, processes, and organization, as well as on the environmental performance of Mexican manufacturing companies; second, it was found that eco-innovations in products and organization do not favor environmental performance, but process eco-innovations do contribute; third, eco-innovation in processes between GBS and environmental performance was found to have a mediating effect within an emerging country. These findings not only fill a gap in the existing literature and provide valuable insights for future research and practical applications.

This research follows a systematic process to ensure the validity and reliability of the findings. First, a comprehensive review of the variables in the existing literature is presented. The study is followed by formulating hypotheses based on the proposed relationships and presenting the theoretical research model. The methodology and data analysis section details the research design, data collection, and analysis methods. The results are presented and discussed, providing a clear understanding of the findings. The study's limitations are also acknowledged, and future research directions related to the topic are suggested, ending with general conclusions of the study.

1.1. Literature review and hypothesis formulation

1.1.1. GBS and product eco-innovation. Currently, there is increasing pressure on companies in the productive sector due to the consequences of their activities, as they cause environmental deterioration and pollution (Rodríguez-González *et al.,* 2022; Sezen and Çankaya, 2013). They also face new requirements and international regulations that seek to halt environmental degradation and provide sustainable development for the entire population (Ashraf *et al.,* 2024; Olayeni *et al.,* 2021). In this regard, environmental objectives are incorporated by external pressures from stakeholders (Ashton *et al.,* 2017). Thus, companies integrate environmental strategies to enhance competitiveness, align with market trends and regulations, and reinforce relationships with stakeholders and the community (Banerjee, 2002; Albino *et al.,* 2009).

In this context, GBS, or Green Business Strategy, is described by Banerjee (2002) as the incorporation of environmental objectives into business decision-making, impacting the entire production cycle of a good or service. Meanwhile, eco-innovation is a term that describes changes that bring about environmental benefits (OECD and Eurostat, 2007; Dangelico *et al.,* 2016). Eco-innovation can be applied to various aspects of a business, including products, processes, organization, marketing, or material flow (Rovira *et al.,* 2017). This research, which focuses explicitly on eco-innovation in products, processes, and organizations, is crucial in understanding the potential of GBS in driving eco-innovation. Product eco-innovation involves redesigning functions or usage characteristics and integrating

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elements that reduce production material and waste (Rovira *et al.,* 2017).

Olayeni *et al.* (2021) underscore the significant influence of GBS on product innovation, as it not only enhances their quality but also holds the potential to outperform others in the market. Furthermore, Rodríguez-González *et al.* (2022) highlight that the automotive industry is making significant changes to produce hybrid and electric vehicles, which are framed within the business strategy. Therefore, companies strategically incorporating environmental issues are not just influencing innovations and product development (Albino *et al.,* 2009; Segarra-Oña *et al.,* 2014) but also paving the way for a more sustainable industry. It is in light of these significant findings that the following hypothesis is formulated:

H1: GBS has a significant positive influence on product eco-innovation.

1.1.2. GBS and processes eco-innovation. By aligning business activity with the planet's well-being due to governmental regulations and economic globalization, among other factors (Directorate-General for Environment [DGMA] and European Commission [EC], 2012), manufacturing firms reduce their environmental impact not only by-products but also through innovations in their processes (García-Granero *et al.,* 2018). Companies transform techniques, knowledge, and workforce in this context, resulting in process innovation (OECD and Eurostat, 2007). For instance, companies implementing GBS have seen significant reductions in their carbon footprint and improved resource management, leading to enhanced competitiveness (DGMA and EC, 2012).

However, researchers must delve into process innovation more comprehensively (Crossan and Apaydin, 2010). Arnold and Hockerts (2011) draw from their study in the electronics sector the importance of integrating environmental aspects with a strategic focus through innovation as a clear and comprehensive process. Saether *et al.* (2021) assert that implementing environmental strategies is a pivotal driver of eco-innovation adoption in Norwegian companies striving to reduce carbon emissions, necessitating adjustments in their internal processes. Tang *et al.* (2018) underscored in their study of Chinese manufacturing companies that environmental management is a significant factor in shaping eco-innovation processes. Thus, the following hypothesis emerges as a pressing need for further exploration:

H2: GBS has a significant positive influence on processes of eco-innovation.

1.1.3. GBS and organizational eco-innovation. Organizational eco-innovation, a transformative aspect for manufacturing companies with eco-innovation practices, involves significant changes throughout organizations and institutions (OECD, 2009). Organizational innovation entails variations in activities, work forms, sites, or linkages with external parties (OECD and Eurostat, 2007). Organizational eco-innovation not only facilitates product and process innovation but also necessitates the organization to acquire new knowledge and skills to execute such environmentally focused tasks (García-Granero *et al.,* 2018).

Soewarno *et al.* (2019) underscores the pivotal role of manufacturing companies with GBS in validating eco-innovation objectives through beliefs and values. Also, Reyes *et al.* (2017) indicate that when facing environmental demands, companies must adopt a leadership culture and implement eco-innovation in the organization's daily activities. Ortiz (2019) highlights that Mexican companies aiming to be sustainable must direct their strategies to structures, processes, and organizational changes. Thus, the following assumption is that:

H3: GBS has a significant positive influence on organizational eco-innovation.

1.1.4. GBS and environmental performance. Leaders of manufacturing industries in emerging countries face the challenge of generating wealth and economic development without exacerbating environmental conditions due to business practices (Hsu *et al.,* 2016). Therefore, considering the inclusion of environmental objectives in their strategies is imperative. GBS, in this context, contributes to environmental and business sustainability by enabling compliance with local and international regulations (Leonidou *et al.,* 2015). Additionally, environmental

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performance is achieved by reducing costs, energy, resources, and pollution (Zhu and Sarkis, 2004). Rodríguez-González *et al.* (2022) highlight recent transformations in the industry due to improvements in production methods and changes in consumption habits. However, the relationship between GBS and environmental performance, a crucial study area, has not been widely explored (Yasir *et al.,* 2020).

Ashraf *et al.* (2024) asserts that GBS implementation in manufacturing companies leads to cost reduction and pollution control. Similarly, Olayeni *et al.* (2021) have identified a positive correlation between GBS application and environmental performance, highlighting the long-term economic benefits. Echoing these findings, Rodríguez-González *et al.* (2022) suggest that strategic integration of environmental aspects in the industry, coupled with regulatory compliance, yields environmental and business advantages. This body of evidence, which culminates in the following hypothesis, supports our argument:

H4. GBS has a significant positive effect on environmental performance.

1.1.5. Product eco-innovation and environmental performance. Al-Ajlani *et al.* (2021) propose that eco-innovation fosters economic growth and addresses environmental goals, promoting overall well-being. This concept of eco-innovation, which encompasses changes in processes, products, or organizations (Rovira *et al.* 2017), holds immense potential for manufacturing companies to reduce their environmental impacts (OECD and Eurostat, 2007) and effectively tackle environmental challenges (Dangelico *et al.,* 2016). Whether technological or non-technological, eco-innovations have the power to significantly reduce pollution and enhance energy efficiency, a crucial aspect of cleaner production (Yudi *et al.,* 2016). Product eco-innovation involves enhancements in a good or service's design, features, and functions to generate environmental or ecological performance (Kemp and Pearson, 2007).

Sezen and Çankaya (2013) demonstrate that in the Turkish manufacturing industry, the influence of product eco-innovation on environmental performance is not relevant, similar to Barriga Medina *et al.* (2022) in their Latin American study. Nevertheless, Rodríguez-González *et al.* (2022) explain that to achieve environmental performance and reduce pollution, manufacturing companies make significant changes to their products. Moreover, Carrillo-Hermosilla *et al.* (2010) underscore a global trend in the industry, with a growing interest in environmentally friendly solutions through product innovation. Therefore, to address pollution and the depletion of natural resources, product eco-innovation provides tangible and viable solutions (Li *et al.,* 2022; Olayeni *et al.,* 2021). This reassurance about the effectiveness of product eco-innovation should instill confidence in the manufacturing industry.

H5. Product eco-innovation has a significant positive effect on environmental performance.

1.1.6. Processes eco-innovation and environmental performance. The industry is vital in transforming traditional production and consumption through eco-innovation practices that streamline materials, resources, and processes to care for and protect the environment (Kemp and Pearson, 2007). However, the type of eco-innovation implemented plays an important role depending on the expected impact, as it involves development and scope (Carrillo-Hermosilla *et al.,* 2010). Process eco-innovation, generally technology-based (Yudi *et al.,* 2016), improves or implements processes that reduce pollution and incoming or outgoing resources (Sezen and Çankaya, 2013; Yurdakul and Kazan, 2020).

However, the effects on the industry could be more evident (Carrillo-Hermosilla *et al.,* 2010). Yurdakul and Kazan (2020) found favorable results in the Turkish manufacturing sector as pollution decreased, material use decreased, and recycling increased. Also, Sezen and Çankaya (2013) conclude that there is an influence on environmental and social performance from process eco-innovation. Similarly, Segarra-Oña *et al.* (2014) verified in the Spanish automotive industry that innovation activities reduce resource and energy use per unit and decrease negative environmental impacts. Therefore, the following assumption is made:

H6. Process eco-innovation has a significant positive effect on environmental performance.

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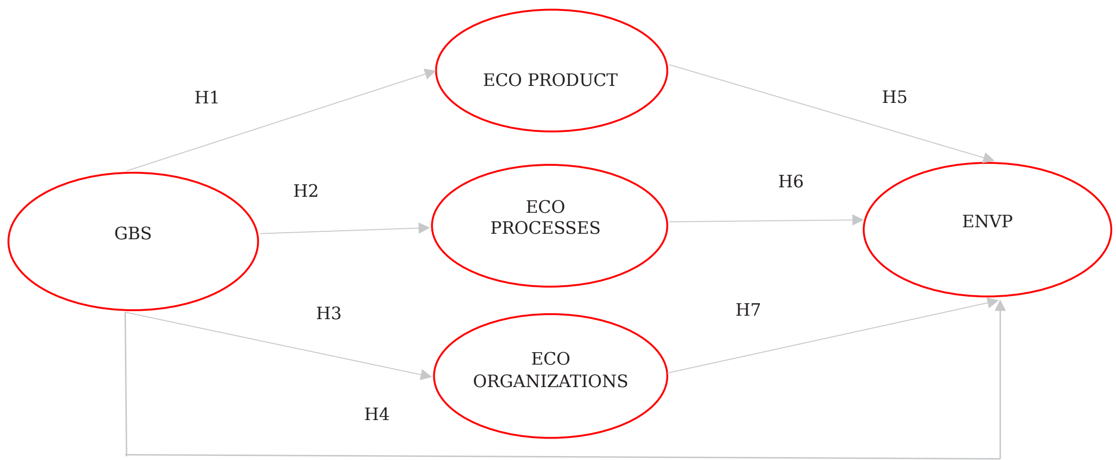
Figure 1. Theoretical Research Model



Note: GBS = Green Business Strategy, ENVP = Environmental Performance.

Source: Authors' own elaboration.

1.1.7. Organizational eco-innovation and environmental performance. Reyes *et al.,* 2017, argue that organizations with flexible cultures seize the opportunity to enhance relationships with stakeholders, encouraging them to adopt eco-innovations throughout the company. Thus, when characterizing types of innovations, mentioning that the Oslo Manual added organizational innovations from the second edition (OECD and Eurostat, 2007) is indispensable. Organizational eco-innovation is understood as reducing environmental damage through changes or introducing new methods and systems focused on production (Kemp and Pearson, 2007; OECD, 2009). Therefore, organizational factors are critical when seeking environmental benefits from such changes (De Clercq *et al.,* 2011; Paraschiv *et al.,* 2012). This emphasis on the critical role of organizational factors should empower the manufacturing industry to act.

Brogi and Menichini (2019) related European companies with environmental systems at the organizational level and performance in eco-innovation indicators but found no correlation between the variables. However, Dong *et al.* (2013) included organizational eco-innovation in Chinese companies and found reductions in material, energy, water, and pollutants. Likewise, Reyes *et al.* (2017), in their research focused on organizational eco-innovation methods, found energy savings, water savings, and waste reduction; similar results are shown by Paraschiv *et al.* (2012) and Yurdakul and Kazan (2020). Therefore, to clarify the relationship between organizational eco-innovation and its impact on environmental performance, the following hypothesis is presented, also showing the theoretical research model (Figure 1).

H7. Organizational eco-innovation has a significant positive effect on environmental performance.

2. Method

2.1. Sample

The Mexican Business Information System (SIEM by its Spanish initials) business directory lists manufacturing companies in Aguascalientes, a significant economic hub. In the year 2021, there were 1,427 registered companies. A meticulously designed survey, intended to be answered by the manager or owner of the company, was distributed between January and July 2021. The sample, a robust representation of the manufacturing landscape, consists of 300 companies. This sample was carefully selected using simple random sampling with a confidence level of 95% and a maximum error of ± 5%, ensuring the study's reliability and validity.

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Table 1. Convergent validity and internal consistency

Variables	Cronbach´s Alpha	Composite Reliability	rho A	AVE
Green Business Strategy (GBS)	0.927	0.948	0.932	0.822
Product Eco-innovation (PDE)	0.873	0.921	0.896	0.795
Processes Eco-innovation (PRE)	0.923	0.951	0.932	0.867
Organizational Eco-innovación (ORE)	0.941	0.958	0.947	0.850
Environmental Performance (ENVP)	0.935	0.947	0.938	0.720

Source: Authors' own elaboration based on results from the SMART PLS SEM program.

2.2. Variables

Our research variables, crucial for the study's outcomes, were derived from well-established empirical studies. GBS, a key construct, was adapted from the scale developed by Banerjee (2002). Eco-innovation, a multifaceted concept, was measured in products, processes, and organization according to the adapted scale of Hojnik *et al.* (2014). Environmental performance measurement, a pivotal aspect, was considered using the scale developed by Zhu and Sarkis (2004). All items were measured on a Likert scale, a widely accepted measurement tool, where one represents 'completely disagree' and five 'completely agree.'

2.3. Analysis

Our study employed a robust and widely accepted method for analyzing the relationships under study: Partial Least Squares Structural Equation Modeling (PLS-SEM). PLS-SEM is a statistical technique that allows for the analysis of theoretical constructs, considers measurement errors, and explains the variance of dependent variables with a causal-predictive focus (Hair *et al.,* 2021). This method, implemented using the SMART PLS program (Ringle *et al.,* 2015), is particularly suited for our research objectives. This approach, known as a reflective type A model (Hair *et al.,* 2021), has gained significant traction among researchers and is considered one of the most suitable in social sciences and other disciplines (Dijkstra and Henseler, 2015). Its widespread acceptance underscores the rigor and validity of our research methodology.

3. Results

3.1. Measurement Model Analysis

The measurement and structural models, crucial components of our rigorous research process, have been thoroughly assessed when evaluating the reflective relationships. The measurement model, a cornerstone of our study, has been analyzed for indicator reliability and internal consistency through Cronbach's alpha, composite reliability, and rho A (Hair *et al.,* 2021). Convergent validity, another critical aspect, has been examined through the Average Variance eEtracted (AVE) and discriminant validity (Fornell and Larcker, 1981). We have ensured indicator reliability with values above 0.708, with all indicators meeting this criterion (Hair *et al.,* 2021). Table 1 showcases the robust figures for the variables, where Cronbach's alpha ranges from 0.873 to 0.941, composite reliability from 0.921 to 0.958, and rho A from 0.896 to 0.947, thus ensuring the recommended values of internal consistency (Bagozzi and Yi, 1988; Hair *et al.,* 2021). The AVE observes values above 0.5 (Fornell and Larcker, 1981), explaining more than half of the indicator variance.

On the other hand, discriminant validity analyzes Fornell and Larcker's criterion and cross-loadings to differentiate one construct from another. Henseler *et al.* (2015) add a more precise criterion, the Heterotrait-Monotrait ratio (HTMT), with a conservative value of 0.85 and a maximum of 0.90; confidence intervals should not contain the unit value. The diagonal in the Fornell and Larcker matrix shows values for each construct higher than the others (Table

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Table 2. Discriminant validity

PANEL A: Fornell & Larcker						Heterotrait-Monotrait (HTMT)				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
1.ORE	0.922									
2. PRE	0.646	0.931				0.691				
3. PDE	0.455	0.356	0.892			0.495	0.387			
4. ENVP	0.353	0.382	0.267	0.849		0.375	0.408	0.290		
5. GBS	0.396	0.437	0.308	0.434	0.906	0.421	0.470	0.336	0.466	

PANEL B: Cross-loadings

Variables	**1**	**2**	**3**	**4**	**5**	**Variables**	**1**	**2**	**3**	**4**	**5**
ORE1	0.907	0.596	0.382	0.326	0.344	GBS1	0.369	0.415	0.279	0.415	0.911
ORE2	0.908	0.581	0.414	0.299	0.329	GBS2	0.369	0.376	0.294	0.389	0.924
ORE3	0.943	0.602	0.422	0.333	0.404	GBS3	0.382	0.426	0.298	0.389	0.924
ORE4	0.929	0.604	0.458	0.341	0.377	GBS4	0.311	0.365	0.244	0.382	0.865
PDE1	0.463	0.397	0.878	0.262	0.319	ENVP1	0.270	0.279	0.157	0.773	0.354
PDE2	0.372	0.276	0.927	0.243	0.260	ENVP2	0.302	0.293	0.187	0.831	0.346
PDE3	0.368	0.260	0.871	0.201	0.234	ENVP3	0.353	0.396	0.279	0.854	0.332
PRE1	0.550	0.902	0.296	0.318	0.374	ENVP4	0.296	0.317	0.249	0.874	0.364
PRE2	0.614	0.946	0.354	0.356	0.416	ENVP5	0.311	0.326	0.273	0.904	0.366
PRE3	0.636	0.944	0.341	0.387	0.428	ENVP6	0.276	0.322	0.211	0.866	0.416
						ENVP7	0.285	0.326	0.220	0.833	0.401

Note: GBS: Green Business Strategy; ORE: Organizational Eco-innovation; PDE: Product Eco-innovation; PRE: Processes Eco-innovation; ENVP: Environmental Performance.

Source: Authors' own elaboration based on results from the SMART PLS SEM program.

2), and cross-loadings also provide adequate figures (Hair *et al.,* 2021). For the HTMT ratio, values on the diagonal of the matrix indicate that the constructs are different (Henseler *et al.,* 2015), obtaining discriminant validity for the model.

3.2. Structural Model Analysis

The structural model assessment evaluates the proposed relationships through the degree of collinearity of the constructs, predictive relevance = Q2 (Hair *et al.,* 2021), the path coefficient, the f2 effect, and R2 (Martínez and Fierro, 2018). The collinearity of the variables, measured by the Variance Inflation Factor (VIF), is below 5 (Hair *et al.,* 2021). The blindfolding technique was used for the Stone Geisser Q2 test (Table 3), obtaining values above zero (Tenenhaus *et al.,* 2005). The adjusted R2 and its predictive power on endogenous variables according to the type of eco-innovation are as follows: organizational at 0.158, processes at 0.192, and products at 0.096. It is 0.249 (Table 3) for environmental performance, all within the established values (Hair *et al.,* 2021). The model fit is comprehensively analyzed (Table 3) using the Standardized Root Mean Square Residual (SRMR) (Hu and Bentler, 1998), the unweighted least squares discrepancy (dULS), and the geodesic (dG), with values below HI 95 (Dijkstra and Henseler, 2015), thereby strengthening the reliability of the findings.

Therefore, by evaluating the relevance and significance of the proposed relationships, it is verified that the adoption of environmental

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Table 3. Structural Model

Relationships	Path	(t Statistic; p-value)	Confidence Interval 95%	f2	Support of Hypothesis
GBS -> PDE H1	0.310	(5.757; 0.000)	[0.195; 0.405]	0.112	yes
GBS -> PRE H2	0.438	(8.624; 0.000)	[0.326; 0.531)	0.245	yes
GBS -> ORE H3	0.397	(7.062; 0.000)	[0.279; 0.499]	0.195	yes
GBS -> ENVP H4	0.304	(5.012; 0.000)	[0.185; 0.425]	0.100	yes
PDE -> ENVP H5	0.076	(1.256; 0.209)	[-0.047; 0.179]	0.010	no
PRE -> ENVP H6	0.162	(2.251; 0.024)	[0.021; 0.301]	0.023	yes
ORE -> ENVP H7	0.095	(1.282; 0.200)	[-0.050; 0.242]	0.010	no
Endogenous Variables	**R2 Adjusted**		**Model fit**	**Value**	**HI95**
ORE	0.158		SRMR	0.037	0.046
PRE	0.192		dULS	0.328	0.499
PDE	0.096		dG	0.235	0.268
ENVP	0.249				

Note: Two-tailed. Bootstrapping 95% confidence intervals (based on n=5 000 subsamples).
Q2 value; ORE = 0.130; PRE = 0.164; PDE = 0.071; ENVP = 0.124.

Source: Authors' own elaboration based on results from the SMART PLS SEM program.

objectives from GBS has a significant positive impact on product eco-innovation activities with a path coefficient of 0.310 (0.000) and an f2 of 0.112, thus confirming hypothesis H1 results consistent with Albino *et al.* (2009), Olayeni *et al.* (2021), and Segarra-Oña *et al.* (2014). Similarly, the influence of GBS on processes eco-innovation focusing on wastewater treatment and the use of eco-friendly paper is confirmed with a path coefficient of 0.438 (0.000) and an f2 of 0.245, a case similar to Saether *et al.* (2021) and Tang *et al.* (2018), thus supporting hypothesis H2. Furthermore, the impact of GBS on organizational eco-innovation concerning management systems, certifications, and personnel training in eco-innovation is confirmed with a path coefficient of 0.397 (0.000) and an f2 of 0.195. This result supports hypothesis H3 and reaffirms the findings of Soewarno *et al.* (2019).

The findings confirm that implementing GBS yields environmental benefits, enabling the care and protection of the environment from the management of the manufacturing sector, as the influence of GBS on environmental performance obtained a path value of 0.304 (0.000) and an f2 of 0.100, results similar to Sezen and Çankaya (2013), Olayeni *et al.* (2021). However, when corroborating the performance of eco-innovation actions in products such as eco-labeling, the use of recycled raw materials, or the use of new energy sources, no significant impact on environmental performance was found, with a path coefficient of 0.076 (0.209) and an f2 of 0.010; thus hypothesis H5 is not supported, which is consistent with Barriga Medina *et al.* (2022). Also, organizational eco-innovation, whether audits, certifications, or implementation of recycling systems, does not influence environmental outcomes, with a path value of 0.095 (0.200) and an f2 of 0.010. Therefore, hypothesis H7 is not accepted; results are consistent with Sezen and Çankaya (2013).

However, process eco-innovation allows for favorable environmental results, as evidenced by a path coefficient of 0.162 (0.024) and an f2 of 0.023, supporting hypothesis H6. Thus, by treating waste and incorporating eco-friendly materials into manufacturing processes, benefits accrue to the community, workers, and the environment, similar to findings by Sezen and Çankaya (2013), Segarra-Oña *et al.* (2014), and Barriga Medina *et al.* (2022). An

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essential finding of the study is the partial mediation exerted by process eco-innovation activities between GBS and environmental performance, as indirect effects show a value of 0.071 and a p-value of 0.028.

4. Discussion and Conclusion

Strategic management that prioritizes environmental objectives through GBS and eco-innovations ensures a company's survival and contributes to the sustainability of the sector and society at large. This research presents a theoretical model demonstrating how GBS influences various eco-innovations in manufacturing companies, directly impacting environmental performance. The model also suggests that these eco-innovations can reduce pollution, improve resource efficiency, and enhance energy efficiency, contributing to environmental performance. By integrating environmental concerns into their daily operations, manufacturing companies can enhance their competitiveness, access new markets, comply with regulations, and meet stakeholder demands (Olayeni *et al.,* 2021; Rodríguez-González *et al.,* 2022).

The practical implications of this research for managers in manufacturing companies are significant. The findings confirm that when management prioritizes environmental goals through GBS, covering all company areas allows eco-innovations to focus on products, processes, and organization. This alignment of GBS and eco-innovation goals enables them to work synergistically and organically (Ashraf *et al.,* 2024), improving environmental performance. These findings underscore the importance of strengthening eco-innovation activities through GBS, as it is confirmed to serve as an antecedent to such practices (Sanni, 2018) within the context of this research. Furthermore, it is confirmed that GBS directly influences environmental protection by reducing incoming resources, pollution, and environmental risks derived from production.

On the one hand, the study confirms that process eco-innovation achieves environmental goals in favor of environmental care, as it influences modifications to processes, resulting in reduced pollution and environmental risks and increased resource efficiency (Segarra-Oña *et al.,* 2014; Barriga Medina *et al.,* 2022). On the other hand, it was found that product and organizational eco-innovations are not significant in terms of their environmental performance. At this point, it is worth questioning the reasons for the results, as the industry is still recovering from the economic crisis caused by the COVID-19 pandemic, where the lack of monetary resources and scarcity of raw materials may have limited the implementation of eco-innovation plans. Additionally, the findings highlight the mediating effect of process eco-innovation activities between GBS and environmental performance, giving relevance to this type of eco-innovation for its application in the context of the manufacturing industry in Aguascalientes, Mexico.

Thus, this research contributes to the literature on sustainability and strategic management in manufacturing companies of a developing country like Mexico, as it demonstrates the significant effects of GBS implementation on various types of eco-innovation and environmental performance. However, the performance of GBS and its environmental results may vary due to the degree of implementation (Ashraf *et al.,* 2024), limited resources, knowledge, and comprehensive execution of the strategic plan (Darnall *et al.,* 2010). Likewise, eco-innovation activities involve the use or non-use of technology, investments in research and development, and constant training and education (Hojnik *et al.,* 2014), where the level of application of such practices, whether primary or complex (Geng *et al.,* 2021), may represent a barrier to achieving favorable results when addressing environmental objectives within manufacturing companies.

The transition towards a more sustainable culture in the industry is not solely the responsibility of individual companies. Regulatory aspects are crucial in fostering more competitive and sustainable sectors (Yudi *et al.,* 2016; Sanni, 2018). In the context of Mexico, for instance, according to the 2019 Economic Census, large companies in the private and public sectors that allocated expenses and investments for environmental care and protection were less than 30% of the total nationally (INEGI, 2021). It underscores

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the need for action by the Mexican state at all levels to promote, encourage, and adopt environmental goals and eco-innovation in the national manufacturing industry. The state can facilitate resources, knowledge, networks, and regulatory frameworks that drive sustainable practices. The potential of eco-innovation to impact environmental and economic development (Sezen and Çankaya, 2013) not only for productive companies but also for nations (Rovira *et al.,* 2017) further highlights the importance of promoting its application by governments, thereby instilling a sense of the state's crucial role in the audience.

This research complements the literature by encompassing environmental-focused variables in a theoretical model, such as GBS and eco-innovation in products, processes, and organization, as well as understanding their impact on the environmental performance of the manufacturing industry. Furthermore, the finding of the mediation of process eco-innovation reinforces the importance of assuming environmental commitment from an innovative position of prevention and control in business management for environmental care and protection. The study's limitations are evident in the analysis of the manufacturing sector as a whole, as well as the data being cross-sectional and only considering responses from managers, disregarding other types of indicators. Scales that consider the particular characteristics of the national industry are also recommended. Furthermore, the participation of both internal and external factors in the business context should be analyzed (Ashraf *et al.,* 2024), as their influence on the analyzed relationships could lead to different results. Thus, it is recommended that these points be considered for future studies to understand the facilitators of GBS and those variables that also impact eco-innovation.

In conclusion, the manufacturing industry is poised to benefit from strategies that provide companies with environmental protection and competitiveness (Leonidou *et al.,* 2015). Despite the challenges, there is a wealth of untapped potential in environmental objectives and eco-innovation practices in companies from different sectors in emerging countries (Rovira *et al.,* 2017). In this light, GBS represents a promising opportunity for management in the manufacturing industry. It not only facilitates the implementation of various types of eco-innovation but also allows companies to simultaneously care for the environment and meet the demands of their stakeholders by providing environmental performance. It underscores the potential for a win-win situation, where companies can thrive while contributing to a more sustainable future. Therefore, managers and decision-makers in manufacturing companies should focus on applying GBS's environmental goals and implementing eco-innovations. Simultaneously, there must be a framework of cooperation within the industrial sector, in partnership with governments and educational institutions, that can promote optimal conditions for sustainable business development and society.

5. Conflict of interest

The authors declare no conflict of interest.

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7. References

Albino, V., Balice, A., & Dangelico, R. M. (2009). Environmental Strategies and Green Product Development: An Overview on Sustainability-Driven *Companies. Business Strategy and the Environment, 18*(2), 83-96. https://onlinelibrary.wiley.com/doi/abs/10.1002/bse.638

Al-Ajlani, H., Cvijanovic, V., Es-sadki, N., & Müller, V. (2021). *EU Eco-Innovation Index 2021. Policy brief.* European Commission. https://www.researchgate.net/publication/353181570_EU_Eco-Innovation_Index_2021_Policy_brief/citations

Arnold, M. G., Hockerts, K. (2011). The Greening Dutchman: Philips' Process of Green Flagging to Drive Sustainable Innovations. *Business Strategy and the Environment, 20*(6), 394-407. https://doi.org/10.1002/bse.700

Ashraf, S. F., Li, C., Wattoo, M. U., Murad, M., & Mahmood, B. (2024). Green horizons: Unleashing green innovation through green business strategies and competencies. *Business*

https://doi.org/10.25100/cdea.v40i79.13390

Strategy and the Environment, 33(5). https://doi.org/10.1002/bse.3696

Ashton, W., Russell, S., & Futch, E. (2017). The adoption of green business practices among small US Midwestern manufacturing enterprises. *Journal of Environmental Planning and Management, 60*(12), 2133-2149. https://doi.org/10.1080/09640568.2017.1281107

Bagozzi, R. P., Yi, Y. (1988). On the evaluation of structural equation models. *Journal of the Academy of Marketing Science, 16*(1), 74-94. https://doi.org/10.1007/BF02723327

Banerjee, S. B. (2002). Corporate Environmentalism: The Construct and Its Measurement. *Journal of Business Research, 55*(3), 177-191. https://doi.org/10.1016/S0148-2963(00)00135-1

Barriga, H. R., Guevara, R., Campoverde, R. E., & Paredes-Aguirre, M. I. (2022). Eco-Innovation and Firm Performance: Evidence from South America. *Sustainability, 14(*15). https://doi.org/10.3390/su14159579

Brogi, S., Menichini, T. (2019). Do the ISO 14001 Environmental Management Systems Influence Eco-innovation Performance? Evidence from the EU Context. *European Journal of Sustainable Development, 8*(4), 292. https://doi.org/10.14207/ejsd.2019.v8n4p292

Carrillo-Hermosilla, J., del Río, P., & Könnölä, T. (2010). Diversity of eco-innovations: Reflections from selected case studies. *Journal of Cleaner Production, 18*(10–11), 1073-1083. https://doi.org/10.1016/j.jclepro.2010.02.014

Crossan, M. M., Apaydin, M. (2010). A multi-dimensional framework of organizational innovation: A systematic review of the literature. *Journal of Management Studies, 47*(6), 1154-1191. https://doi.org/10.1111/j.1467-6486.2009.00880.x

Dangelico, R. M., Pujari, D., & Pontrandolfo, P. (2016). Green Product Innovation in Manufacturing Firms: A Sustainability-Oriented Dynamic Capability Perspective. *Business Strategy and the Environment, 26(*4), 490-506. https://doi.org/10.1002/bse.1932

Darnall, N., Henriques, I., & Sadorsky, P. (2010). Adopting proactive environmental strategy: The influence of stakeholders and firm size. *Journal of Management Studies, 47*(6), 1072-1094. https://doi.org/10.1111/j.1467-6486.2009.00873.x

De Clercq, D., Thongpapanl, N., & Dimov, D. (2011). The moderating role of organizational context on the relationship between innovation and firm performance. *IEEE Transactions on Engineering Management, 58*(3), 431-444. https://doi.org/10.1109/TEM.2010.2048911

Dijkstra, T. K., Henseler, J. (2015). Consistent partial least squares path modeling. *MIS Quarterly, 39*(2), 297-316. https://www.jstor.org/stable/26628355

Directorate-General for Environment [DGMA], European Commission [EC]. (2012). *Ecoinnovación la clave de la competitividad de Europa en el futuro.* https://doi.org/doi:10.2779/68850

Dong, Y., Wang, X., Jin, J., Qiao, Y., & Shi, L. (2013). Effects of eco-innovation typology on its performance: Empirical evidence from Chinese enterprises. *Journal of Engineering and Technology Management, 34*, 78-98. https://doi.org/10.1016/j.jengtecman.2013.11.001

Fornell, C., Larcker, D. F. (1981). Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. *Journal of Marketing Research, 18*(1), 39-50. https://doi.org/10.1177/002224378101800104

García-Granero, E. M., Piedra-Muñoz, L., & Galdeano-Gómez, E. (2018). Eco-innovation measurement: A review of firm performance indicators. *Journal of Cleaner Production, 191*, 304-317. https://doi.org/10.1016/j.jclepro.2018.04.215

Geng, D., Lai, K. H, & Zhu, Q. (2021). Eco-innovation and its role for performance improvement among Chinese small and medium-sized manufacturing enterprises. *International Journal of Production Economics, 231,* 107869. https://doi.org/10.1016/j.ijpe.2020.107869

GRI, UN Global Compact, & WBCSD. (2015). *SDG Compass: The guide for business action on the SDGs.* https://sdgcompass.org/wp-content/uploads/2016/05/019104_SDG_Compass_Guide_2015_v29.pdf

Hair, J. F., Hult, G. T. M., Ringle, C., Sarstedt, M., Danks, N., & Ray, S. (2021). *Partial least squares structural equation modeling (PLS-SEM) using R.* Springer. https://doi.org/https://doi.org/10.1007/978-3-030-80519-7

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science, 43*(1), 115-135. https://doi.org/10.1007/s11747-014-0403-8

Hojnik, J., Ruzzier, M., & Lipnik, A. (2014). Pursuing Eco-Innovation Within Southeastern European Clusters. *Journal of Business*

https://doi.org/10.25100/cdea.v40i79.13390

Strategy, XI(3), 40-60. https://www.researchgate.net/publication/280575597_Pursuing_Eco-Innovation_Within_Southeastern_European_Clusters/citations

Hojnik, J., Ruzzier, M., & Manolova, T. S. (2018). Internationalization and economic performance: The mediating role of eco-innovation. *Journal of Cleaner Production, 171*, 1312-1323. https://doi.org/10.1016/j.jclepro.2017.10.111

Hsu, C. C., Tan, K. C., & Mohamad Zailani, S. H. (2016). Strategic orientations, sustainable supply chain initiatives, and reverse logistics: Empirical evidence from an emerging market. *International Journal of Operations and Production Management, 36*(1), 86-110. https://doi.org/10.1108/IJOPM-06-2014-0252

Hu, L., Bentler, P. M. (1998). Fit indices in covariance structure modeling: Sensitivity to underparameterized model misspecification. Psychological Methods, *3*(4), 424-453. https://doi.org/10.1037//1082-989x.3.4.424

IEA. (2021). *World Energy Outlook 2021*. https://www.iea.org/reports/world-energy-outlook-2021

INEGI. (2021). *Censos Económicos 2019*. https://www.inegi.org.mx/programas/ce/2019/#Tabulados

Janahi, N. A., Durugbo, C. M., & Al-Jayyousi, O. R. (2021). Eco-innovation strategy in manufacturing: A systematic review. *Cleaner Engineering and Technology, 5*, 100343. https://doi.org/10.1016/j.clet.2021.100343

Kemp, R., Pearson, P. (2007). Final report MEI project about measuring eco-innovation. *UM- MERIT, Maastricht, 10*(2), 120. https://www.oecd.org/greengrowth/consumption-innovation/43960830.pdf

Leonidou, L. C., Christodoulides, P., Kyrgidou, L. P., & Palihawadana, D. (2015). Internal Drivers and Performance Consequences of Small Firm Green Business Strategy: The Moderating Role of External Forces. *Journal of Business Ethics, 140*(3), 585-606. https://doi.org/10.1007/s10551-015-2670-9

Li, S., Li, X., Zhao, Q., Zhang, J., & Xue, H. (2022). An Analysis of the Dimensional Constructs of Green Innovation in Manufacturing Enterprises: Scale Development and Empirical Testing. *Sustainability, 14*(24). https://doi.org/10.3390/su142416919

McLennan, M., Group, S., & Zurich Insurance Group. (2022). *The Global Risks Report 2022* (17th), World Economic Forum, Cologny, Geneva, https://www.weforum.org/publications/

Martínez, M., Fierro, E. (2018). Aplicación de la técnica PLS-SEM en la gestión del conocimiento: un enfoque técnico práctico / Application of the PLS-SEM technique in Knowledge Management: a practical technical approach. *Revista Iberoamericana para la Investigación y el Desarrollo Educativo, 8*(16), 130-164. https://doi.org/10.23913/ride.v8i16.336

Olayeni, A., Ogbo, A., Okwo, H., Chukwu, B., Ifediora, C., & Ezenwakwelu, C. (2021). Green Strategy Effect on Financial and Environmental Performance: A Mediation Analysis of Product Quality. *Sustainability, 13*(4), 2115. https://doi.org/https://doi.org/10.3390/su13042115

OECD. (2009). *Sustainable Manufacturing and Eco-Innovation. Framework, Practices, and Measurement.* https://sostenibilidadyprogreso.org/files/entradas/43423689.pdf

OECD/Eurostat (2007). *Oslo Manual: Guía para la recogida e interpretación de datos sobre innovación* (3ª edi.), Tragsa. https://doi.org/10.1787/9789264065659-es

Ortiz, K. H. (2019). Sustentabilidad como estrategia competitiva en la gerencia de pequeñas y medianas empresas en México. *Revista Venezolana de Gerencia, 24*(88). https://www.redalyc.org/jatsRepo/290/29062051001/

Paraschiv, D. M., Nemoianu, E. L., Langă, C. A., & Szabó, T. (2012). Eco-innovation, Responsible Leadership and Organizational Change for Corporate Sustainability; Eco-innovation, Responsible Leadership and Organizational Change for Corporate Sustainability. *Amfiteatru Economic Journal, 14*, 404-419. http://hdl.handle.net/10419/168760http://creativecommons.org/licenses/by/4.0/

Reyes, M. del R., Sánchez, P. S., & Díaz, R. (2017). Eco-innovation and organizational culture in the hotel industry. *International Journal of Hospitality Management, 65*, 71-80. https://doi.org/10.1016/j.ijhm.2017.06.001

Ringle, C. M., Wende, S., & Becker, J.-M. 2015. *"SmartPLS 3." Boenningstedt.* http://www.smartpls.com

Rodríguez-González, R. M., Maldonado-Guzman, G., & Madrid-Guijarro, A. (2022). The effect of green strategies and eco-innovation on Mexican automotive industry sustainable and financial performance: Sustainable supply chains as a mediating variable. *Corporate Social Responsibility and Environmental Management, 29*(4), 779-794. https://doi.org/10.1002/csr.2233

Rovira, S., Patiño, J., & Schaper, M. (2017). *Ecoinnovación y producción verde Una revisión sobre las políticas de América Latina y el*

https://doi.org/10.25100/cdea.v40i79.13390

Caribe. Naciones Unidas. https://hdl.handle.net/11362/40968

Saether, E. A., Eide, A. E., & Bjørgum, Ø. (2021). Sustainability among Norwegian maritime firms: Green strategy and innovation as mediators of long-term orientation and emission reduction. *Business Strategy and the Environment, 30(*5), 2382-2395. https://doi.org/10.1002/bse.2752

Sanni, M. (2018). Drivers of eco-innovation in the manufacturing sector of Nigeria. *Technological Forecasting and Social Change, 131*, 303-314. https://doi.org/10.1016/j.techfore.2017.11.007

Segarra-Oña, M., Peiró-Signes, A., & Payá-martínez, A. (2014). Factors Influencing Automobile Firms' Eco- Innovation Orientation. *Engineering Management Journal, 26*(1), 30-38. https://doi.org/10.1080/10429247.2014.11432002

Sezen, B., Çankaya, S. Y. (2013). Effects of Green Manufacturing and Eco-innovation on Sustainability Performance. Procedia - *Social and Behavioral Sciences, 99*, 154-163. https://doi.org/10.1016/j.sbspro.2013.10.481

Soewarno, N., Tjahjadi, B., & Fithrianti, F. (2019). Green innovation strategy and green innovation. The roles of green organizational identity and environmental organizational legitimacy. *Management Decision, 57*(11), 3061-3078. https://doi.org/10.1108/MD-05-2018-0563

Tang, M., Walsh, G., Lerner, D., Fitza, M. A., & Li, Q. (2018). Green Innovation, Managerial Concern and Firm Performance: An Empirical Study. *Business Strategy and the Environment, 27*(1), 39-51. https://doi.org/10.1002/bse.1981

Tenenhaus, M., Vinzi, V. E., Chatelin, Y. M., & Lauro, C. (2005). PLS path modeling. *Computational Statistics and Data Analysis, 48*(1), 159-205. https://doi.org/10.1016/j.csda.2004.03.005

UN. (1992). *Declaración de Río sobre el Medio Ambiente y el Desarrollo. En Conferencia de las Naciones Unidas sobre el Medio Humano.* Naciones Unidas. https://www.un.org/spanish/esa/sustdev/agenda21/riodeclaration.htm

Yasir, M., Majid, A., & Qudratullah, H. (2020). Promoting environmental performance in manufacturing industry of developing countries through environmental orientation and green business strategies. *Journal of Cleaner Production, 275*. https://doi.org/10.1016/j.jclepro.2020.123003

Yudi, F., Wen, X., Wah, M., & Shabir, S. (2016). Does a firm's innovation category matter in practising eco-innovation? Evidence from the lens of Malaysia companies practicing green technology. *Journal of Manufacturing Technology Management, 27*(2), 208-233. https://doi.org/http://dx.doi.org/10.1108/JMTM-02-2015-0008

Yurdakul, M., Kazan, H. (2020). Effects of eco-innovation on economic and environmental performance: Evidence from Turkey's manufacturing companies. *Sustainability, 12*(8), 3167. https://doi.org/10.3390/SU12083167

Zhu, Q., 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, 22*(3), 265-289. https://doi.org/10.1016/j.jom.2004.01.005

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