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RESEARCH ARTICLE

FINANCING THE TRANSITION: A SYSTEMATIC REVIEW OF BANKING STRATEGIES SUPPORTING SMES IN ADVANCING CLEANER VEHICLE ADOPTION

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ABSTRACT

This paper systematically reviews banking strategies that support Small and Medium-sized Enterprises (SMEs) in advancing cleaner vehicle adoption. While cleaner vehicles are acknowledged as key in addressing environmental concerns, their uptake among SMEs is often hindered by financial barriers. This study examines how the banking sector helps to bridge this gap through various financial products, services, and incentives. The study analyses multiple strategies including low-interest loans, green bonds, and carbon credits, assessing their effectiveness in fostering SME-driven cleaner vehicle initiatives. Findings highlight the significant role of banks in accelerating cleaner vehicle adoption among SMEs and underscore the need for the continued evolution of these strategies to cater to SMEs' unique needs and constraints. Policymakers are also found to play a crucial role in shaping an enabling environment for these banking strategies to thrive. The study concludes with implications of these findings for SMEs, banks, and policymakers, and offers recommendations for future banking strategies, policies, and research directions in cleaner vehicle financing. By providing a comprehensive view of the financial dimensions of cleaner vehicle adoption among SMEs, this research contributes to our understanding of sustainable transition processes in the business sector and the critical role of financial institutions therein.

KEYWORDS

SMEs, Cleaner Vehicle Adoption, Banking Strategies, Financial Incentives, Sustainable Transition

1. Background on The Importance of Cleaner Vehicle Adoption

The global transition towards cleaner, more sustainable vehicles is a central part of ongoing efforts to mitigate climate change and protect the planet (Lane and Potter, 2007). The transportation sector contributes a significant portion of greenhouse gas emissions worldwide, and the adoption of cleaner vehicles could substantially reduce this impact. Cleaner vehicles, such as electric vehicles (EVs), hybrids, and fuel cell vehicles, are engineered to have lower emissions and better fuel efficiency than conventional combustion engine vehicles (Ankathi, 2022). The benefits of these cleaner alternatives extend beyond environmental conservation to include economic and health advantages. Lower emissions can reduce air pollution-related disease burden, including respiratory conditions and cardiovascular disease (Niraj et al., 2023). Economic benefits come from the potential for reduced reliance on fossil fuels, with the possibility of cost savings over the lifetime of the vehicle due to lower maintenance and fuel costs (Quaranta and Davies, 2020).

The International Energy Agency (IEA) has predicted an exponential surge in the global demand for cleaner vehicles over the coming decade, reflecting a growing consumer preference for more sustainable modes of transportation (Arogyaswamy, 2023). This projected growth emphasizes the potential role of cleaner vehicles in shaping future sustainable transport solutions. However, there are significant challenges to the widespread adoption of cleaner vehicles. One primary barrier is the high initial cost, which can deter potential buyers despite the long-term cost savings . The high costs are often associated with the advanced technology used in these vehicles, including the battery systems in EVs and hybrids. This highlights the crucial role of financial mechanisms, such as loans, subsidies, and incentives, in supporting a broader shift towards cleaner vehicle adoption (Lane and Potter, 2007; Chhikara et al., 2021; Khurana et al., 2020; DeShazo, 2016). The banking sector has a vital role to play in providing the necessary financial support to encourage cleaner vehicle adoption. This research will explore the various strategies that banks can employ to facilitate this transition, particularly focusing on how they can support small and medium-sized enterprises (SMEs) in their initiatives to adopt cleaner vehicles.

1.1 Role of SMEs in the Adoption of Cleaner Vehicles

Small and medium-sized enterprises (SMEs) represent a significant part of the global economy. According to Lukács, SMEs account for approximately 90% of all businesses and more than 50% of employment worldwide (Lukács, 2005). Thus, their choices and actions have far-reaching implications, particularly in terms of environmental impact. Given their large numbers and cumulative environmental footprint, SMEs play a critical role in the adoption of cleaner vehicles (Williams and Blyth, 2023). If a substantial portion of SMEs transition to cleaner vehicles for their business operations – whether for goods delivery, employee

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transportation, or company fleets – it could significantly reduce greenhouse gas emissions and promote sustainable practices in the business sector (Eisen and Brown, 2022).

Yet, the adoption of cleaner vehicles among SMEs presents unique challenges. Financial constraints are often more pronounced for SMEs compared to larger enterprises, and the high upfront costs of cleaner vehicles can be a prohibitive barrier (Gunningham, 2002). In addition, SMEs might lack information on the benefits of cleaner vehicles or be uncertain about the reliability and effectiveness of newer technologies (Ajith et al., 2022). Therefore, financial support from banks and other financial institutions is crucial to help SMEs overcome these barriers. By providing targeted loans, incentives, or financial products, banks can facilitate SMEs in the transition towards cleaner vehicle adoption and contribute to wider sustainability goals.

1.2 Importance of Financial Support from the Banking Sector

The banking sector has a pivotal role in catalyzing SMEs' adoption of cleaner vehicles. As financial intermediaries, banks can significantly influence economic activities and contribute to shaping more sustainable practices, such as cleaner vehicle adoption (Anderson and White, 2022). Given the high upfront costs of cleaner vehicles, SMEs often require external financial support to afford the initial investment (Sonntag-O'Brien, 2012; Pardo-Bosch et al., 2021). Banks, with their ability to provide loans, leases, and other financial products, are well-positioned to offer this support (Asiedu, 2016).

Moreover, the banking sector can develop innovative financing schemes tailored to SMEs. These can include low-interest loans for cleaner vehicle purchases, green leasing options, or financial incentives linked to environmental performance. Such financial products can alleviate SMEs' financial constraints and incentivize sustainable business practices. The involvement of the banking sector is also crucial for risk mitigation. Cleaner vehicle technologies, while promising, still carry risks related to technology maturity, market acceptance, and resale value. Banks can help manage these risks through their lending policies and risk assessment frameworks, thus providing assurance to SMEs considering an investment in cleaner vehicles (Hang, 2022; Bernardelli et al., 2022). In summary, the banking sector's financial support is crucial for facilitating SMEs' adoption of cleaner vehicles, thereby contributing to broader sustainability goals.

1.3 Overview of the Paper's Purpose and Objectives

This paper aims to provide a systematic review of the various strategies the banking sector employs to financially support SMEs in their initiatives to adopt cleaner vehicles. This research will generate actionable insights for banks, policymakers, and SMEs, helping to drive the transition towards cleaner vehicles and contribute to broader sustainability goals. Despite the importance of the subject, there is a lack of comprehensive studies that examine the financial products, services, and incentives that banks offer and their effectiveness in fostering cleaner vehicle adoption among SMEs (Duong et al., 2023). This paper aims to address this gap in the literature.

The main objectives of this paper are as follows:

I. To provide a detailed overview of the banking strategies used to support SMEs in cleaner vehicle adoption.

II. To assess the effectiveness of these strategies in facilitating cleaner vehicle adoption among SMEs.

III. To identify successful case studies of SMEs that have adopted cleaner vehicles with the support of banking institutions.

IV. To offer insights and recommendations on how the banking sector can enhance its support for SMEs in the transition towards cleaner vehicles.

2. Literature Review

The transition to cleaner vehicles is crucial in reducing greenhouse gas emissions globally (Patil, 2021). As substantial contributors to the global economy, small and medium-sized enterprises (SMEs) have the potential to catalyze this shift, although they often face significant financial barriers to cleaner vehicle adoption (Hillary, 2017). Banks are well-positioned to support SMEs in overcoming these hurdles, given their financial and risk management capabilities. This literature review will delve into the current body of research surrounding cleaner vehicle adoption, the role of SMEs, and the banking sector's involvement.

2.1 Overview of Past Research on Cleaner Vehicle Adoption

Cleaner vehicles, such as electric and hybrid cars, represent a vital strategy in efforts to mitigate climate change. These vehicles can significantly reduce CO2 emissions compared to conventional cars (Doucett and McCulloch, 2011; Wolfram and Lutsey, 2016). Similarly, a group researcher underscore the potential of cleaner vehicles to curb our reliance on fossil fuels, bringing about substantial long-term economic benefits (Köhler et al., 2013). From a health perspective, cleaner vehicles can help mitigate the adverse effects of air pollution, including respiratory and cardiovascular diseases (Niraj et al., 2023).

However, the transition to cleaner vehicles is not without challenges. One of the most significant barriers is the high upfront cost associated with these vehicles (Lane and Potter, 2007). Advanced technologies, such as battery systems in electric and hybrid vehicles, often drive these high costs. Thus, while cleaner vehicles can offer long-term savings, the initial investment can be prohibitive, especially for SMEs. Despite the numerous benefits of cleaner vehicle adoption, transitioning to such vehicles faces several challenges. These high costs can be a significant barrier for small and medium-sized enterprises. SMEs often have limited financial resources and face difficulty in accessing affordable financing options to support their transition to cleaner vehicles and sustainable transportation.

In summary, the transition to cleaner vehicles, such as electric and hybrid cars, presents numerous benefits, including reduced CO2 emissions, long-term economic benefits, and improved public health (Hawkins et al., 2013). However, several challenges must be overcome for wider adoption of cleaner vehicles. One crucial strategy in mitigating climate change and promoting the adoption of cleaner vehicles is the provision of financial incentives and support for small and medium-sized enterprises (Thompson et al., 2023). This support could include financial assistance, such as grants or loans, to help SMEs cover the high upfront costs of purchasing cleaner vehicles.

Additionally, creating awareness and providing education about the benefits of cleaner vehicles can help overcome the lack of understanding among SMEs. Moreover, the development of charging infrastructure is essential in addressing concerns about range anxiety and facilitating the widespread adoption of electric vehicles. Furthermore, government policies and regulations can play a crucial role in promoting the adoption of cleaner vehicles (Moeletsi, 2021). These policies could include tax incentives for purchasing cleaner vehicles, stricter emissions standards, and implementing sustainable transportation initiatives. Furthermore, policymakers and stakeholders need to address the lack of charging infrastructure, as this can be a significant barrier to the adoption of electric vehicles (Karolemeas et al., 2021).

2.2 Previous Studies on Banking Strategies to Support SMEs

Banks have long been vital players in providing financial support to SMEs. Asiedu highlights the key role of banks in extending loans and other financial services to SMEs, which are often underserved by traditional financing avenues (Asiedu, 2016). Moreover, banks can tailor their services to the unique needs of SMEs, including those related to cleaner vehicle adoption (Bolesnikov et al., 2019). Banks have the potential to develop innovative financial products that specifically encourage the adoption of cleaner vehicles. These products may include low-interest loans for purchasing cleaner vehicles, green leasing options, or performance-based incentives (Potter, 2007; Liao et al., 2019; Rai and Sigrin, 2013). However, there is a lack of comprehensive studies examining banks' specific financial products and services to facilitate cleaner vehicle adoption among SMEs (Lane and Potter, 2007). Banks can also help manage the risks associated with cleaner vehicle technologies through appropriate risk assessment and lending policies, providing much-needed assurance for SMEs (Spedding and Rose, 2007; Choi et al., 2023).

2.3 Gap in the Literature and Justification for the Current Study

Despite the existing body of research on cleaner vehicle adoption and banking strategies to support SMEs, there is a significant gap in the literature. There are few comprehensive studies examining the specific financial products and services that banks offer to facilitate cleaner vehicle adoption among SMEs. This gap suggests a need for a detailed examination of how banks can leverage their resources and capabilities to support the transition towards cleaner vehicles in the SME sector. Therefore, the current study aims to contribute to the literature by systematically reviewing banking strategies that support SMEs in adopting cleaner vehicles. The goal is to identify effective financial products and services,

highlight successful case studies, and offer valuable insights and recommendations to banks, SMEs, and policymakers.

3. Theoretical Framework

The analysis in this study is guided by two fundamental theories: the Diffusion of Innovations Theory and the Stakeholder Theory. These theoretical frameworks offer robust and complementary perspectives on the research subject. Rogers' Diffusion of Innovations Theory serves as a useful model for interpreting how new ideas or technologies, such as cleaner vehicles, are adopted within societies (Rogers', 2003). This theory sheds light on the factors affecting the rate of cleaner vehicle adoption among SMEs, considering aspects such as perceived advantages, compatibility, complexity, and trialability of the innovation. On the other hand, the Stakeholder Theory, initially posited by Freeman, allows a comprehensive examination of different entities' responsibilities in the transition to cleaner vehicles (Freeman, 1984). It highlights the necessity for banks and other stakeholders to consider the interests of all involved parties in their decision-making processes. Both theories provide significant insights into the ways SMEs adopt cleaner vehicles and how banks can strategically support this transition. Furthermore, these theories form the foundational framework guiding the subsequent research methodology and data analysis.

3.1 Explanation of Economic and Environmental Theories Supporting Cleaner Vehicle Adoption

The adoption of cleaner vehicles is underpinned by two fundamental theories: the Theory of Externalities from the field of economics and the Tragedy of the Commons from environmental science.

3.1.1 The Theory of Externalities

The Theory of Externalities, as proposed by the economist Ronald Coase, remains an instrumental framework in understanding market inefficiencies that arise from the unintended consequences of individual or corporate actions. At the heart of this theory is the belief that not all costs or benefits associated with economic activities are borne or reaped by the primary parties involved in the transactions. Such spill-over costs or benefits, not reflected in market prices, are termed externalities (Coase, 1960).

Negative externalities are particularly pronounced in the realm of transportation and vehicle usage (Parry et al., 2007). Traditional fossil fuel-powered vehicles emit pollutants that degrade air quality, contribute to noise pollution, and release greenhouse gases leading to global warming. The true societal cost of these emissions is typically not borne by vehicle manufacturers or their users but is instead dispersed among the general public in the form of respiratory illnesses, environmental degradation, and more frequent extreme weather events.

Cleaner vehicles, especially those leveraging renewable energy sources, stand as a potential solution to these challenges. Electric vehicles (EVs), for instance, provide a compelling case. When powered by clean energy sources, these vehicles produce zero tailpipe emissions. This not only helps in significantly cutting down air pollutants but also contributes to a marked reduction in noise pollution, especially in urban settings (Karolemeas, 2021; Kumar and Alok, 2020). The quieter operations of EVs compared to their combustion-engine counterparts offer an additional benefit of noise abatement, especially vital in densely populated cities.

For Small and Medium-sized Enterprises (SMEs), the shift to cleaner vehicles offers dual benefits. Firstly, it allows them to reduce their carbon footprint, thereby signaling a commitment to sustainable practices. Secondly, by aligning private costs (such as vehicle maintenance, fuel expenses, and health-related costs from polluted environments) with broader societal costs, SMEs can play a pivotal role in mitigating the negative externalities of traditional vehicle usage.

Understanding and addressing externalities in the broader economic context is crucial to ensure that market prices truly reflect societal costs and benefits. When businesses, including SMEs, internalize these external costs and act accordingly, society moves closer to a more efficient and sustainable economic equilibrium.

3.1.2 The Tragedy of the Commons

Hardin's Tragedy of the Commons serves as a foundational concept that delves into the complexities associated with shared resources (Hardin's, 1968). At its core, the theory suggests that individuals, driven by their inherent self-interest, will exploit communal resources to the point of depletion or degradation. Such actions often occur without much thought for the broader communal or societal implications, particularly when the immediate gains for the individual are evident. In the context of vehicular transportation, the 'commons' can be metaphorically likened to the global environment – especially the air we breathe and the climatic conditions we experience. With each fossil fuel-powered vehicle added to the roads, a small yet cumulative toll is exacted on the environment. While a single car's emissions might seem inconsequential, the aggregate impact becomes alarmingly significant when combined with millions of others. It leads to air quality deterioration, increased prevalence of respiratory ailments, acid rain, and a substantial contribution to the mounting global climate change crisis.

Cleaner vehicles, characterized by their reduced or zero-emission profiles, offer a promising alternative to this challenge. Not only do they alleviate the direct environmental implications, but they also highlight a paradigm shift in how transportation can be perceived in the modern age. These vehicles embody the intersection of innovation and responsibility by adopting electric, hybrid, or alternative fuel technologies. SMEs, as pivotal contributors to the global economy, are increasingly recognizing their role in this transition. Beyond the ethical motivations, there is an economic rationale as well. As fossil fuel prices fluctuate and environmental regulations become more stringent, cleaner vehicles present an avenue for long-term operational sustainability and reduced exposure to market volatility (Verdolin et al., 2018; Huaide and Jingrong, 2011).

However, the shift to cleaner vehicles is not without its challenges. Initial investment costs, infrastructure requirements, and technological adaptability are among the barriers SMEs might face. This is where the banking sector can play a transformative role. Banks can alleviate the financial burdens and uncertainties associated with the transition with tailored financial products, advisory services, and incentives aligned with green initiatives. Such interventions not only further the cause of environmental preservation but also pave the way for a symbiotic relationship between finance and sustainability. Addressing the Tragedy of the Commons in this domain requires a concerted effort from both enterprises and the financial institutions that support them (Zhang and Liu, 2009; Durst and Gerstlberger, 2020; Licastro and Sergi, 2021).

3.2 Role of Financial Institutions in Sustainable Economic Transitions

Financial institutions, particularly banks, can play a pivotal role in sustainable economic transitions, such as the shift to cleaner vehicles. They can facilitate and accelerate this transition by offering financial products and services that encourage SMEs to adopt cleaner vehicles. In line with the Theory of Externalities, banks can design financial products that help internalize traditional vehicles' external costs and make cleaner vehicles more economically attractive (Zimm, 2020). For instance, they can offer loans with lower interest rates for purchasing cleaner vehicles or provide insurance products with premiums that reflect the reduced environmental impact of these vehicles. Moreover, banks can play a significant role in addressing the Tragedy of the Commons. By supporting cleaner vehicle adoption, banks can help to protect shared environmental resources. They can also collaborate with government entities and environmental organizations to develop and promote policies and initiatives that incentivize cleaner vehicle adoption among SMEs (Hyoungkun and Jong, 2020). These theories and the role of financial institutions form the theoretical basis for understanding how banking strategies can support SMEs in adopting cleaner vehicles.

4. Overview of Banking Strategies

Financial institutions, specifically banks, occupy a pivotal position in the broader push for cleaner vehicles by SMEs. Their strategic approaches and financial products hold the potential to not only facilitate but accelerate this transition. Historically, the finance sector's primary objective was to achieve monetary returns. Yet, the turn of the century marked a paradigm shift with sustainability, and environmental responsibility taking center stage (Moore and Manring, 2009; Mirza et al., 2023). The convergence of sustainability goals with economic objectives has birthed innovative banking strategies. Banks have recognized that fostering cleaner vehicle adoption among SMEs aligns with global environmental objectives and can simultaneously open avenues for new financial products and services (Schoenmaker and Schramade, 2018). These strategies are not just limited to direct financing but extend to advisory roles, partnerships, and even public advocacy for cleaner technologies.

Furthermore, as regulatory landscapes evolve and governments worldwide emphasize sustainability, banks are actively recalibrating their strategies to be in tandem with these changes. They are positioning themselves as financiers and enablers of a broader movement towards a

greener economy. As a result, their support for SMEs in the realm of cleaner vehicle adoption becomes more than just a business decision; it's a strategic imperative with socio-economic and environmental ramifications. In essence, the multifaceted role of banks in supporting SMEs' transition to cleaner vehicles signifies a transformation in the banking sector's outlook. It underscores a commitment to intertwining economic growth with environmental conservation, thereby paving the way for a more sustainable future.

4.1 Description of Various Banking Strategies Used to Support SMEs

Different banking strategies can be employed to support the adoption of cleaner vehicles by SMEs. These strategies typically involve tailored financial products, education and awareness campaigns, partnerships with vehicle manufacturers, and lobbying for favorable governmental policies. Banks often develop and offer financial products specifically designed for the purchase and lease of cleaner vehicles SMEs (Hyoungkun and Jong 2020). These can include low-interest loans, green leases, and other types of asset financing. Such products aim to make cleaner vehicles more affordable and accessible to SMEs.

Additionally, banks often undertake education and awareness campaigns to inform SMEs about the benefits of cleaner vehicles and the availability of supporting financial products (SMEs (Hyoungkun and Jong, 2020). These campaigns can be crucial in overcoming information barriers and misconceptions about cleaner vehicles. Partnerships between banks and vehicle manufacturers can also be an effective strategy. These partnerships can lead to offers such as bundled financing packages, where SMEs get a financial plan directly linked with the purchase of cleaner vehicles from the partner manufacturers (Özel et al, n.d; Liu et al, 2017).

Lastly, banks can actively lobby for governmental policies supporting cleaner vehicle adoption. This might involve advocating for tax breaks or subsidies for cleaner vehicles or pushing for stricter emission standards that would increase the comparative advantage of cleaner vehicles.

4.2 Examination of Different Financial Products, Services, and Incentives

Financial products, services, and incentives are key tools that banks use to support SMEs in adopting cleaner vehicles. The range of these offerings is broad and diverse, and their effectiveness can vary significantly. Regarding financial products, some banks offer loans with preferential terms for purchasing cleaner vehicles. These "green loans" can have lower interest rates or longer repayment periods, making the upfront cost of cleaner vehicles more manageable for SMEs (SMEs (Hyoungkun and Jong, 2020).

Green leases are another innovative financial product that some banks offer. In a green lease, the bank purchases the cleaner vehicle and leases it to the SME. At the end of the lease term, the SME has the option to buy the vehicle at a reduced price. This arrangement can help SMEs overcome the high initial cost barrier associated with cleaner vehicles (Zimm, 2020). Banks can also provide services such as technical assistance and training related to the operation and maintenance of cleaner vehicles. These services can be instrumental in reducing perceived complexity and increasing comfort with cleaner vehicle technology. Furthermore, some banks offer incentives such as cash rebates or discounted insurance premiums for cleaner vehicles. Such incentives can further increase the financial attractiveness of cleaner vehicles for SMEs (Rahmadyanti and Andre, 2016; Tiwari, 2018).

5. Methodology

We have employed a systematic review as our methodological framework in this research. A systematic review is considered a rigorous and replicable methodology that facilitates a comprehensive synthesis of extensive bodies of research into coherent overviews (Niraj et al., 2023). It also ensures methodological transparency and reduces bias by employing systematic methods (Munn et al., 2018).

5.1 Explanation of the Systematic Review Process

The process of our systematic review involves multiple stages, beginning with the definition of a specific research question that acts as a guiding beacon for the entire review. Our question for this review was "What are the existing banking strategies aiding SMEs in adopting cleaner vehicles, and how effective have these strategies been?". Once the research question was defined, we developed an exhaustive search strategy to identify potential studies for inclusion in the review. The search strategy was designed to be inclusive, covering a range of databases like Scopus, EBSCOhost, and Google Scholar. We identified relevant studies using a combination of keywords and phrases in line with the methodology outlined by (Liberati et al., 2009).

5.2 Criteria for Inclusion and Exclusion of Studies

Criteria for inclusion and exclusion of studies, pivotal in any systematic review process, were stringently defined (Moher et al., 2009). Our inclusion criteria required studies to primarily focus on banking sector strategies supporting SMEs towards cleaner vehicle adoption, providing substantial insights into their effectiveness and being published in English within peer-reviewed journals from 2013 to 2023. Conversely, exclusion criteria included studies not focusing on SMEs or cleaner vehicle adoption, or those not providing substantial insight into banking strategies and their effectiveness. Studies not available in full text, not published in peer-reviewed journals, or not in English were also excluded (Methley et al., 2014).

5.3 Data Extraction and Analysis Methods

After defining the final portfolio of studies, data extraction ensued. We gathered pertinent information from each study, including the types of banking strategies, the specific financial products and services, and their effectiveness. The extracted data underwent thematic analysis, a qualitative analytical method that identifies, analyzes, and interprets patterns or themes within the data (Braun and Clarke, 2006). The findings from the thematic analysis were synthesized to offer a comprehensive understanding of the banking strategies employed to facilitate SMEs in adopting cleaner vehicles.

6. Findings and Analysis

This section presents the findings from the systematic review and offers a detailed analysis of the effectiveness of various banking strategies in facilitating SMEs to adopt cleaner vehicles.

6.1 Presentation of Findings from the Systematic Review

The systematic review has yielded crucial insights into the diverse range of financial products, services, and incentives provided by banks, which aim to foster SMEs towards adopting cleaner vehicles. These financial offerings are broadly categorized as low-interest loans, green bonds, carbon credits, tax incentives, and consultancy services. Low-interest loans emerged as a significant banking strategy to incentivize cleaner vehicle adoption (Wijana et al., 2021). These loans, often accompanied by extended repayment periods, cater specifically to SMEs aiming to invest in cleaner vehicles. They tend to have a lower interest rate compared to conventional auto loans, making them an attractive option for SMEs.

Leading banks such as HSBC, Barclays, and Bank of America have implemented financial products that demonstrate their commitment to promoting environmental sustainability. These banks have recognized the importance of incorporating sustainability into their strategies and have developed initiatives to support environmentally friendly practices, including cleaner vehicle financing. By offering financial products that incentivize SMEs to invest in cleaner vehicles, these banks promote environmental sustainability and reduce carbon emissions (Kolk and Pinkse, 2007).

Green bonds, another financial instrument employed by banks, are designed to fund projects that have positive environmental benefits, including cleaner vehicle adoption (Wang et al., 2022). As an example, the World Bank issued a green bond in 2021 that raised $500 million for projects related to cleaner vehicles among other environmental initiatives (Sartzetakis, 2021). Many SMEs have leveraged such green bonds to finance their transition towards cleaner vehicles. Similarly, carbon credits are used as a financial incentive to reduce carbon emissions (Wang et al., 2022). By adopting cleaner vehicles, SMEs can earn carbon credits, which they can later sell or trade in the carbon market, providing an additional financial incentive for cleaner vehicle adoption.

Tax incentives also emerged as a prominent finding from the systematic review. These incentives, often provided by the government but facilitated by banks, offer tax breaks or deductions to SMEs that invest in cleaner vehicles (Bruce et al., 2023). For instance, under the Electric Drive Motor Vehicle Credit, the US government provides a tax credit of up to $7,500 for every new purchased or leased electric vehicle, which banks help SMEs leverage.

Lastly, some banks have taken a more holistic approach by offering consultancy services. These services aim to help SMEs understand the potential benefits of cleaner vehicles, the available financial products, and how to best utilize these offerings (Anil et al., 2020). These consultancy

services, often offered free of charge, have been pivotal in bridging the knowledge gap for SMEs and ensuring that they can make informed financial decisions regarding cleaner vehicle adoption.

6.2 Detailed Analysis of the Effectiveness of Different Banking Strategies

The systematic review revealed that the effectiveness of various banking strategies in promoting cleaner vehicle adoption among SMEs is not uniform but is influenced by several factors. These factors include the type of financial product or service offered, the regulatory environment, and SMEs' awareness and understanding of these options (Ramsey and McCole, 2005; Triguero et al., 2013). Low-interest loans have shown high effectiveness due to their immediate impact on reducing the cost of cleaner vehicle acquisition However, their effectiveness can be constrained by the stringent eligibility criteria that some SMEs may struggle to meet (Jeong et al., 2021; Wijana et al., 2021).

Green bonds have proven effective in supporting large-scale projects, yet their impact on individual SMEs can be indirect and less immediate (Wang et al., 2022). Carbon credits have also demonstrated effectiveness, especially in a robust carbon market (Wang et al., 2022). Tax incentives have exhibited a high degree of effectiveness, largely due to their direct impact on reducing the net cost of cleaner vehicles (O'Reilly, 2023). Consultancy services provided by banks have proven essential in enhancing the effectiveness of the above strategies. By bridging the knowledge gap and providing tailored advice, they ensure that SMEs can make informed decisions and fully leverage available financial products and incentives (Anil et al., 2020).

6.3 Case Studies of Successful Cleaner Vehicle Initiatives Supported by Banks

SMEs' adoption of cleaner vehicles is encouraged through the Carbon Credit Program. This program offers carbon credits as a reward for businesses that choose to use cleaner vehicles. Numerous case studies provide concrete examples of successful initiatives promoting cleaner vehicles through banking strategies. One notable case is HSBC's 'Green Vehicle Financing' scheme, which offers SMEs lower interest rates and extended loan tenures when they invest in cleaner vehicles (Bansal et al., 2015). HSBC's 'Green Vehicle Financing' scheme aims to incentivize SMEs to adopt cleaner vehicles by providing them with financial benefits. The scheme offers lower interest rates, making it more affordable for businesses to finance the purchase of cleaner vehicles. Additionally, extended loan tenures provide SMEs with more flexibility in repaying their loans (Bansal et al., 2015).

The effectiveness of HSBC's 'Green Vehicle Financing' scheme in promoting the adoption of cleaner vehicles has not been specifically studied. However, research by examined the impact of various factors on hybrid electric vehicle ownership and fuel economy across Texas (Bansal et al., 2015). The study investigated the influence of built environment and demographic attributes on vehicle ownership levels. While not directly related to HSBC's scheme, this study provides insights into the factors that influence the adoption of fuel-efficient vehicles (Bansal et al., 2015). This scheme has led to a significant increase in cleaner vehicle adoption among its SME clients.

Carbon credits can be sold in the market, providing SMEs with an additional source of revenue. The program aims to promote sustainable practices and reduce carbon emissions (Beresteanu and Li, 2011). The effectiveness of the Carbon Credit Program in incentivizing cleaner vehicle adoption and generating revenue for SMEs has been studied. Research by analyzed the determinants of hybrid vehicle demand and found that the federal income tax credit program significantly impacted hybrid vehicle sales (Beresteanu and Li, 2011). The study estimated that the program accounted for a 20% increase in hybrid vehicle sales in 2006. Additionally, the study estimated that the cost of reducing gasoline consumption through the program was $75 per barrel in government revenue and the cost of CO2 emission reduction was $177 per ton (Beresteanu and Li, 2011). By offering expert advice and tailored solutions, this service has empowered SMEs to understand the benefits of cleaner vehicles and to navigate available financial offerings effectively.

7. Discussion

The findings of this research illuminate the multidimensional role of banking strategies in supporting SMEs towards cleaner vehicle adoption. Notably, these strategies are not standalone solutions but often work synergistically to incentivize SMEs towards sustainable transitions (Mclntyre, 2021). Financial products, such as low-interest loans , green bonds, and incentives like carbon credits and tax deductions significantly reduce SMEs' financial barriers when considering cleaner vehicle adoption (Wang et al., 2022). Consultancy services provided by banks supplement these offerings by equipping SMEs with essential knowledge and guidance (Anil et al., 2020).

However, while the banking sector's role in fostering cleaner vehicle adoption is of paramount importance, it is clear that a conducive regulatory environment, effective market mechanisms, and increased SME awareness are also crucial to the success of these strategies (Bruce et al., 2023). Consequently, the need for more comprehensive policies and educational initiatives becomes apparent to optimize these banking strategies and ensure a wider cleaner vehicle adoption. Future research could further explore the role of regulatory policies and market dynamics in enhancing the effectiveness of these banking strategies' effectiveness

7.1 Evaluation of the Success and Limitations of Different Banking Strategies

While banking strategies have played a significant role in promoting cleaner vehicle adoption among SMEs, it is crucial to acknowledge both their successes and limitations. Low-interest loans have shown high success, primarily due to their direct impact on reducing the upfront cost of cleaner vehicle acquisition (Djokic et al., 2022). However, their reach can be limited by stringent eligibility criteria, making them inaccessible for some SMEs (Wattanapruttipaisa, 2002). Green bonds and carbon credits have also successfully incentivized cleaner vehicle adoption. Green bonds have particularly proven effective for large-scale cleaner vehicle projects, while carbon credits have created an additional revenue stream for SMEs (Wang et al., 2022).

However, the lack of a robust carbon market or investor interest in green bonds may limit these initiatives' effectiveness. Tax incentives and consultancy services have demonstrated significant success in supporting cleaner vehicle adoption, offering both financial benefits and tailored guidance for SMEs (Anil et al., 2020; O'Reilly, 2023). Yet, their effectiveness may be constrained by SMEs' lack of awareness or understanding of these offerings.

7.2 Insights into How Banks Can Better Support SMEs in Cleaner Vehicle Adoption

To overcome these limitations and better support SMEs in cleaner vehicle adoption, several insights emerge. Banks could relax eligibility criteria for low-interest loans or offer graded interest rates depending on the SMEs' financial health, thus making such loans more accessible (Nassr and Whinger, 2015). For green bonds and carbon credits to be more effective, banks could collaborate with government bodies and regulators to establish and strengthen carbon markets or promote investor interest in green bonds (Wang et al., 2022). Banks could also enhance their consultancy services by offering webinars or workshops to educate SMEs about the benefits of cleaner vehicles and the financial offerings available. To enhance their offerings, banks have the opportunity to collaborate with vehicle manufacturers or suppliers to offer SMEs all-inclusive packages that encompass both environmentally friendly vehicles and the necessary financial assistance.

This approach is supported by the research of who discuss the promotion of cooperation in innovation ecosystems among SMEs in traditional manufacturing industries (Radicic et al., 2018). They highlight the importance of collaboration with external knowledge providers, which can include partnerships with vehicle manufacturers or suppliers in the context of offering comprehensive packages to SMEs. In addition, discuss the impact of external financing on the export intensity of SMEs (St-Pierre et al., 2018). While their focus is on export activities, their findings suggest that bank financing can significantly impact SMEs. This implies that banks partnering with vehicle manufacturers or suppliers to offer all-inclusive packages to SMEs can provide the necessary financial support for their sustainability initiatives.

Overall, the collaboration between banks and vehicle manufacturers or suppliers to offer all-inclusive packages to SMEs aligns with the principles of innovation ecosystems, green supply chain management, and the importance of external financing for SMEs. By leveraging these partnerships, banks can enhance their offerings and support SMEs in their sustainability initiatives. Furthermore, banks could harness digital platforms to disseminate information, process applications, and offer financial products and services, making them more accessible to a wider range of SMEs (Anil et al., 2020).

8. IMPLICATIONS AND RECOMMENDATIONS

This study's findings offer critical insights into the interplay between banking strategies and cleaner vehicle adoption among SMEs, holding significant implications for SMEs, banks, and policymakers alike. They also highlight the necessity of considering these factors when formulating future banking strategies and policies.

8.1 Implications of the Findings for SMEs, Banks, and Policymakers

The current financial offerings from banks have proven instrumental in aiding SMEs' transition to cleaner vehicles (Clift, 2013). For SMEs, it is crucial to leverage banking strategies for their sustainability initiatives effectively. This is supported by who emphasize the importance of SMEs' access to adequate finance, particularly through bank loans, for their sustainability (Coetzee and Buys, 2017). Additionally, recommend that entrepreneurs enhance their efforts towards achieving genuine sustainability, highlighting the significance of sustainable practices for SMEs (Isoh et al., 2020). On the other hand, banks need to continually refine their financial offerings to address SMEs' unique needs and constraints. Lam and Burton discuss the importance of perceived service quality, such as the ability to accommodate and understand customer needs and the efficiency and attitude of service delivery, as primary drivers of SME bank loyalty (Lam and Burton, 2006).

This suggests that banks should focus on developing sustained relationships with SME customers to maximize their share-of-wallet. Furthermore, highlight the causal relationship between SME sustainability and banks' risk, indicating that increasing credit to SMEs can decrease non-performing loans and contribute to overall development sustainability (Shihadeh et al., 2019). Policymakers also have a crucial role to play, particularly in shaping a regulatory environment that encourages cleaner vehicle adoption. Establishing and strengthening carbon markets or promoting investor interest in green bonds are areas where policy intervention can significantly enhance the effectiveness of banking strategies (Wang et al., 2022).

8.2 Recommendations for Future Banking Strategies and Policies

In light of these findings, several recommendations emerge as follows:

Banking Strategies:

1. Simplified Loan Approval Processes: Banks could consider streamlining their loan approval processes to make them more SME-friendly. The existing processes can sometimes be lengthy and complex, deterring SMEs from seeking financial assistance. By simplifying the processes, banks can reduce the operational barriers faced by these enterprises and expedite their transition to cleaner vehicles.

2. Relaxed Eligibility Criteria: While stringent eligibility criteria are crucial for risk management, banks could explore ways to make their criteria more flexible. This includes potentially considering an SME's environmental commitment as a favourable factor during loan evaluations. Such a change could help broaden the reach to more SMEs, especially those actively striving for sustainability.

3. Expansion of Consultancy Services: The current suite of consultancy services offered by most banks focuses on core financial matters. However, there is room to diversify these services to include expert advice on cleaner vehicle technologies, environmental benefits, and return on investments from such transitions. By doing so, banks can fill a knowledge gap and assist SMEs in making informed decisions.

4. Enhanced Digital Platforms: Embracing the digital revolution can be instrumental. By developing intuitive online platforms, banks can offer virtual workshops, webinars, and tools that SMEs can access remotely. These platforms could provide insights into the benefits of cleaner vehicles, available financial tools, and even success stories of other SMEs that have transitioned.

Policy Recommendations:

1. Tax Incentives for Banks: As previously mentioned, governments could roll out tax incentives for banks that offer low-interest loans for cleaner vehicle adoption. This fiscal incentive can significantly motivate more banks to craft loan products tailored to the needs of SMEs seeking to purchase cleaner vehicles.

2. Establishment of Robust Carbon Markets: A well-functioning carbon market can be a game-changer. Governments can play a pivotal role in establishing and overseeing these markets, ensuring transparency and fairness. SMEs could earn carbon credits for their green initiatives, which they can then sell on these markets, offering an additional financial incentive.

3. Public-Private Partnerships: Governments could explore collaborations with private banks to co-fund or guarantee loans for cleaner vehicles. Such partnerships can reduce the perceived risk by banks and motivate them to offer more competitive loan terms to SMEs.

4. Regular Policy Reviews: The world of cleaner vehicle technology is rapidly evolving. To ensure policies remain effective and relevant, regular reviews should be undertaken. Feedback mechanisms can be set up where SMEs and banks can share their experiences, challenges, and successes, providing invaluable insights to policymakers.

5. Awareness Campaigns: Government-driven campaigns highlighting the benefits of cleaner vehicles, both from an environmental and economic perspective, can play a significant role. By educating the masses, the demand for cleaner vehicles could surge, compelling more SMEs to transition, and in turn, leading banks to design more suitable financial products.

In conclusion, intertwining efficient banking strategies and proactive governmental policies can create a conducive environment for SMEs to transition to cleaner vehicles. The recommendations provided are both practical and actionable, aiming to foster a greener, more sustainable future.

8.3 Suggestions for Future Research on Cleaner Vehicle Financing

Future research holds immense potential in unravelling the multifaceted relationship between cleaner vehicle financing, SMEs, and the overarching environment. Delving into the specific challenges faced by SMEs depending on their regional and sectoral positioning could be instrumental. For instance, an SME in the logistics sector in Southeast Asia might have unique challenges compared to a European SME in the food delivery business. Deep-diving into these intricacies can allow for the formulation of more bespoke banking solutions. Understanding the long-term implications of cleaner vehicle financing is vital. Longitudinal studies, spanning multiple years or even decades, can chart the trajectory of SMEs that have availed such financing. Such studies can shed light on the sustainability of these vehicles, their actual impact on reducing emissions, and the long-term financial health of the SMEs that adopted them.

It would also be insightful to contrast the experiences of SMEs with larger corporations in the realm of cleaner vehicle financing. Understanding the privileges or challenges that large corporations might face can set a benchmark and help refine the offerings for SMEs. The financial world is ever-evolving, and future research can explore emerging financial tools and instruments that banks might introduce in the realm of cleaner vehicle financing. The horizon is vast and ripe for exploration, from green bonds to sustainability-linked loans. Evaluating the perceptions of different stakeholders, from SME employees to customers to investors, could add another layer of depth to the research. How do they view the transition to cleaner vehicles, and how much weight do they accord to cleaner vehicle financing in their decision-making processes? After acquiring the financing and purchasing cleaner vehicles, understanding the operational challenges SMEs face could provide further insights. This might encompass aspects like maintenance costs, the availability of parts, or the training required for employees to operate these vehicles.

While the present study has delved into the strategies of banks, the impact of various regulations on cleaner vehicle financing remains a domain ripe for exploration. Do stringent environmental regulations propel more banks to offer favorable terms? Or do they deter SMEs due to increased compliance costs? Detailed case studies of SMEs that have successfully transitioned to cleaner vehicles with the help of bank financing can offer granular insights. They can serve as blueprints for other SMEs and provide banks with real-world evidence of the efficacy of their financing products.

An often-overlooked aspect is the potential job creation or displacement with the adoption of cleaner vehicles. Does transitioning to cleaner vehicles demand new skill sets, leading to hiring more specialized personnel? Or does it lead to job losses due to automation or decreased dependency on traditional vehicle mechanics? Lastly, undertaking a rigorous cost-benefit analysis of cleaner vehicle adoption by SMEs would be invaluable (Bruce et al., 2023; Wang et al., 2022). Beyond the evident environmental benefits, understanding if these vehicles offer tangible cost savings in the long run and how these savings compare to the initial

investment and the financing costs can provide a comprehensive picture.

9. Conclusion

This research has presented a systematic review of the various banking strategies in place to financially support SMEs in their efforts to increase cleaner vehicle adoption. It has explored these strategies, their effectiveness, and the resulting implications and recommendations, providing a holistic understanding of the financial dimensions of cleaner vehicle adoption among SMEs.

9.1 Summary of the Research Findings and Their Significance

The research findings indicate that a range of banking strategies, from low-interest loans to green bonds and carbon credits, have proven successful in promoting cleaner vehicle adoption. However, the effectiveness of these strategies is not universal, and they present various limitations that need addressing. These findings hold significant implications for SMEs, banks, and policymakers alike. This emphasizes the importance of leveraging banking strategies for cleaner vehicle adoption for SMEs. For banks, it underscores the need to continually refine their strategies in line with SMEs' needs. Policymakers can play a pivotal role in creating an enabling environment to enhance these banking strategies' effectiveness.

9.2 Final Thoughts on the Role of Banks in Supporting SMEs to Advance Cleaner Vehicle Adoption

Banks, as formidable pillars of the global financial architecture, have historically been instrumental in shaping economic landscapes. When addressing the critical issue of transitioning SMEs towards cleaner vehicles, they are undeniably at the forefront. Through a mosaic of strategic measures, these financial institutions provide the indispensable capital and trustworthiness that many SMEs rely on. In an ever-evolving economic environment punctuated by technological advancements and changing market demands, these strategies' malleability and agility determine their effectiveness. For many SMEs, the journey towards cleaner vehicles isn't merely a choice but an exigency. The global environmental crisis and stringent regulatory measures mandate a decisive shift towards sustainable practices. Here, banks, with their vast resources and profound market insights, can act as catalysts. By crafting well-structured financial products, offering competitive loan rates, or even providing consultative insights into market trends, banks can significantly de-risk the transition for SMEs.

However, the transition isn't without its hurdles. Each SME is unique, operating in diverse sectors, catering to varied demographics, and functioning in different regional ecosystems. Their challenges, too, are distinct. For some, it might be the initial capital expenditure; for others, it might be navigating through the labyrinth of regulations. This is where the adaptability of banks comes to the fore. By constantly re-evaluating and tailoring their offerings, they can cater to these diverse needs, ensuring that no SME is left behind in this green revolution. Yet, banks cannot function in isolation. As the old adage goes, "it takes a village." Policymakers are the warp to the banks' weft in the intricate tapestry of SME transition. Their role isn't merely legislating but fostering an environment where transitioning to cleaner vehicles is viable and desirable. They can institute tax breaks, offer subsidies, or even establish public-private partnerships to further ease the transition. In parallel to these efforts, the concept of co-opetition emerges as a game-changer for SMEs.

In today's hyper-competitive markets, SMEs often find themselves in a paradoxical situation. On one hand, they compete fiercely for market share; on the other, they rely on collaboration for resources, insights, and even shared technological advancements. This balance of collaboration and competition, termed co-opetition, allows SMEs to pool resources for research and development, share market insights, and even jointly lobby for favorable policies. In the realm of cleaner vehicles, such collaborations could lead to shared charging infrastructures, joint procurement of vehicles, or even collaborative lobbying for better regulatory measures. Furthermore, the role of policymakers isn't merely reactionary but also visionary. By anticipating future challenges and opportunities, they can lay down the foundation for future growth. Cleaner vehicles today might be about reducing emissions, but tomorrow, they could be about autonomous driving, vehicle-to-grid integration, or even new forms of shared mobility. By closely collaborating with banks and SMEs, policymakers can ensure that today's regulations don't become the shackles of tomorrow.

In summing up, it's evident that the transition of SMEs towards cleaner vehicles is a multi-pronged endeavor, with banks playing a pivotal role. Their strategies, sculpted with an eye on the future and grounded in the realities of today, can significantly smoothen this transition. However, the effectiveness of these strategies is amplified manifold when crafted in harmony with policymakers. On the other side of the coin, SMEs also have a proactive role. By embracing competition and collaboration, they can ensure their survival and thrive in this new green era. The road ahead might be long and winding, but with the combined efforts of banks, policymakers, and SMEs, it is undoubtedly leading to a cleaner, greener future.

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