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Integrating Green Finance and Sustainable Development in the Built Environment: A Review under the Lens of Akerlof's Lemon Theory and Williamson's Transaction Cost Theory

Intégrer la Finance Verte dans le Secteur de l'Immobilier : Une Revue sous le Prisme de la Théorie du Signal d'Akerlof et de la Théorie des Coûts de Transaction de Williamson

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Abstract:
This article review delves into the pivotal role of green financing within the financial system of green buildings, focusing on instruments such as green loans and bonds. These financial mechanisms are tailored to promote eco-friendly constructions thus incentivizing investments in energy-efficient homes, renewable energy systems, and water-saving technologies. The review employs the Lemon Theory and Transaction Cost Theory as analytical frameworks to assess how green finance can enhance sustainability in construction. It explores how these mechanisms mitigate information asymmetry and transaction costs, thereby facilitating more efficient allocation of resources and decision-making processes. Through a synthesis of theoretical insights and empirical evidence, the review evaluates the effectiveness of green finance in advancing sustainable development goals within the built environment. Ultimately, this comprehensive analysis aims to inform policymakers, practitioners, and researchers about leveraging innovative financial models to achieve environmental efficiency, reduce greenhouse gas emissions, and enhance overall environmental conditions in construction practices.

Key Words: Green finance; Green buildings; Sustainable Development; Lemon's Theory; Transaction Cost Theory.

Résumé :
Cet article examine le rôle crucial du financement vert au sein du système financier des bâtiments écologiques, en mettant l'accent sur des instruments tels que les prêts verts et les obligations vertes. Ces mécanismes financiers sont conçus pour promouvoir les constructions respectueuses de l'environnement, incitant ainsi les investissements dans l'immobilier éco-énergétiques, les systèmes d'énergie renouvelable et les technologies d'économie d'eau. L'étude utilise la Théorie du Citron (Lemon Theory) et la Théorie des Coûts de Transaction (Transaction Cost Theory) comme cadres analytiques pour évaluer comment le financement vert peut renforcer la durabilité dans la construction. Elle explore comment ces mécanismes atténuent l'asymétrie d'information et les coûts de transaction, facilitant ainsi une allocation plus efficace des ressources et des processus décisionnels. À travers une synthèse d'apports théoriques et de preuves empiriques, l'article évalue l'efficacité du financement vert dans la réalisation des objectifs de développement durable dans l'environnement bâti. En définitive, cette analyse exhaustive vise à informer les décideurs, les praticiens et les chercheurs sur l'utilisation de modèles financiers innovants pour améliorer l'efficacité environnementale, réduire les émissions de gaz à effet de serre et améliorer les conditions environnementales globales dans les pratiques de construction.

Mots clés : Finance verte; Immobilier Ecologique; Développement Durable; Théorie du Signal, Théories des Coût de Transaction.

Introduction

Green financing matters as one of the components of green buildings' financial system, as it deals with special financial instruments designed to promote environmentally friendly buildings' construction and development (Debrah et al., 2022). Essentially, green loans can be allocated to fund the development of energy-efficient homes, the installation of renewable energy systems or water-saving technologies. These financial instruments provide favorable conditions and interest rates which attract borrowers to make sustainable building technologies their primary investment. Similarly, green bonds serve as debt instruments raised through the issuance of bonds to finance eco-friendly projects like building energy-saving office premises, sustainable apartments, or green infrastructure. The revenues that are solely generated through green bonds perfectly support the building of green structures and also the care for the environment. Through the provision of the initial funding needed for green buildings, green finance holds an influential position in the process towards a more sustainable constructed environment, ensuring environmental efficiency, reduction of greenhouse gases, and contributing to overall enhancement in environmental conditions.

This article review the article review employed a rigorous methodology focusing on recent, high-quality literature from diverse academic databases. Emphasizing green finance and sustainable development, particularly in urban contexts, the review ensured relevance by selecting articles published within the last six years. This approach integrated empirical data and theoretical frameworks, aligning with sustainable development goals to provide comprehensive insights into the intersection of green finance and the built environment.

we aim to explicate how green finance, sustainable development, and the building industry are all interlinked. By leveraging the Lemon Theory and Transaction Cost Theory as analytical tools, this review looks at how green finance mechanisms can help improve sustainability in the construction industry. Through the analysis of green financing initiatives, the review attempts to identify their effectiveness in promoting environmentally sustainable construction projects and, at the same time, in reducing information asymmetry and transaction costs. Based on the complete examination, the review is aimed to discern the merits and demerits of using green finance to achieve sustainable development goals in the built environment.

The investigation will focus on the manner in which Akerlof's Lemon Theory clarifies the matters of quality approval and risk management in green building projects and the consequences for the

markets, efficiency, and consumers' trust. Furthermore, Williamson's Transaction Cost Theory will be utilized to investigate the costs and benefits of various governance structures in the context of green finance. The review will aim to reveal the efficient allocation of resources as well as the decision-making processes. Through the integration of theoretical frameworks and empirical data abstracted from respective current literature, the review guides policymakers, practitioners, and researchers in providing viable solutions in line with the aim of achieving sustainable building through innovative financial models.

In the following sections of our article, we will be presenting the methodology used for the extraction of the articles, and the presentation of the theoretical framework. Thereafter, we will present the review of articles and the application of the chosen theoretical framework. And ultimately, we will discuss the impact of green finance and the implication of policy makers, investors and stakeholders.

1. Methodology

For the article review, a strategic and detailed methodology approach was adopted. The criterion for the selection of the articles was thoroughly fine-tuned in order to guarantee the quality and appropriateness of the articles. In particular, articles must have been published in the last six years so that they can be in line with the latest green finance and sustainable development trends. This time-based dimension of the review ensures that it deals with the most recent scientific research results and findings hence increasing its practicality and applicability.

Secondly, the chosen articles must have focused, primarily or even indirectly on various areas of green finance. These include environmentally friendly investments, sustainable economic development, and mitigation of climate change. Additionally, emphasis was put on green buildings as one of the selection criteria, which was manifest in the requirement for selected articles specifically to address or explore issues linked with sustainable construction, energy-efficient designs, and innovative financial models for green building projects. Through this approach, the review aims to distill essential literature to form a comprehensive timely collection that illuminates the intersection between green finance and sustainable development in urban environments.

More importantly, the research is also based on several other parameters to guarantee the statistical and comprehensive dimensions of the methodology used. The alignment of articles with

sustainable development goals became a fundamental guideline, implying that selected texts should align with broader sustainable development goals, addressing environmental, social, and economic issues. This criterion guarantees that the review embraces an inclusive point of view of sustainability touching not only the environmental factors but also the area of social equity and economic efficiency. Also, priority was given to those articles that discuss research findings based on empirical data or adhere strictly to theoretical frameworks designed to support the connection between green finance and sustainable development. This assures that the data used for the review is original, trustworthy, and reliable, which results in valid evidence that is helpful in framing policy and practice.

The search strategy was made through querying Google Scholar, Web of Science, Scopus, and ResearchGate databases. This is done purposely to ensure that a well-designed and comprehensive approach is selected for the identification of relevant literature for the review. At the onset, keywords and key terms, such as green finance, sustainable development, and green buildings, were identified. These keywords were then linked together with different Boolean operators to come up with search strings that were synchronized with the syntax of each database accessed.

Lastly, a filter was composed by publication date, document type, and relevance to confine the search results to only contain articles published within the last six years, empirical and theoretical research studies that directly deal with the discussion on the interrelation between green finance and the built environment and sustainable development.

In addition, citation tracking and snowballing procedures were applied which meant searching for further articles that were referenced or cited in the principal papers. The process of searching was done by making regular search updates and refinements to include the new literature and the most recent research findings. Such a precise search method was the key to collecting an overwhelming array of peer-reviewed journals on the subject the outcome of which was high quality and extensive research.

2. Theoretical Framework

The theoretical framework used on this subject, was based on the work of El Ouafa, K., & Benatia, M. A. (2018), an article that aims to establish a theoretical framework for green finance. El Ouafa,

K., & Benatia, M. A. (2018) propose the theory of lemon's by George Akerlof, and the Transaction Cost Theory by Oliver Williamson.

The lemon theory as coined by Akerlof in the green finance domain is an insightful framework for viewing the widely encountered problem of information asymmetry and the character of financing quality. Information imbalance in the green finance domain increases the gap of information between investors and sellers on things like green bonds and renewable projects.

The investors face a serious problem of not having sufficient information regarding the performance of such particular asset types. Thus, Akerlof's theory cautions individuals about the pitfalls of such kind of asymmetry that might result in scenarios such as adverse selection where the quality of the assets deteriorates as they cannot be distinguished from the high-quality assets.

Additionally, the green investment sector is also faced with a myriad of uncertainties. In essence, investors can be undecided on the real environmental impact, viability for the long-term, and the pertinent risks that are associated with green assets. Such a risk is likely to cause distortion of investment decisions and unbalance the market. Therefore, as a way of addressing the information asymmetry and bringing about transparency in green finance, the application of Akerlof's Lemon Theory becomes very necessary for the enhancement of trust and allowing capital to flow into environmentally sustainable projects, which consequently helps the cause of sustainable development and combating of climate change.

Williamson's Transaction Cost Theory (TCT) is an effective tool to examine the efficiency of market institutions while considering funding for green buildings. TCT emphasizes the importance of reducing transaction costs including negotiation, contracting, and monitoring; which, naturally, have a strong influence on market efficiency. Given that green building, finance is primarily based on projects that are highly sophisticated and involve energy performance contracts, certification programs, and environmental compliance standards, TCT helps to define how these transaction costs determine general efficiency as a whole.

For instance, high operational costs may cause investors to lose their money or delay in implementation of projects. In this context, a bottleneck to green building funding is created. Moreover, TCT enables the choosing of financial instruments for the minimization of transaction costs. The different financing options, the green bonds, the equity financing, and the public-private partnerships, entail different transaction costs. TCT advises the choice of the financing model that

suits the green projects' features. For instance, green bonds might fit large-scale developments that have standardized characteristics, while equity financing might prove more successful for establishing green innovative, and customized projects. Moreover, TCT stresses the fact of the need for well-constructed contractual arrangements to avoid risks like poor environmental performance, energy efficiency, and compliance. Transparent and binding contracts can mitigate uncertainties and allow for effective financing since they create a clear and accountable framework for all contracting parties. Through incorporating TCT in green building financing, stakeholders will be able to decide on the use of financing tools and contractual agreements which will ensure an increase in market effectiveness as well as accelerate the shift which is much needed to a sustainable built environment.

3. Literature Review:

3.1. The Review of Articles

Akomea-Frimpong et al. (2022) reveal the principal barriers that impede green finance practices in the construction sector. The main issue indicated is that there are no common set standards in the regulations which lead to implications and hindrances in the step-by-step efforts in regions across the globe. Additionally, the authors indicate that financial products that carry a "green" element usually carry higher risks and as such discourage banks from offering them thereby limiting the accessibility and variety of such products for consumers. The existence of this risk aversion undermines the spread of green finance tools and lowers their possible uptake. Besides that, although green financing obtains significant recognition for the seriousness of its role in facilitating sustainable development, many banks worldwide, however, do not show enough desire to develop financial products that are in line with the principle of green finance. Such a limited use reveals a gap between awareness and action which is evidence of the need for increased efforts from financial institutions leading to an eventual elimination of barriers and a successful application of the green finance framework throughout the world.

Green financial assistance as proven by Wang et al. (2021) is crucial in the development of green buildings. The article emphasizes on integration of green finance features into the index methodology of green building development where they can have a tremendous potential to accelerate the greening of our infrastructure systems. Green buildings should be considered

paramount in reducing environmental implications while simultaneously improving positive impacts such as the design, construction, and operation stages. Therefore, the study provides evidence of their critical role in environmental sustainability. On the other hand, Wang et al. pinpoint the science and technology funding into green building construction alongside the industrial size and the green financial aids as the most basic influencers. Through elucidating these major factors the article brings to attention the heterogeneous reality of factors that direct the green buildings development trajectory which includes financial support and technological advances that are the essence of sustainable infrastructure.

Abbas et al. (2023) have given an inclusive look at the hurdles faced in the way of green finance adoption. One of the major obstacles that have been identified, is the absence of comprehensive green databases, and this results in difficulties to the financial institutions when analyzing the risks that are related to the environment and in asset valuation. Also, the article illustrates the bureaucratic problems experienced by green projects including being with intricate approval procedures and administrative activities. The aforementioned barriers create bottlenecks in project planning which in turn slow down the pace of implementation thus diluting the possible scope and effectiveness of the green finance initiative. Abbas et al. also illustrate a financial barrier which is in the high initial costs of green technologies and projects that may discourage investors or restrict the number of sustainable investments.

Khan et al. (2022) explore significant green finance issues in depth in their study. One observed drawback is that of an unclear agreement on the green finance definition, which results in difficulties in effective implementation and metrication. Ambiguity provides an obstacle in the way of standardizing a green finance scheme and could hinder its effectiveness. They also point out a void in the relationship between green finance and environmental quality. Green finance shows promise for the goals of sustainable development through the reduction of ecological damage, but little has been concluded about this causation through practical research. To deal with these uncertainties and to enshrine a common approach to green finance is necessary for its maximization in the area of environmental issues and sustainable development.

Muganyi et al. (2021) have also narrowed their focus on green financing meant to construct green buildings that meet the green building requirements. Their analysis reveals key barriers to green finance programs in general with emphasis on issues in green building development. The article

pinpoints policy impediments as the main hurdle, emphasizing management obstructions at the micro and meso levels that contract the performance of green financing tools. These obstacles hinder the effective use of green building initiatives and do not give room for the projects to scale up to the level of impact required for the fulfillment of sustainability goals. On the other hand, Muganyi et al. point to complex risk dimensions that comprise vulnerability especially financial institutions entering into carbon financing. The complex facets of these risks create hurdles for the investors as well as for the project developers and ultimately preclude the success of green finance ventures.

Braga and his colleagues (2021) do thorough research on contributions of the green bonds in funding projects that promote the sustainability of the environment such as green buildings, renewable energy, and clean transport. Green bonds, which are fixed-income securities, act as a powerful tool to provide capital in the capital market for the purpose of financing environmental projects. The article examines extremely the big size of the green bonds market, the number of 3,000 bonds issued after 2007 totaled more than USD 414 billion for sustainable investments. Moreover, Braga and his team emphasize green bonds as a de-risking option, where governmental and multilateral agencies play an outstanding role. Through green bond issuance or adopting policies supportive of green bond issuance by these entities, the yields and volatility of green investments are lowered making them more appealing investments.

Nevertheless, the article observes that green investment carries its intrinsic risks and also that the fixed costs are higher at the beginning. Consequently, such an approach promotes the enforcement of a comprehensive public policy framework intended to reduce risks associated with green investments while creating a favorable environment for green finance and hence the low-carbon economy transition. Braga et al. analysis offers a useful picture of the operating interface and challenge of green bond financing that is the cornerstone of the global agendas for sustainable development.

As related to green finance, Chang et al. (2021) have presented a highly structural analysis of the problems and concerns exceeding finance capital mobilization. The article highlights the deeper essence of capital relocation not only to promote environment-friendly measures but also to make sure long-term sustainability. An integral part of the green financing journey is a refined perception of the risks, the disincentives, and the incentives. Among the listed issues are stranded assets,

disclosure practices, and green project definitions whose combination has significant implications on climate finance strategies. The authors Chang et al. in this sense highlight the strategic nature of decision-making and policy adoption as a critical tool for strategic allocation of capital to sustainability causes, thereby advancing the objectives of environmental conservation and climate change risk mitigation.

Miraj et al. (2021) outlined in their study research the financial considerations for the implementation of green buildings (GBs), introducing the key challenges and opportunities for their adoption. The article stresses the fact that the higher overall investment required for GBs impedes them, as evidenced by the average 9.22 percent increase over traditional blocks. Cost-benefit serviceability of energy and water efficiency in GBs and whether it can significantly offset expenditures of construction, maintenance, and renewals becomes a point of argument. Miraj et al point out, that the cost-benefit ratio is an essential tool in evaluating the investment of money into a GB technology. Interestingly, the article provides a ratio of cost and benefit which is 2.35, and, therefore, the profits accrued to managing the GBs exceed the original investment and maintenance costs.

Concerning financing of green buildings, Rana et al. (2021) present a discussion of the current financial instruments (FIs) and their performance in promoting sustainable development and emission reduction approaches. The article presents a significant knowledge gap in the effects of FIs. It stresses the importance of in-depth review studies to understand thoroughly their impact. A noticeable point is also the request for sector-specific incentives that can fit different types of energy improvement needs of the underserved population including residential properties, heritage buildings, and non-profit organizations. Rana et al. draw attention to the bridging of the gaps as a means of promoting equity in access to Green Financing to make it more effective in realizing the goal of sustainability through green building development. Through the identification of the key areas where improvement is needed and the recommendation of focused interventions, the article contributes novel and valuable insights that can be used to increase the effectiveness and inclusivity of green financing mechanisms.

In the context of the the Association of Southeast Asian Nations (ASEAN Association), Kapoor et al. (2021) argue that there are certain green finance initiatives that both the member state governments have to adopt. The article highlights the role of the government and its impact on the

aviation market through multiple means. In the first place, ASEAN governments could train stakeholders through information and guidance in green bond funding and, therefore education to increase awareness and access to green financing instruments. What is more, promoting green building regulations through adoption can push investment in green buildings, helping to develop sustainable infrastructure. Finally, by increasing local currency bond financing attracting domestic investors could integrate green finance into local markets translating to improve the sustainability of the development projects undertaken. Kapoor and the team pinpoint the possible role of green bonds as a proficient strategy for attaining energy efficiency and fostering sustainable development in the ASEAN area while highlighting the critical role of government in facilitating these initiatives.

In the article by Kajimo-Shakantu et al. (2022) the authors look into both the practicality of green building structures as the basis for green bond issuance and also the South African property market. Through these demonstrations, they highlight the ecological values that green buildings promote and illustrate how these echo the green financing fundamentals, thereby presenting a very attractive investment opportunity. Moreover, the authors perform a complete study on market dynamics and environmental impacts that influence small construction contractors to win infrastructure projects including green buildings. This analysis reveals the difficulties and strengths spots of contractors who find their way into the developing terrain of sustainable construction practices and green financing initiatives.

On the topic of green financing Liu et al. (2022) point out that, unfortunately, in the current situation there are very few financial incentives or measures proposed by governments that can convince people to invest in green building projects. Although capital investment tax exemptions comprise one method to entice green buildings, they probably are not enough to encourage construction businesses completely, due to the high entry barriers that they face. The article proves the significance of institutions and regulations to be built, which in turn, will surely make a huge difference in adding more financial incentives to make the trend of green building attractive enough for developers. Liu et al.'s study underline the need for the government's policies and the appropriate incentives to be less contradicting to the financial realities of green building development. This way, the green construction goal can be more environmentally beneficial than financially feasible for stakeholders.

Bertoldi et al. (2021) discuss in great detail innovative financing tools meant to sustain green building projects. The article focuses on the EU's search for different methods like green mortgages, on-bill financing, and energy performance contracting that can make it easier for the renovation of buildings. Green bonds have emerged as efficient instruments for stimulating direct investments in energy-efficient building retrofits. Secondly, the article highlights the significance of a collaborative approach between public and private agencies for the proper mobilization of investments. Bertoldi et al. recommend using government funds to attract private investors into the sector through loan guarantees or interest rate subsidies, however, this strategy aims to be very effective in terms of optimization of resources and the higher speed of energy renovation activities. Through requiring innovative financing mechanisms and public-private partnerships, the article provides important information contributing to the enhancement of sustainable construction practices and the accomplishment of energy efficiency goals within the EU.

Vanishvili, M., & Katsadze, I. (2022) examine green bonds as a good financing mechanism for green buildings, outlining how development banks have traditionally issued green bonds to fund environmental projects. These loan instruments act as bonds or debt securities whose purpose is to ensure climate-resilient infrastructure and sectors focused on environmental sustainability. In addition, the authors evaluate the financial advantage associated with green investments by the analysis of spreads on bonds, secured by commercial mortgages, for green buildings. Bond yields are almost always below the ones predicted by real asset ratings, which confirms the strong financial situation for investments in green buildings. In this respect, the study of Vanishvili and Katsadze demonstrates that the green bonds' main purpose is in the framework of sustainable development and attracting investments to the construction of resilient climate-robust projects.

Hsieh et al. (2020) maintain that the judging criteria for green building certification is the inverse of the equaling capital cost. The outcome implies that the Real Estate Investment Trust's (REITs) certified green would be an appealing investment with a lower cost of equity, which in turn reflects the financial return of the sustainable building standards. In addition, it explains the fact that the kind of governance of corporations has an effect on the funding of environmentally responsible initiatives. This reveals the significance of concentrated as well as diffused structures in influencing decisions for a company to put its funds into green projects. This means that the emergence of environmentally responsible structures may be achieved by developing better

corporate governance practices that align with both environmental and financial targets. Hsieh et al. present proof that environmental governance, financial induction, and real estate investment sustainability are interrelated elements. This fact is very crucial in decision-making if investors want to make a profit.

Leskinen et al. (2020) demonstrate that green certificates can have a pro-environmental effect on asset prices by using a systematic analysis. The article demonstrates the positive impact of energy certifications on property values through the lens that they may be producing different benefits such as more rental income, reduced bills, and utilities costs. These factors jointly contribute to the asking price being high for the investors when determining the property value. Moreover, Leskinen et al. call for the introduction of complex assessment models including features related to the green nature of real estate in order to enable financing providers to switch to sustainable real estate alternatives.

Alshboul et al. (2022) indicate the importance of cost forecasting which is an essential tool for developing green buildings that are, in fact, an important tool for social and environmental impact reduction. The article presents a new method that would depend on machine learning algorithms like extreme gradient boosting, deep neural networks, and random forest algorithms for accurate prediction of these expenses. Utilizing powerful state-of-the-art computational tools is the purpose of the study to improve the accuracy and reliability in the green building sector. In addition, the suggested models are designed as decision support instruments that will be applicable throughout the whole project management to enable project managers and practitioners to make the right decisions at any stage of the process. Through means of more precise prediction of cost to the operator, and also offering valuable insights, these models will have the potential to enhance decision processes, advance resource allocation, and develop automation research in the green construction industry.

Agyekum et al. (2021) consider investors as enablers for the green construction market that values green buildings as assets better than the rest. These are due to their lower risks and potential for cost-savings and competitive returns to investments. This article spotlights both the growing importance of ethical investment and the emerging concept of corporate social responsibility as the drivers of developing sustainable decisions in the allocation of funds in green buildings. Green investments are becoming more common thanks to the investors' recognition that these projects

provide both financial benefits and hazard reduction. Agyekum et al. explain how this evolution in the sentiment of the investors affects the expansion of the eco-building market, triggering the demand for eco-friendly construction practices. Also, the article highlights broader societal and environmental implications of investor decisions, thus showing that financial concerns in the building industry are not separate from the sustainable development objectives.

Porumb et.al (2020) presents a useful analysis of the effect of green building certification on property values and its wider implications for sustainable development among other related issues. The article emphasizes the high price tag involved in green building certification, where office buildings with certified green features have been reported to sell at 19% higher than their non-certified counterparts. Moreover, the study points out a very fascinating fact that the rental prices climb up by 10.5 percent for each kilometer which is proportional move to the growing need for environment-friendly buildings in the suburbs. It implies a strong linkage between green certification and property values, an indication of market understanding of the economic and environmental benefits derived through the adoption of eco-friendly construction techniques.

In addition, Porumb et al. deliver an explanation of how green certifications are a product of the growing concerns of sustainability within the building industry with a focus on the building sector as institutions that consume the most energy and contribute to carbon dioxide emission. By popularizing green and environmentally responsible building processes, green certification initiatives, however, are of key significance to a reduction of the negative impact on the built environment by the overall sustainability goals. The authors conclude that the broad range of their research findings provides a compelling economic and environmental rationale demonstrating the importance of green building certification in achieving sustainable development in the building sector.

3.2. Application of Theoretical Frameworks

The contribution of different sources proves the consistency with Akerlof's theory of lemons and Williamson’s transaction cost theory in several aspects. The essence of Akerlof's theory is on the role of information asymmetry and the levels of uncertainty in market efficiency, which shared distinctly similar issues like the lack of standardization and definition as was depicted by Akomea-Frimpong et al. (2022) and Khan et al. (2022). The non-existence of clarity on green financial

products standards and investments brings about a chastening situation where market efficiency and distortion are experienced. Furthermore, the issues of greater perceived risk in green financials exposed by Akomea-Frimpong et al. (2022) and Braga et al. (2021) are also in line with the Akerlof hypothesis. A higher risk might have some long-lasting outcomes like a negative effect of adverse selection, which subsequently sees the market being flooded by poor-quality products at the expense of high-quality ones. Such behavior not only harms the reliability and efficiency of green finance projects but also obstructs the sustainable development goals to be achieved.

Moreover, the trends pointed out in various articles are also closer to the Transactions Cost Theory. These barriers increase the problems faced by the stakeholders, lengthen the decision-making processes, and raise the overall costs of environmental finance initiatives. Furthermore, the demand for a wholesome public policy structure, as Braga et al. (2021) and Kapoor et al. (2021) argue, can be understood by applying Transaction Cost Theory. The provision of such frameworks makes the processes more streamlined, administrative tasks are reduced and there is clarity and guidance for market participants leading to lower transaction costs during green finance transactions. Policymakers can resolve these specific transaction costs which will then create an enabling atmosphere that is prone to the spread of green finance solutions thus increasing market efficiency which in turn promotes sustainable development goals. Overall, these findings can be said to correspond with the Transaction Cost Theory which essentially illustrates the need to do away with the transaction disruptions in the course of adopting green finance practices in order to achieve the long-term sustainability objectives.

4. Discussion

4.1. Impact of Green Finance

A tremendous force for sustainable development, green finance is an essential drive towards a low-carbon economy and for the preservation of natural resources. It goes beyond mere economic considerations and into ecosystem protection and community well-being. Green finance is a pioneer when it comes to creating financial tools like green bonds and eco-friendly investment portfolios that channel capital towards projects that mitigate climate change, help the adoption of alternative energy sources, and provide for the development of sustainable infrastructure.

Through the application of incentives, the program promotes environmentally responsible behaviors across businesses and industries, thus helping them to shift towards greener working schemes, lowering their carbon footprint in the process and contributing towards the global initiative to fight climate change. Furthermore, green finance helps to bridge the gap between the socially and economically deprived segments by providing them with an opportunity to have access to affordable and sustainable energy sources as well as green housing which in turn is a step to equity and social inclusion. Green finance has assumed the role of the main driving force behind the rapid transition to a low-carbon and eco-friendly economy that can provide sustainable development and allow for both economic growth and environmental preservation for the benefit of current and future generations.

4.2. Implications for Policymakers, Investors, and Stakeholders

The study highlights the significance of policymakers coming up with unified policy blueprints, shared practices, and precise definitions to prevent information gaps and uncertainties in the green finance market. Bureaucratic streamlining and some of the measures that provide incentives to start green finance adoption can lower transaction costs. Investors ought not to miss the financial advantages and competitive returns of green buildings, fearing the adverse selection effects. The green building industry and its stakeholders should advocate to the regulators and financial providers for creative financing devices, increased adoption of green financing, and encouragement of green construction practices. Public-private partnerships and capacity-building initiatives would be the best approach to building up the green finance mechanisms' efficiency and inclusivity.

Conclusion

In summary, the article review on green financing and green buildings shows a complex interconnection between theoretical theories and empirical facts. While the consequences of Akerlof's Theory of Lemons and Williamson’s Transaction Cost Theory are observable across issues such as information asymmetries, perceived risks, and bureaucracy, there are creative ways through which these challenges can be addressed by initial engagement through innovative financing tools, setting policy directions and through public-private sector collaboration.

The study highlights the necessity to adopt a multi-level strategy that involves policymakers, investors, and other stakeholders in cooperation to set common standards and promote incentives to speed up the process of transforming the built environment into a sustainable and low-carbon economy.

The emphasis is on the critical need for policymakers to develop cohesive policy frameworks, standardized practices, and clear definitions to mitigate information gaps and uncertainties within the green finance market. Streamlining bureaucratic processes and implementing incentives can effectively reduce transaction costs associated with adopting green finance initiatives. Investors are encouraged not to overlook the financial benefits and competitive returns associated with green buildings, as concerns over adverse selection effects should not deter their involvement.

Furthermore, stakeholders in the green building industry are urged to advocate for regulatory support and innovative financial instruments that promote wider adoption of green financing and sustainable construction practices. Initiatives such as public-private partnerships and capacity-building programs are seen as essential strategies to enhance the efficiency and inclusivity of green finance mechanisms. These collaborative efforts aim to foster a conducive environment for sustainable development while leveraging financial opportunities in the green economy.

This article remains merely theoretical, the impact of the theories chosen can be perceived, however, further empirical studies may take place. The green finance, a field that is still at its naissance, is yet to be completely explored. The results of this modest study may be completed by further studies concerning Akerlof's Theory of Lemons and its linkage within the employees' environmental organizational behavior within companies that promote and/or use green finance.

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