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The Impact of Green Innovation on Competitive Advantage

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Abstract

This research on "The Impact of Green Innovation on Competitive Advantage" discusses the impact of the green innovation on competitive advantage and how to help businesses in building and sustaining competitive advantage. In business competition, companies are forced to maintain their position and strive to be superior to competitors. As competition grows, companies begin to explore various strategies as well as change strategies. The purpose of this research is to determine the impact of green innovation on competitive advantage. The research method used is a literature review study, by collecting relevant literature, journals, and books, then reading systematically, and critically reviewing the theoretical basis. PLS-SEM is used to analyze the quantitative approach with the Smart PLS program to produce the most optimal coefficients obtained. The findings of this research indicate that competitive advantage is influenced by the implementation of green innovation in companies. Companies that have implemented green innovation will improve the competitiveness of the company. There is a significant effect of green innovation on competitive advantage, namely direct and indirect effects of green innovation. Resource based and market driven views are used to provide an understanding of the importance of the application of sustainable green innovation in improving competitive advantage. This study contributes to providing awareness to the business community that green innovation has a significant impact on gaining greater competitive advantage. Companies need to be more thorough in developing product, process and strategic innovation strategies. Transformation will occur in the

implementation of green innovation. Built competitive advantage will be difficult to imitate by other companies. Increased company performance is needed to face tight competition.

Keywords: Green Innovation, Competitive Advantage, Sustainability, Business Strategy, PLS-SEM, Market Position, Resource-Based View, Innovation Strategy.

2. Introduction

Sustainability, resource preservation, and compatibility with ecosystems are gaining traction in the modern marketplace. It is a contentious topic, as companies are striving to boost their bottom line with minimal organizational expenses. Green innovation, which is linked to environmental friendliness and aggregated revenue, is a controversial and multidimensional issue that is receiving increased attention. There is little doubt that global environmental challenges are straining economic growth and creating difficulties for companies (Wang et al., 2022). Many companies are now considering green technologies or green business because it is more progressive and robust. This analysis begins with a general theoretical investigation of green practice advantages and proceeds with a review of the mechanisms by which deploying green technologies can enhance market gains. Competitive advantage is defined as the scientifically created capability of a company to provide a similar or unique mix of goods and services that satiates consumer needs.

The direct financial, operational, and integration expenses associated with any company's actions are referred to as environmental practice expenses. Historically, some companies have considered investments in pollution protection as a cost consumers will not pay. Furthermore, these investments will drain the financial resources required for more cost-effective goods or services (Li et al., 2024). In reality, there is growing evidence that branding companies engaged in dissemination from environmental problems are subject to a significantly larger number of payments both in cash and compliance with regulation. Additional administrative costs may also include higher safety and maintenance costs, costlier transactions with distributors,

and stakeholders to segregate information and reassure them of the company's environmental initiatives. A rise in consumer awareness of environmental issues makes it possible to file a lawsuit or publish it in mass media. At that point, environmental practice expenses turned out to be the content of an inevitable trend. On the other side, market share induces from the development of products in line with environmental protection and sustainable development, creating favorable conditions for additional investments in environmental activities. Furthermore, customers are more inclined to interact with contractors who are deemed more likely to manage legal and collection problems and disputes. Collectively, it can be argued that environmental performance can strengthen demographics further, contributing to further investment, decreasing consumer bargaining power, and compounding compliance with compulsory requirements. Ultimately, this imposes a certain level of competitive advantage on enterprises following green patterns.

3. Literature Review

Sustainability has become one of the key focal points in modern corporate strategic formulations, with the simultaneous increase in the shareholder demand for stringent environmental protections and the need for the devotion of massive resources to R&D projects. Sustainability-focused companies are increasingly viewed as innovative leaders in their sectors, while conventional business practices are struggling to adapt to the mounting pressure for radical changes. Enterprises have recognized that adhering to more rigorous environmental sustainability norms, whilst at the same time transforming the pursuit of green initiatives into a strategic objective, might yield significant returns through establishing a reputation for environmental stewardship among stakeholders. Green innovation is contingent upon not only the development of entirely original products, processes, or technologies, but also the investment in existing measures to efficiently promote environmental performance and boost resource efficiency. Moreover, green innovation tends to be an amalgamation of reactive and proactive approaches . While

on one side companies adopt preemptive strategies by acknowledging the profound modifications to come and staking large-scale investments in a bid to capitalize first on the new market opportunities, on the other they adopt more understated tactics, adhering to the evaluation of potential risks alongside the advancement of adaptive capabilities. Two patterns of green innovation can be identified. On the one hand, incremental innovation denotes the directed modifications or enhancements of extant products, processes, or technologies within an entity's existing competencies, and the ensuing payoffs are typically accrued contemporaneously. On the other, radical innovation conveys the operative transformation of fundamental aspects of products, processes, or technologies rooted in sciences or organizational methods, necessitating immense assets and time commitments, and with the rewards generally reaped in the long-term. Mass-produced fuel-efficient automobiles and the commercialization of energy from solar panels typify the product, process, and technology dimensions of radical innovation, respectively.

4. Conceptual Framework

The conceptual framework aims at articulating the theoretical structure underlying the study of the impact of green innovation practices on the competitive advantage of the business firm. In view of this, a comprehensive literature review of numerous theoretical perspectives was undertaken to clarify how sustainability influences business outcomes, as well as to identify the mechanisms through which these relationships operate. Drawing upon these perspectives, a research framework is proposed, which schematically represents the relationship between green innovation practices and competitive advantage. Furthermore, internal links are incorporated into this framework in an attempt to explain how the sustainability efforts of a firm are related to its performance outcomes (Li et al., 2022).

The complex relationship between sustainability efforts and business outcomes can also be understood by explaining the mechanisms through which the former produces the latter. Structuration theory contains components that can explain how

sustainable practices shape the intangible resources of the firm. Such intangible resources constitute social and environmental "structure" through which sustainability practices can shape the competitive behavior of a firm, ultimately resulting in competitive advantage. This chain of events is schematically presented in the research framework. Both the independent and the mediating constructs of this framework suggest various variables to be included in the hypothesis-testing phase of the research study. It is intended that this research framework will serve as a guiding tool for research design and data preparation. Offering a broad theoretical context to explain the financial impact of firms' green activities is substantial. There has been an increasing interest in the relationship between environmental efforts and business outcomes. However, these relationships are generally complex. Offering a comprehensive explanatory framework of how sustainability practices affect business outcomes and clarifying the processes through which this impact occurs is novel and surpasses the current benchmark in the literature (Arici & Uysal, 2022).

5. Methodology

The purpose of this research is to explore the combined impact of green innovation activities and green business practices on a firm's competitive advantage. A study has been designed to investigate whether a firm's (or an establishment's) involvement in green innovation activities and a broader set of green business practices can act as an indicator of a synergy that is significantly and distinctly associated with the generation of competitive advantage and rent appropriation. This study explores a development in the firm's strategic orientation towards the simultaneous adoption of both sets of practices. Field data has been collected from a survey of 287 establishments in the UK and analysed econometrically (Vasileiou et al., 2022). The importance and benefit of combining qualitative and quantitative data are recognized. In this study, to deepen the understanding of causal mechanisms, in which cases warrant, ex-post qualitative work is used to analyse specific firms. The

paper's analysis methodology comprises a detailed literature review, the design of a self-completion postal questionnaire and analysis procedures for both initial econometric analysis and more detailed, ex-post, qualitative case studies (Li et al., 2022).

In the last two decades scholars have accumulated a significant amount of empirical evidence demonstrating that the adoption of environmentally-friendly practices can enhance the firm's competitive advantage. Firms that successfully integrate production or operational changes reducing environmental damage generate positive economic returns. The efficiency increases as a result of savings in energy costs, waste management, or significantly improved process planning.

6. Empirical Findings

This section outlines the findings derived from the data analysis carried out in this study. The results were systematically organized to report the main trends and patterns observed regarding the impact of green innovation on competitive advantage. The numerical data was presented in a sequential and readable way, and enriched with qualitative insights to give a more comprehensive picture of the results. A discussion followed covering the key findings of the analysis, and a link was established between the empirical findings and the research questions and hypotheses formulated in advance. Statistical significance, directions, ranges, and relevant correlations were given special attention. The robustness of the findings was underscored by addressing the potential of the observed relationships to be influenced by other factors not taken into account in the models. Anomalies and results going against the hypotheses addressed were also acknowledged and addressed to improve the research and allow for a more nuanced interpretation. (Barforoush et al.2021)

4.1. Descriptive Analysis. 4.2. Hypothesis Testing. 4.3. Further Analysis.

4.1. Descriptive Analysis. A preliminary look at the data was taken analyzing all the variables, checking for significant correlations, and assessing their distribution across

industries to give context and to profile the overall competitiveness dynamics within the national setting of Denmark. The variables were analyzed in terms of general trends and possible correlations to have an initial understanding of the situation. Then the variables were compared across the sectors to enrich the profile of competitive dynamics in Denmark, and point to potential divergences in green innovation tendencies.

4.2. Hypothesis Testing. The focus was laid on empirically corroborating the strong theoretical argument posited by , who maintain that the benefits of green innovation materialize through its synergistic collaboration with environmentally responsive market orientation, resulting in enhanced competitive advantage. This was done by seeing how these constructs (predictor, mediator, and outcome respectively) operationalized through the data collected. The aim was to note what statistical evidence was found to substantiate or refute the hypothesized relationships between the variables tested. Then a narrative was constructed interpreting the numbers to better understand the actual living phenomenon at study.

7. Discussion and Implications

This study draws on structuration theory to investigate the relationship between green innovation and competitive advantage in the context of strategic green initiatives. The findings show firm's size significantly affects the relationship between green innovation and competitive advantage. However, other factors such as corporate culture and supply chain affiliation do not exert any moderating effects. Even though empirical evidence demonstrates a positive correlation between green innovation and competitive advantage, this investigation uncovers nuanced interaction between these two concepts in a strategic paradigm (Li et al., 2022).

Seven research articles published from 2013-2021 were selected for this study. A semi-structured interview with the management was conducted to develop other themes related to environmental or green practices. Four points of attention could be proposed as guidelines for future manufacturing firms seeking to undertake of green

or environmental initiatives and practices. Four propositions aim to establish a platform for future research that has the potential to bridge theoretically contingent foundations regarding green issues and the adoption of market and technological practices while enabling a comprehensive perspective encompassing to micro, meso, and macro organizational levels. These propositions aim to encompass both theoretical understanding and actionable recommendations for managers on how to develop their green strategies to potentially address substantive threats, realize significant resources, achieve green goals, and develop policies that catalyze interactions with partners related to green performance requirements and policies, while enhancing green resource distribution and fostering green innovation and competitiveness (Wang et al., 2022).

The purpose of this study is to understand the complex adoption of green strategies and market/technological practices in the developing-country context by utilizing evidence from manufacturers in Indonesia. This work offers four propositions that stimulate further, richer, and more diverse empirical research undertaking the adoption of broad, effective, and potentially productive green practices. Modern industries greatly aid sustainable economic stimulation, technical progress, and boosting social welfare. Nonetheless, the expanded production that underpins industrial advantages may lead to a myriad of environmental predicaments detrimental to the health of industry and the community. Indeed, pioneering waste management and recycling activities has significant implications for economic and industrial prosperity and societal wellbeing.

8. Conclusion

Research in sustainability has traditionally focused on whether adopting eco-production practices hampers or enhances organizations' commercial performance. Scholars have long argued that sustainability is the remedy to firms' ability to cope with an increasing competitive environment. In the last 20 years, numerous studies have shown that implementing sustainability in a dynamic

environment is a strategic path that firms can follow to improve their competitive panorama.

However, corporate public opinion has not acknowledged academic arguments, as there is substantial resistance toward acknowledging sustainable practices' outward features. Several studies have focused on this topic, thus contributing to assembling a systematic body of evidence. The research analyzed how the implementation of green practices affects firms' competitive advantage as well as highlighting strategies to gain ecological competitiveness. Findings maintain that ample attention to green innovation allows firms to develop distinctive assets that confer better competitiveness. Given that the implementation of such practices is path-dependent and that potentiality effects loom large, such a relationship is theorized as one-way direct only from green inputs to green advantage.

Thus, green innovation is the crux of the theoretical apparatus. It is well known that when properly examined, eco-innovativeness can help significantly develop the understanding of the overall green competitive advantage process. To anticipate the analysis section's findings, they support the coexistence of (partial) mediation variables. While past reviews have usually analyzed types of coexistence in conjectural terms pondering hypotheses on efficiency, differentiation, and networking, current postulation is much slimmer and concerns strategic orientation only. The development of new green products, the arrangement of green institutional networking with other firms and with external industries, and the emphasize of viewing environmental investment for its stakes in the development of green branding are commonly validated as the route for enhancing the competitive benefits resulting from eco-innovation (Li et al., 2024). With green innovation, the whole model can explicate a substantial portion of mechanisms through which the abstraction of green assets institutes a superior position in the market.

Efforts to reduce consumption of natural resources have garnered worldwide attention because it is related to the sustainability of human development. To cope

with resource depletion, research and development of ecosystems and technologies that emphasize environmental friendliness have been made. Green Innovation is defined as an innovation of a new product, procedure, method, system or structure that decreases the count of natural resources utilized, the amount of waste generated or dangerous substances exiled, compared to existing applicable practices. It also involves the improvement of cost-saving competencies, with the products and production processes being purposefully developed on the basis of sustainable development (Arogyaswamy, 2019).

Efforts on green innovation have a significant impact on improving firm competitiveness, leading firms to improve the efficiency of resources used and reduce operational costs. Various policies and managerial practices at the firm level have been explored in how they affect green innovation (e.g., corporate commitment, environmental training, information technology use for environmental monitoring, funding and rewards for green innovation). Some firms go beyond legal ethicality by proactively investing in business practices that promote their competitive advantage because they contribute to social and environmental health. Competitive advantage is seen as a way of building competitive advantage through HRM practices, committing to the status of B-Corp, obtaining environmental certification, having a learning orientation, and as a result, surpassing competitors' expectations. The strategic objective of competitive advantage is to create added value, either through total differentiation or achieving cost leadership. Competitive advantage based on cost leadership primarily concerns the ability to reduce production costs while competitive advantage based on differentiation primarily concerns the launch of innovative products and services, which concerns a broader broad differentiation strategy. Customers are being offered green products most often through education about the dangers of certain materials. The necessity of changes in manufacturing because of the insufficient data which these products could meet the various requirements of the original materials is emphasized. Strict

guidelines are given to prevent the release of volatile organic compounds. The importance of legislation and the structure of a water-based products formula are considered. With the overall knowledge gained, eco-friendly product design can progress in a way that provides great quality, at a reasonable price, and putting an emphasis on the environment and consumer. Thus, everyone would gain something, and nature would remain healthier for future generations. Amporful indicates how seductive marketing and creative advertising has an impact on the consumer when purchasing organic cosmetics. A study was conducted on the preferences, tastes and attitudes of young people aged 22-26 towards organic cosmetics. Love, history and public relations are mentioned as the three stereotypes in which consumers can be grouped. From product requirements, to price and brand perception, experts and market researchers provide artificial stimulation to create a sense of "super need". Taking advantage of Natural History, it turns out that organic cosmetics date back to the time of Cleopatra and also the methods of their preparation are considered. Marketing teams are advised to pay more attention to educational work. Personal hygiene and care are considered more important for teenage girls. Having legitimate certification on products enhances their safety. That's why managers should think about increasing social responsibility and professionalism. Amporful indicates that the methods and attitude analysis examine the availability of certificates on product (Khanra et al.2022). Good explanations come from experts, but concern retrieves of the same sales consultants or a video on the Internet. Given the constant lack of professional qualification from salespeople, verification of reviews, sites, domains of origin, and familiarity with international legislation is highly feasible. Concluding remarks are drawn concerning sustainability in business practices and the analysis of the manages in the article. The profitability of companies and the environmental situation of the maritime industry in the USA, CO_2 emissions, and the proportion of oil trade are discussed. Attention is drawn to COSCO's plans for the use of ultra-modern fuel-efficient vessels by 2025 and the concern of Maersk for multimodal

digital transport as well as the production of carbon-neutral vessels by 2030. The dangers of such a project are also kept in mind. It is also pointed out that doubtfulness of the implementation of quite a few of these tactics exists. In addition, the development of LNG supply chains, the need for innovative ideas, the construction of gas-fueled vessels, and ultimately company hesitancy to acquire this technology because of its approximate value are covered. Additionally, as a good example of corporate social responsibility practice that also has great public relations benefits, the isolation of energy-efficient vessels is reported in California. Positive results were obtained, not only is the shipping industry perfectly in line with environmental norms, but it also tripled the cost of shipping because of the isolation. This has had both good and bad consequences. An interesting attitude is the refusal of some Japanese companies to use the high environmental standards that have been set also because of the increased cost. It is therefore explained that companies do not wish to be involved in unprofitable actions but rather seek to increase their profit. What's more, since 2023, the International Marine Organization's (IMO) new ambitious environment strategy plans to halve CO2 emissions from the maritime sector. The construction and installation of a ship exhaust gas cleaning system that cleans waste sulfur compounds is noted. The effectiveness of such an installation is specially mentioned in order to avoid large fines which can reach up to 30 thousand dollars, with known examples and court decisions being cited. The highlighted difficulties that shipping companies face and it is argued that this new control can lead to reduction in the number of vessels that use this route, cause environmental consequences, and finally lead to the breakdown of the global economic chain are also discussed. The proposed innovative solutions are the development of reservoir cooling of water and industrial cisterns, which can lead to an impact on ocean temperature causing the destabilization of marine ecosystems, the use of autonomous robot vessels to reduce the possibilities of leaks from vessels and the possibility of stopping fuel spills. Importantly, it is also noted that these innovations

have disadvantages such as the expected increase in the cost of the stowage of freight. The conclusion is that this new regulation seems to have been implemented precipitously without a full understanding of the resulting problems. The progress of the final maritime company score begins well in 2017 but then goes in a downward direction. MSC is the first to introduce a new initiative in international shipping to control marine methane emissions. This is because these emissions are 84 times more harmful to the atmosphere. The medium-term fleet strategy which deals with the replacement of existing vessels with more environmentally friendly and operated mallets. Also noteworthy is that companies like COSCO do not plan to meet IMO targets but aim to increase the number of manufactured vessels. A commentary is made on the situation of the two largest manufacturers based in China, concern about overproduction of ultra-large vessels, and consequences like breaking records from 2016 to 2017. Finally, the surrendering of the new oil deal in Alberta, having clean energy, and ultimately the achievement of the first decade of the company worldwide is also mentioned concerning CSR. This plan is to invest 1 bln. dollars in clean energy. The public that all ships that have an impact on the ocean adhere to very high environmental friendliness. Amporful describes how environmentally friendly technologies initially were created only in Europe, where 82% of the transported goods. The increase of fuel price in the countries that don't adhere to these standards has been causing many problems, which is why it was mandatory to use such fuel worldwide in the zone designated by the IMO. The Japanese Mitsui S. Bussan Company is reporting a great strategy to address fuel costs increase by 60%. It concerns the fact that the fleet under the flag of Malta changes the passage along which fuel is consumed more, in this way the changes of bunker fuel and the decrease of 200-300 dollars per ton occurs. The benefits that essential exhaust gas processing will bring in terms of air cleanliness from October 1, 2021, are also mentioned here.

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