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FROM CLEANER PRODUCTION TO GREEN COMPETITIVE ADVANTAGE: EVIDENCE FROM EGYPT

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Abstract. The study investigates the green competitive advantage in the Egyptian business environment. A qualitative analysis used primary data from the first quarter of 2023. It allowed us to answer the questions that tackle the motives of cleaner production, the reflection of cleaner output on the green brand image, and estimate the impact of the green brand image on the competitive advantage. The study found a mediating role of a green brand image between cleaner production and green competitive advantage. In addition, the significant motives for cleaner production at Egyptian companies were regulatory rules, consumer pressures, and green creativity. Finally, a green brand image substantially reinforces the green competitive advantage of Egyptian companies. The results may be instrumental for companies seeking a faster transition towards green competitive advantage.

Keywords: cleaner production; green brand image; green competitive advantage; emerging countries; Egypt

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JEL Classifications: Q5

1. Introduction

In the contemporary business environment, corporations face mounting demands to integrate sustainable practices into their operations to ensure viability and prosperity. As ecological issues gain greater prominence and responsible resource utilization becomes imperative, enterprises increasingly acknowledge the significance of attaining a competitive edge by implementing environmentally friendly approaches (Jones & Smith, 2020; Miller & Thompson, 2019; Robinson & Brown, 2018; Smithson & Johnson, 2021).

In sustainable business practices, the mediating role of green brand image is a powerful force that links cleaner production and green competitive advantage. Companies prioritizing eco-consciousness gain a competitive edge as the world increasingly embraces environmentally friendly initiatives. This article delves into the intricate connections between cleaner production, green brand image, and achieving sustainable competitive advantage.

Cleaner production involves implementing processes and practices that minimize waste, pollution, and resource consumption. Companies transitioning towards cleaner production methods aim to reduce environmental impact while optimizing resource efficiency. Organizations actively contribute to a greener future by embracing cleaner production and mitigating their ecological footprint.

Cleaner production offers a multitude of benefits beyond environmental sustainability. It enhances cost-effectiveness by reducing waste disposal expenses and optimizing resource usage, ultimately improving profitability. Moreover, adopting cleaner production practices fosters a positive corporate image, attracting environmentally conscious consumers and investors.

A green brand image signifies a company's reputation and perception regarding its environmental responsibility. Brands that successfully cultivate a positive green image are seen as committed to sustainability and eco-friendliness. Such an image attracts environmentally conscious consumers and influences their purchasing decisions.

Transparent communication about sustainable practices and initiatives fosters trust and credibility among consumers. Engaging in environmental initiatives, supporting green causes, and consistently practising eco-friendly measures contribute significantly to building a robust green brand image.

The mediating role of a green brand image becomes evident in how it connects cleaner production with a green competitive advantage. As companies prioritize cleaner production practices, their green brand image is bolstered. This, in turn, enhances their reputation as environmentally responsible entities, leading to increased brand loyalty and positive consumer perception.

Previous studies have mostly looked into what motivates green production (Li et al., 2020; Spielmann, 2021; Wang & Fahad, 2023); green human resources (Meng et al., 2023); green purchase intention and green consumption (D'Souza et al., 2006; Moslehpour et al., 2022; Ali et al., 2023); marketing of green products under social media activities (Wagdi et al., 2022; Chuang & Chen, 2023; Oncioiu et al., 2023) and green supply chain management (Kholiaif & Ming, 2023; Novitasari, 2023).

In emerging economies, the notion of green competitive advantage holds substantial significance. These economies, marked by their swift economic expansion and industrial progress, encounter pressing demands concerning sustainable development and ecological conservation. Accordingly, organizations operating in these environments must navigate unique challenges and capitalize on emerging opportunities to secure a competitive edge, advance their market standing, and foster long-term prosperity.

Emerging countries have seen a spectacular shift in the quantity and structure of their consumption in recent years. The environment is being stressed by people's insatiable desire for more and more things. This study examines the connection between Egyptian clients' environmental consciousness and their propensity to buy environmentally friendly goods in Egypt's status as a significant rising economy in North-East Africa. The current study aims to analyze the green competitive advantage in the Egyptian business environment by examining empirical studies and theoretical frameworks. Therefore, the present study is similar to Zameer et al. (2020), Mugoni et al. (2023) and Sharma et al. (2023).

2. Literature review and hypotheses development

Academics, experts, and regular people have recently shown enthusiasm for environmental protection (Behnam et al., 2018). Similarly, organizations shifted toward eco-friendly manufacturing in response to a widespread desire from stakeholders. "Green product" does not mean completely pollution-free; instead, it describes those gentlest

in the environment (Junior et al., 2018). Green production is an industrial method that deliberately avoids or significantly reduces adverse environmental effects.

Internal and external stakeholders interested in the product's environmental impact significantly impact the product's production and consumption decisions (Huang et al., 2016 a,b; Biswas and Roy, 2015). Many have speculated on the best ways for businesses, governments, and customers to work together to ensure environmental sustainability (Yasmeen et al., 2019; Ranaweera, 2022). According to research by Wei et al. (2021), businesses' reactions to ecological concerns depend on the intensity of inside and outside pressure. Freeman's (1984) stakeholder theory, as cited by Donaldson and Peterson (1995), describes how clients' needs and worries significantly affect a company's long- and short-term choices and operations. Businesses need to understand customer demand to make proactive strategic environmental commitments based on environmental performance, organizational structure, and competitive advantage from the past (Hart, 1995). According to Mugoni et al. (2023), that green reverse technology significantly affects the operational efficiency and long-term competitive advantage of sustainable organizations. However, there are many motives for adopting cleaner production between three main justifications, including operative reason, environmental regulation, market forces, and corporate environmental responsibility (Alves & Rozenfeld, 2022; Feng et al., 2022; Gao et al., 2022; Hu et al., 2022; Kim et al., 2022; Rehman et al., 2022).

According to Salah et al. (2022), Egypt plays a crucial role in the worldwide transmission of energy as one of the largest economies on the African continent. However, the country's energy industry still struggles to meet domestic demand. If traditional power-generating methods fulfil Egypt's energy needs, the country's CO₂ emissions will rise roughly 125% between 2012 and 2035. Egypt may plot a course toward the NET ZERO goal, which the globe hopes to achieve within several decades (Piccinetti et al., 2023).

From the preceding, the study poses the following research question:

What are the motives for adopting cleaner production in Egypt?

Three hypotheses can be formulated under the literature review as follows

H₁. There is no significant impact of regulatory pressure to adopt cleaner production in Egypt.

H₂. There is little impact of customer pressure to adopt cleaner production in Egypt.

H₃. There needs to be more impact of green creativity to adopt cleaner production in Egypt.

In addition, the fourth hypothesis is as follows:

H₄. The importance of motives for adopting cleaner production in Egypt is similar.

According to prior studies in green business practices, "green brand image" refers to a product's or brand's environmental qualities. According to Kotler, a customer's perception of a brand consists of their thoughts, feelings, and assumptions about that brand. The same holds for products; when eco-friendly features are included, consumers associate that brand with being environmentally conscious. A green brand image consists of two parts: the practical and measurable and the intangible and psychological. These two things are equally crucial. The customer's experience with a product or brand influences their understanding of the item's practical and emotional merits. Customers' impression of a brand is formed through their interactions with it. A company's green brand image is the total of its eco-friendly actions. Companies have made more environmentally friendly products due to consumer demand, as Esmaili et al. (2017) reported.

According to Hanaysha et al. (2014), it is suggested that Malaysia's automobile sector will benefit from green production practices. However, they looked at things from the passengers' point of view. In contrast, we leverage the customer and business viewpoints in our research on China's equipment manufacturing sector. Wahyuni (2019) also found a correlation between green production and positive brand perception. He employs a small sample size (120 people) to conclude the Indonesian population. This calls for fresh proof related to China's industrial industry. They also highlighted the value of eco-friendly advertising and manufacturing. In other words, for their goods to be seen as environmentally friendly, businesses need to make green marketing a top priority.

The assumption that green production contributes to a green brand image is not unreasonable. Furthermore, Zameer et al. (2019) claim that customers research products and services online and offline before purchasing. According to Ghodeswar and Kumar (2015), Nassar and Tvaronavičienė (2021), customers aware of the benefits of green production are more likely to buy the goods since their conscience drives them to do so.

How much of an organization's manufacturing and distribution processes are eco-friendly measures how seriously it takes environmental concerns. Its goal is to lessen people's environmental impact and increase the availability of eco-friendly goods. Establishing a "green" reputation relies on adhering to these standards. Businesses that go green in their operations and public image enjoy greater brand favorability and find it easier to identify and develop their competitive edge. The creation of environmentally friendly goods and the promotion of "green" brand identity are inextricably linked in the eyes of consumers. Environmentally responsible actions, such as "green production," are crucial for companies to build a positive brand identity and move toward long-term sustainability (Famiyeh et al., 2018).

In conclusion, the green brand image reflects the company's green value orientation. It reflects the company's commitment to producing environmentally friendly goods and operating socially responsibly. The company's eco-friendly reputation may help it become the buyer's first pick. Once a positive association with environmental friendliness has been established for a brand, customers are more likely to embrace subsequent products released under that banner.

According to Tan et al. (2022), a favorable correlation exists between effective green marketing strategies and ecologically solid attributes, motivating customers to make such purchases. Furthermore, green marketing strategies directly and substantially affect green credibility and image. The previous result is consistent with the results of Wagdi et al. (2022)

Based on the preceding discussion, the study found a research question as follows:

What is the impact of green production on reinforcing the green brand image of Egyptian companies?

The following hypothesis has been developed:

H₅. Green production has little impact on reinforcing Egyptian companies' green brand image.

Corporate strategy and management expertise are critical in responding to the rise of green production technology. According to Dai et al. (2017), Helfat and Martin's (2015) research highlighted the importance of management abilities in establishing, growing, and adjusting a company's means of sustenance. Knowledge acquisition and cooperation with environmental specialists have been shown to boost green product development, the quality and productivity of new products, the speed of development cycles, and the company's competitiveness. The emphasis of their research has been on technological advancement rather than environmentally friendly manufacturing. In contrast, our study focuses on how ecologically responsible manufacturing may boost business success. The traditional green production strategy promotes organizational sustainability and protects the environment. However, not much data supports the claim that becoming green increases a company's competitive edge.

Moreover, green production is primarily a tool for improving environmental management. Protecting the environment and increasing public knowledge of green production are two ways ecolabelling may boost a company's competitiveness. An organization's innovation, a resource contributing to its core competitiveness, will be bolstered provided it has the resources and capacities to do so, as per resource-based theory. Many consumers like green goods; thus, producing them sustainably is seen as a competitive advantage. It is assumed that the product's innovative qualities would give it an edge in the market. Therefore, a company's innovation ability grows if it manufactures eco-friendly goods. Green production incorporates corporate social responsibility into the core company operations.

Similarly, Ritter et al. (2015) argue that green production aligns with the needs of green consumers. Chen et al. (2006) argue that green innovation may give businesses an edge in the marketplace. They only looked at data from 200 people and used ANOVA instead of SEM to analyze it. Their study also lacked antecedent factors, including green inventiveness, regulatory pressure, and client pressure. In addition, Esty and Winston (2009) stressed the importance of how environmental initiatives generate competitive advantage for forward-thinking organizations. According to Ambec (2017), a competitive advantage in the green industry has been proposed due to a green industrial strategy. These researches focused on the policy level. However, efficiency and competitiveness are ignored. Examining the relationship between green production and green competitive advantage is essential. The study derived the following research question from the preceding:

What is the impact of green production on reinforcing the green competitive advantage of Egyptian companies?

Therefore, a hypothesis can be formulated under the literature review as follows.

H6. Green production has little impact on reinforcing Egyptian companies' green competitive advantage.

Both green innovation and green production have similar ends in mind and use similar means of execution (i.e., resources and expertise). By encouraging innovation inside the workplace, businesses may acquire the knowledge and tools necessary to adopt eco-friendly manufacturing processes. In other words, encouraging green innovation will come naturally to a company that has already transitioned to environmentally friendly industrial practices. Creativity is the fundamental source of organizational innovation, according to the componential theory of creativity, and the workplace may alter the elements that contribute to creativity. Furthermore, the ambidexterity hypothesis explains how to deal with competing needs at the organizational level (Bledow et al., 2009a, 2009b). The two stages of development are exploration and exploitation. Manufacturing environmentally friendly goods (innovation) is emphasized at the exploration stage. The focus of exploitation, on the other hand, is on implementation and spread. The company may create and apply novel concepts at the initial theory stage. The second step is distribution and marketing, where firms may reap the benefits of their labour.

Similarly, given a componential theory of creativity and ambidexterity theory, creative organizations are more likely to adopt green production, which will likely strengthen the green brand image and increase the green competitive advantage during the exploitation phase of ambidexterity theory. Further, as previously indicated, green production affects green brand image and competitive advantage; hence, green production may function as a method via which green creativity might fortify green brand image and competitive advantage. As a result, green production has the potential to mediate the relationships between environmentally responsible innovation, green brand image, and green competitive advantage.

What is the impact of green production on the green brand image of Egyptian companies?

Therefore, the hypothesis can be formulated under the literature review as follows:

H7. There is not a significant impact of cleaner production on the green brand image of Egyptian companies.

3. Study methodology and design

3.1 Study variables

The study compiled a summary of the literature on cleaner production, green brand image, and green competitive advantage into an intellectual framework to bolster green competitive advantage. This philosophical framework is built on both Mugoni et al. (2023), Sharma et al. (2023), and Zameer et al. (2020). The study variables were classified into three groups: the motives for adopting cleaner production as independent variables, the green competitive advantage as a dependent variable, and the green brand image as a mediating variable. A study can clarify the expected relationship through the following Figure 1.

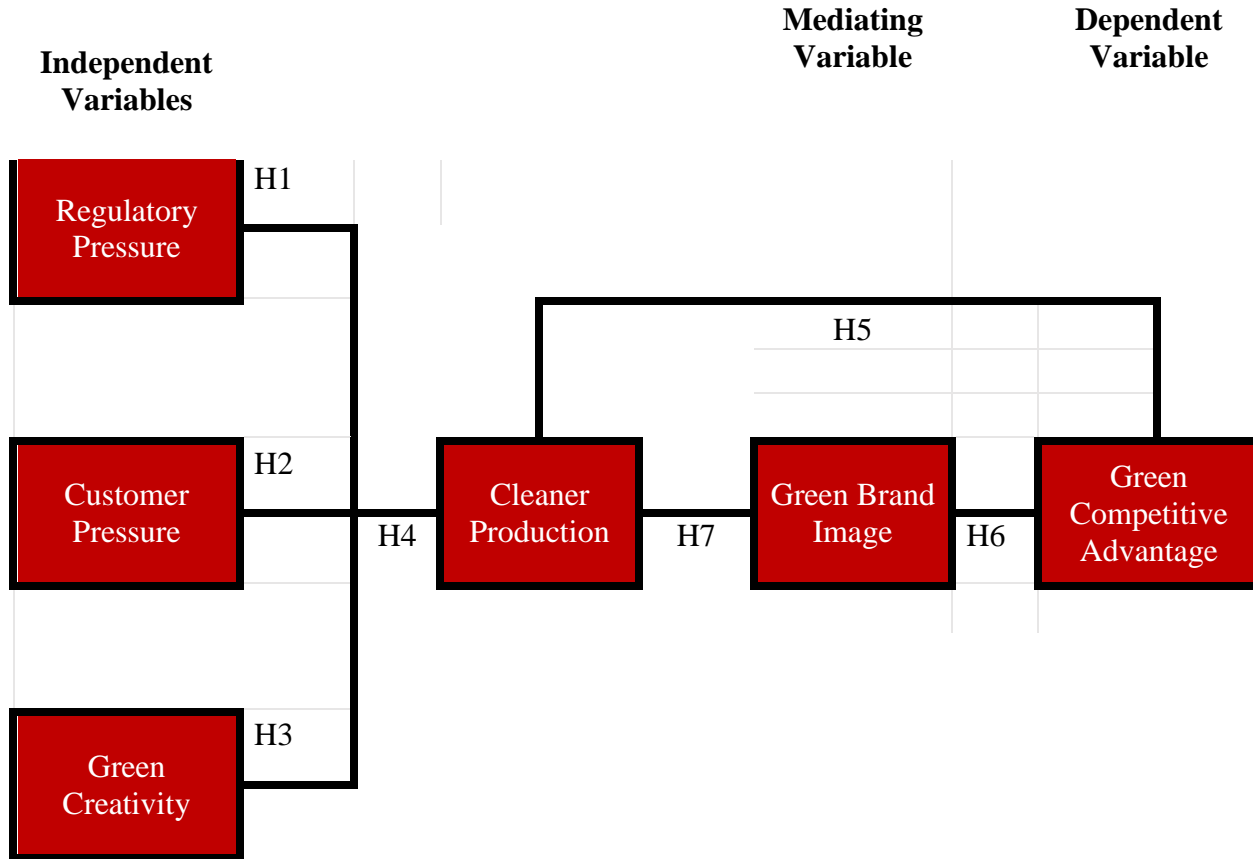


Figure 1. Study Variables and Hypotheses

3.2 Study hypotheses

According to Literature review and study variables, the study hypotheses can be formulated as follows:

H₁. There is no significant impact of regulatory pressure to adopt cleaner production in Egypt.

H₂. Customer pressure to adopt cleaner production in Egypt has an insignificant impact.

H₃. Green creativity has an insignificant impact on adopting cleaner production in Egypt.

H₄. The importance of motives for adopting cleaner production in Egypt is similar.

H₅. There is not a significant impact of cleaner production on reinforcing the green brand image of Egyptian companies.

H₆. There is little impact of cleaner production on reinforcing the green competitive advantage of Egyptian companies.

H₇. There is not a significant impact of cleaner production on the green brand image of Egyptian companies.

3.3 Measurement and segment of participants

The study questionnaire adopted a 5-point Likert scale as a Measurement of relationships between these variables; the study to enhance comprehension, the survey questionnaire was translated into Arabic. Academic specialists who are bilingual in English and Arabic have reviewed the translation. It was ensured that no significant translation-related differences existed. After completion, the questionnaire was disseminated to participants. Original development of all observable and latent constructs occurred in English as the survey was administered to Egyptian company administrators and employees.

3.4 Data collection

The data was collected through seven Egyptian governorates: Cairo, Giza, Alexandria, Suez, Buhaira, Beni Suef, and Fayoumin in the first quarter of 2023. Table 1 shows the responses.

Table 1. Study sample

No.	Governorates	Responses	Weight %
1	Cairo	127	32.23
2	Giza	89	22.59
3	Alexandria	53	13.45
4	Suez	21	5.33
5	Buhaira	32	8.12
6	Beni Suef	44	11.17
7	Fayoum	28	7.11
Total		394	100

The previous table shows that Cairo and Giza are more than 50% of the participants in the questionnaire. This is normal, as most of the main centers of Egyptian companies are in those governorates.

4. Test Hypotheses

4.1 Reliability test

The value of the reliability coefficient at the survey level, in general, is (79.31%), which is statistically sound. The reliability coefficient values for the main axes of the survey list are (0.759, 0.797, 0.831, 0.784, and 0.817) also statistically good. The reliability coefficient is 60% or more. Therefore, the survey list has high internal consistency and reliability, and the researcher can rely on them to achieve the study's objectives and popularize the results.

4.2 The first hypothesis test

The formulation of the hypothesis can be reviewed as follows

H₁. There is no significant impact of regulatory pressure to adopt cleaner production in Egypt.

Through inferential analysis, we have the following statistical output (see Table 2).

Table 2. Outputs of the first hypothesis test outputs

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.787 ^a	.620	.619	.7006

a. Predictors: (Constant), D11

ANOVA^b

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	314.085	1	314.085	639.947	.000 ^a
	Residual	192.393	392	.491		
	Total	506.478	393			

a. Predictors: (Constant), D11

b. Dependent Variable: D3

Based on the outputs of the inferential analysis of that hypothesis, it turns out that the coefficient (R) was estimated by (0.787). Still, the coefficient (Adjusted R Square) was estimated by (0.619), which indicates a change in attitude toward cleaner production, from which (61.9%) can be interpreted according to a change in regulatory pressure. On the other hand, it turns out that the coefficient (F) was estimated by (639.947); it was significant at the 1% level; therefore, the study rejects the null hypothesis and accepts the alternative hypothesis as follows:

Regulatory pressure to adopt cleaner production in Egypt has a significant impact.

4.3 The second hypothesis test

The formulation of the hypothesis can be reviewed as follows

H₂. There is little impact of customer pressure to adopt cleaner production in Egypt.

Through inferential analysis, we have the following statistical output (see Table 3)

Table 3. Outputs of the second hypothesis test outputs

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.889 ^a	.790	.790	.5203

a. Predictors: (Constant), D12

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	400.355	1	400.355	1478.850	.000 ^a
	Residual	106.122	392	.271		
	Total	506.478	393			

a. Predictors: (Constant), D12

b. Dependent Variable: D3

Based on the outputs of the inferential analysis of that hypothesis, it turns out that the coefficient (R) was estimated as (0.889). Still, the coefficient (Adjusted R Square) was estimated by (0.79), which indicates a change in attitude toward cleaner production, from which (79%) can be interpreted according to a change in customer pressure. On the other hand, it turns out that the coefficient (F) was estimated by (1478.85); it was significant at the 1% level; therefore, the study rejects the null hypothesis and accepts the alternative hypothesis as follows

Customer pressure to adopt cleaner production in Egypt has a significant impact.

4.4 The third hypothesis test

The formulation of the hypothesis can be reviewed as follows

H₃ There is little impact of green creativity to adopt cleaner production in Egypt.

Through inferential analysis, we have the following statistical output

Table 4. Outputs of the third hypothesis test outputs

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.832 ^a	.692	.691	.6310

a. Predictors: (Constant), D13

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	350.386	1	350.386	879.940	.000 ^a
	Residual	156.092	392	.398		
	Total	506.478	393			

a. Predictors: (Constant), D13

b. Dependent Variable: D3

Based on the outputs of the inferential analysis of that hypothesis, it turns out that the coefficient (R) was estimated by (0.832). Still, the coefficient (Adjusted R Square) was estimated by (0.691), which indicates a change in green creativity, from which (61.9%) can be interpreted according to a change in green creativity. On the other hand, the coefficient (F) was estimated by (879.94); it was significant at the 1% level. Therefore, the study rejects the null hypothesis and accepts the alternative hypothesis as follows

Green creativity has a significant impact on adopting cleaner production in Egypt.

4.5 The fourth hypothesis test

The formulation of the hypothesis can be reviewed as follows

H₄. The importance of motives for adopting cleaner production in Egypt is similar.

Through inferential analysis, we have the following statistical output (see Table 5)

Table 5. Outputs of the fourth hypothesis test outputs

Test Statistics^a

N	394
Chi-Square	566.220
df	2
Asymp. Sig.	.000

a. Friedman Test

Based on the outputs of the inferential analysis of that hypothesis, it turns out that the coefficient (Chi-Square) was estimated by (566.22); it was significant at the 1% level. Therefore, the study rejects the null hypothesis and accepts the alternative hypothesis.

There is a significant difference in the importance of motives for adopting cleaner production in Egypt.

4.6 The fifth hypothesis test

The formulation of the hypothesis can be reviewed as follows

H₅. There is not a significant impact of cleaner production on reinforcing the green brand image of Egyptian companies.

Through inferential analysis, we have the following statistical output

Table 6. Outputs of the fifth hypothesis test outputs

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.714 ^a	.510	.509	1.1466

a. Predictors: (Constant), D3

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	536.440	1	536.440	408.044	.000 ^a
	Residual	515.348	392	1.315		
	Total	1051.788	393			

a. Predictors: (Constant), D3

b. Dependent Variable: D4

Based on the outputs of the inferential analysis of that hypothesis, it turns out that the coefficient (R) was estimated by (0.714). Still, the coefficient (Adjusted R Square) was estimated by (0.509), which indicates a change in reinforced green brand image, from which (50.9%) can be interpreted according to a change in cleaner production. On the other hand, it turns out that the coefficient (F) was estimated by (408.044); it was significant at the 1% level; therefore, the study rejects the null hypothesis and accepts the alternative hypothesis as follows

There is a significant impact of cleaner production on reinforcing the green brand image of Egyptian companies.

4.7 The Sixth hypothesis test

The formulation of the hypothesis can be reviewed as follows

H₆. There is little impact of cleaner production on reinforcing the green competitive advantage of Egyptian companies.

Through inferential analysis, we have the following statistical output (see Table 7).

Table 7. Outputs of the sixth hypothesis test output

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.780 ^a	.608	.607	1.0421

a. Predictors: (Constant), D3

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	660.070	1	660.070	607.836	.000 ^a
	Residual	425.686	392	1.086		
	Total	1085.756	393			

a. Predictors: (Constant), D3

b. Dependent Variable: D5

Based on the outputs of the inferential analysis of that hypothesis, it turns out that the coefficient (R) was estimated by (0.78). Still, the coefficient (Adjusted R Square) was estimated by (0.607), which indicates a change in reinforcing the green competitive advantage of Egyptian companies, from which (60.7%) can be interpreted according to a change in cleaner production. On the other hand, it turns out that the coefficient (F) was estimated by (607.836); it was significant at the 1% level; therefore, the study rejects the null hypothesis and accepts the alternative view as follows:

H₆. There is a significant impact of cleaner production on reinforcing the green competitive advantage of Egyptian companies.

4.8 The seventh hypothesis test

The formulation of the hypothesis can be reviewed as follows

H₇. There is no significant impact of green brand image on reinforcing the green competitive advantage of Egyptian companies.

Through inferential analysis, we have the following statistical output (see Table 8).

Table 8. Outputs of the seventh hypothesis test outputs

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.951 ^a	.904	.904	.5154

a. Predictors: (Constant), D4

ANOVA^b

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	981.621	1	981.621	3695.170	.000 ^a
	Residual	104.135	392	.266		
	Total	1085.756	393			

a. Predictors: (Constant), D4

b. Dependent Variable: D5

Based on the outputs of the inferential analysis of that hypothesis, it turns out that the coefficient (R) was estimated by (0.951). Still, the coefficient (Adjusted R Square) was estimated by (0.904), which indicates a change in reinforcing the green competitive advantage of Egyptian companies, from which (90.4%) can be interpreted according to a change in green brand image. On the other hand, it turns out that the coefficient (F) was estimated by (607.836), which was significant at the 1% level ;herefore, the study rejects the null hypothesis and accepts the alternative hypothesis as follows:

Green brand image has a significant impact on reinforcing the green competitive advantage of Egyptian companies.

5. Conclusion and recommendations

It is becoming more apparent to companies that they need to adopt environmentally friendly practices to survive in today's environmentally conscious market. This study investigates how cleaner production mediates a company's green brand image and its green competitive advantage. This investigation explores how "green brand image" relates to a company's long-term success in the marketplace.

Companies have been pushed to include environmental issues in their business plans due to the worldwide environmental challenges and the increasing customer awareness of sustainability. Building a "green" reputation for a company's offerings is a very effective way to attract and retain customers. At the same time, more people are beginning to realize that adopting cleaner production processes is a great way to lessen the harmful effects of manufacturing on the environment and boost productivity. The term "green brand image" describes how clients think about a business or its offerings in terms of their impact on the environment. Customers are more likely to be loyal to a company that portrays itself well in the green market. Companies may set themselves apart from rivals and appeal to environmentally sensitive customers by cultivating a "green brand image." However, "cleaner

production" refers to methods and tools that lessen production's adverse environmental effects. It includes many tactics, such as eco-design, waste minimization, energy efficiency, and the employment of renewable materials. The gentler production may also save money and improve productivity.

The term "green competitive advantage" describes the long-term benefit that businesses receive from their eco-friendly practices. It involves things like better product performance in terms of the environment, entering new green markets, and increasing client loyalty. Achieving a green competitive edge allows businesses to strengthen their standing in the market, increase their profits over time, and reduce their environmental impact.

Cleaner production acts as a mediating variable between green brand image and green competitive advantage. A solid green brand image positively influences adopting and implementing cleaner production practices within an organization. Cleaner production, in turn, enhances environmental performance, reduces costs, and fosters innovation, leading to sustainable competitive advantage.

At the level of statistical analysis, and according to data collected from seven Egyptian governorates, 394 participations were obtained that dealt with the investigation of cleaner production motives, in addition to analyzing the impact of cleaner production on both the green image and the green competitive advantage of Egyptian companies. The study found three main motives for adopting cleaner production in Egyptian companies: regulatory pressure, customer pressure, and green creativity. All of these motives were significant at the 1% level.

However, the importance of these motives varies, as the most important reasons for Egyptian companies were regulatory rules, consumer pressures, and green creativity. That was significant at the 1% level. The previous result differs from what Zameer et al. (2020) indicated for ranking these motives. The current study can explain this according to the difference in the characteristics of the Egyptian business environment from the Chinese business environment and the difference in awareness among clients of environmental issues.

When investigating the dynamic relationships between green brand image, cleaner production, and green competitive advantage, inferential statistics concluded that there is a significant impact of cleaner production on reinforcing the green brand image of Egyptian companies; that under the coefficient (Adjusted R Square) was estimated by (0.509); it was significant at the 1% level. There is a substantial impact of cleaner production on reinforcing the green competitive advantage of Egyptian companies. That under the coefficient (Adjusted R Square) was estimated by (0.607), it was significant at the 1% level. Green brand image has a substantial impact on reinforcing the green competitive advantage of Egyptian companies. That under the coefficient (Adjusted R Square) was estimated by (0.904), it was significant at the 1% level. The previous results correspond with Amores-Salvadó et al. (2014).

To enhance Egyptian companies' awareness of the benefits of eco-friendly production, the study suggests the following:

- a. Develop awareness campaigns: create a comprehensive campaign to educate Egyptian companies about the advantages of eco-friendly production. This can include organizing workshops, seminars, and webinars led by sustainability and green practices experts. Provide practical examples of successful companies that have adopted eco-friendly production methods, highlighting the positive impact on their bottom line.
- b. Collaborate with industry associations: partner with industry associations and chambers of commerce to reach a broader audience of Egyptian companies, and work with these organizations to incorporate sustainability and eco-friendly practices into their training programs, conferences, and networking events.
- c. Provide financial incentives: introduce government subsidies or grants to support companies that adopt eco-friendly production practices, offer tax breaks or other financial incentives to encourage companies to invest in renewable energy sources, energy-efficient machinery, waste reduction, and recycling initiatives.

- d. Showcase success stories: highlight success stories of Egyptian companies already embracing eco-friendly production, and share case studies and testimonials demonstrating the positive impact on their brand reputation, cost savings, and long-term sustainability.
- e. Foster knowledge sharing and collaboration: create platforms for Egyptian companies to exchange ideas, best practices, and challenges related to eco-friendly production. Establish online forums, networking events, and industry-specific working groups where companies can discuss their experiences, seek advice, and share resources, and encourage collaboration and partnerships to accelerate the adoption of eco-friendly practices across different sectors.
- f. Implement certification programs: introduce certification programs specifically focused on eco-friendly production, collaborate with recognized international standards organizations or develop national eco-labels to certify companies that meet specific sustainability criteria.
- g. Engage universities and research institutions: Collaborate with universities and research institutions to conduct studies and provide training on eco-friendly production methods. Encourage academic research on sustainable technologies and practices relevant to different industries, establish partnerships between companies and academia to foster innovation, develop sustainable solutions, and create student internship or apprenticeship opportunities.
- h. Promote international collaborations: encourage partnerships and knowledge exchange between Egyptian companies and international organizations, businesses, or experts in eco-friendly production, facilitate participation in international conferences, exhibitions, and trade fairs focused on sustainability to highlight Egyptian companies' efforts and learn from global best practices.
- i. Establish a centralized resource hub: create a centralized online platform or resource hub that provides comprehensive information, guidelines, and tools related to eco-friendly production. This hub can include case studies, research papers, practical guides, and access to expert advice.
- j. Monitor and evaluate progress: establish mechanisms to monitor and assess the progress of Egyptian companies in adopting eco-friendly production practices and collect data on energy consumption, waste generation, carbon emissions, and other relevant metrics. Use this information to track improvements, identify areas for further development, and recognize companies that excel in sustainability.

As suggestions for future studies, the study recommends the following

- a. Explore the concept of "Green Competitive Advantage" by conducting a comparative analysis of sustainable practices adopted by various industries. As the world embraces the urgency of addressing environmental concerns, businesses increasingly recognize the importance of integrating sustainability into their operations. This study would examine how sustainable practices can serve as a source of competitive advantage, enabling firms to achieve better economic performance while positively impacting the environment.
- b. Explore the concept of Green Supply Chain Management (GSCM) and its role in creating a competitive advantage for businesses in the global marketplace. With increasing environmental concerns and growing consumer demand for sustainable products, companies recognize the significance of integrating green practices into their supply chains. This study will investigate the strategies, benefits, and challenges of GSCM implementation across various industries.
- c. Investigate the relationship between Corporate Environmental Responsibility (CER) and financial performance to unveil the potential for a Green Competitive Advantage in businesses. As environmental concerns become increasingly urgent, companies are under growing pressure to demonstrate responsible practices. This study will examine how embracing CER initiatives can impact a firm's financial performance and competitive position.
- d. Examine the influence of environmental regulations on the development of Green Competitive Advantage (GCA) in businesses operating in different countries. Governments have implemented diverse regulatory frameworks to address environmental challenges as environmental concerns escalate worldwide. This study will analyze how varying environmental regulations impact the adoption of green practices and their subsequent effects on businesses' competitive advantage. By conducting a comparative analysis of

case studies from different countries, we seek to identify the role of regulatory factors in fostering GCA and the implications for businesses striving for sustainable growth.

- e. Explore the Green Human Resource Management (GHRM) concept and its potential to provide businesses with a competitive edge in a rapidly changing world. With increasing environmental awareness and the need for sustainable business practices, companies recognize the importance of aligning their HR strategies with green principles. This study will investigate the various GHRM practices organizations can adopt to foster a culture of environmental responsibility, enhance employee engagement, and achieve sustainable competitive advantage.

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