

Factors That Hinder the Small Agriculture Sector from Implementing Electrification Technology

Dwight D. Gatlin

Department of Business, Liberty University, Lynchburg, VA, USA
Email: dgatlin6@liberty.edu

How to cite this paper: Gatlin, D. D. (2025). Factors That Hinder the Small Agriculture Sector from Implementing Electrification Technology. *Open Journal of Business and Management*, 13, 1093-1117.
<https://doi.org/10.4236/ojbm.2025.132058>

Received: February 4, 2025

Accepted: March 11, 2025

Published: March 14, 2025

Copyright © 2025 by author(s) and Scientific Research Publishing Inc.
This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).
<http://creativecommons.org/licenses/by/4.0/>



Open Access

Abstract

Grounded in stakeholder theory, this study analyzes the obstacles and prospects associated with implementing electrification technologies in the Small-Ag sector of the agricultural and heavy construction machinery industries. This study emphasized attaining net zero carbon emissions by the mid-21st century. Obstacles preventing the adoption of technologies in the Small-Ag sector include insufficient regulations, infrastructure, and market preparedness, which impede widespread adoption. This study is significant for marketing acumen in aligning projects with consumer and regulatory requirements, particularly emphasizing the environmentally aware Generation Z, a substantial market sector. This study included a single case study to examine the consequences of inadequate electrification uptake on market share and sustainability efforts. Data obtained from interviews enables a thorough comprehension of stakeholder viewpoints. The findings highlight the imperative for strategic business model innovation to improve brand awareness and address the changing expectations of discriminating consumers. The study includes significant insights into how the electrification of agriculture and machinery might enhance environmental sustainability and promote market competitiveness.

Keywords

Agriculture, Electrification, Marketing, Stakeholder, Sustainability, Decarbonization, Generation Z

1. Introduction

The adoption of electrification by manufacturers can facilitate decarbonization, but insufficient enabling policies, infrastructure, and market preparedness impede

widespread market acceptance. Manufacturers use electrification technologies to necessitate proficient marketing expertise to identify and develop projects that align with market and regulatory requirements (Chen et al., 2022). Comprehending the consumer psychology of various consumer segments will assist organizational leaders in formulating efficient marketing tactics. The existing gaps in the literature directly link to the uncertainties surrounding the genuine expectations of Generation Z customers. Thereby providing a precise aim for the study. Establishing or revitalizing brand awareness is a potential approach outlined in the literature. Generation Z and Millennial shoppers exhibit discernment over the brands they purchase. Generation Z adult customers, born between 1997 and 2002, lead the sustainability movement, with 68% recognized as environmentally conscious buyers (McCoy et al., 2021).

Manufacturers' electrification adoption can lead to decarbonization; however, the lack of supporting policies, infrastructure, and market readiness hinders mass market adoption. Electrification adoption technologies by manufacturers demand expert marketing skills to detect and create projects that meet market and legal expectations (Chen et al., 2022). Understanding the consumer psychology of most consumer groups will help organizational leaders create effective marketing strategies. Current gaps in the literature can relate to the unknowns about the proper expectations of Generation Z consumers. Deepening knowledge about consumers' behaviors and interactions with their environment will enable organizational leaders to craft valuable marketing strategies. Projections indicate that millennials and Gen Z consumers will outnumber all other age groups and should remain the focus of marketers. Younger consumers are also becoming the primary catalyst for retail expansion (McCoy et al., 2021). These age groups have grown up with digital technology that is readily available and are likely to research products and brands before purchasing. These generations of consumers are brand-aware and tech-savvy. In an ever-consuming world, companies are increasingly compelled to anticipate and forecast people's demands to maintain a competitive edge (Laurenti et al., 2022).

Building or reimagining brand awareness is a prospective solution identified in the literature. Generation Z and Millennial consumers are selective about the brands they buy. Generation Z adult consumers (born between 1997 and 2002) are the frontrunners in the sustainability movement, with 68% identified as eco-friendly purchasers (McCoy et al., 2021). Many individuals prioritize brand and prestige, favoring foreign brands over local brands, indicating a preference for developed market economies over emerging ones (Pillay, 2021). Technological development, economies of scale, supply networks, and global competition are all common factors that incentivize organizations to become flexible and improve (Rezaei & Behnamian, 2021).

This study is divided into four sections. Section 1 revealed the issue: the potential consequences of insufficient electrification adoption in the Small-Ag (commercial and consumer equipment) sector of the farm and heavy construction ma-

chinery industry. Section 2 included the methodology I used to execute the study in alignment with the problem and purpose statements. Section 3 included the study's data findings, delineated novel themes, compared the data findings with existing literature, and examined the implications of the results on the issue statement. Section 4 included the summary of the results, application, and recommendations.

1.1. Purpose Statement

The study's purpose was to increase understanding of the impact of the lack of electrification adoption in the Small-Ag market segment of the farm and heavy machinery industry, which could result in the potential inability to achieve net zero carbon emissions by the mid-21st century. I sought to uncover opportunities for an organization in the farm and heavy equipment industry to differentiate its product portfolio from competitors and explore creative ways that the industry's market segment can decarbonize without jeopardizing market share. The geographical region of the Southern United States was the focus of the study. Fifteen participants contributed to achieving data saturation for the qualitative research. Considering unclear criteria, such as data saturation, establishing the sample size arbitrarily decreases the reliability of qualitative studies and leaves room for speculation about the study's validity (Tutar et al., 2023). The data came from interviews because this method emphasizes understanding the qualitative study and the participants' interactions and perspectives (Baixinho et al., 2022). The design included collecting reliable data that small farm equipment leaders can use when considering the effects of adopting electrification strategies and growing the future market. I explored the significant problem of not achieving a higher future market share through a descriptive lens, capturing the manufacturing industry's complexity and creating a rich consumer behavior narrative for analysis and comparison.

1.2. Research Questions

The following research questions guided the study. The research questions aligned to help marketing professionals understand their consumers and create effective strategies. Qualitative studies are appropriate if the researchers attempt to understand human interactions and behavior in their natural environments (Alam, 2021). The research questions used for this study included:

RQ1. How will farms and heavy equipment electrification differentiate the Small-Ag market segment from competitors?

RQ2. What can the Small-Ag market segment of the farm and heavy equipment industry do to achieve net-zero carbon emissions without jeopardizing market share growth?

RQ3. What are the benefits of electrification of processes and products to manufacturers?

According to Mayer (2020), short-term pull demand inflation may arise follow-

ing an industry's decarbonization process. The first research question addressed how electrification will enable the organization to differentiate from competitors. This question helped readers understand that organizations that are slow to adopt electrification have policies that differentiate in markets and specific areas in which they operate. Research question number 2 introduced the element of decarbonizing without losing market share. If leaders do not enforce policies for decarbonization, environmental conditions will. Growing concerns about industries switching to fossil fuels ignited debates on the relationship between decarbonization and economic growth (Copley, 2023). The third research question addressed the benefits of electrification. Together, the research questions built on each other to address the potential impact of the lack of electrification adoption in the farm and heavy machinery industry. The results could address the question of the potential inability to achieve net zero carbon emission by the mid-21st century and jeopardize future market share growth. According to Mayer (2020), short-term pull demand inflation may arise following an industry's decarbonization process.

1.3. Assumptions, Limitations, and Delimitations

The first assumption was that consumers with positive attitudes towards eco-friendly products purchase eco-friendly products. The qualitative findings indicate that the knowledge and attitudes of Gen Z consumers regarding eco-friendly practices were inadequate to persuade young people to afford eco-friendly items (Tran et al., 2022). To mitigate the risk, the organization should implement a diversification plan, a universally used and effective strategy for reducing price risk. During the early phase of implementing a market diversification plan, firms will see an increase in uncertainty regarding market demand because of unexpected factors in new markets that can cause disruptions (Wang & Liu, 2023).

The second assumption was that engaging in sustainable behavior enhances individuals' propensity to make more positive adjustments. Generation Z customers might experience a favorable emotional state known as a warm glow when they buy environmentally friendly products to strengthen their self-identities that prioritize ethical values (Mahasuweerachai & Suttikun, 2022). The risk of this assumption is that with unverified data on the mass acquisition of Small-Ag products, leaders are slow to become early suppliers of unknown demand for fear of losing profits. I mitigated this risk by including quantifiable research methods for reliability. The study was flexible, and quantitative tools used were for triangulation because quantifying and qualifying data produces results that are easily interpreted and of superior quality (Perez et al., 2023).

The third assumption was that all interviewed leaders were knowledgeable about the organization's benefits of eco-friendly products. The organization's leaders should engage in effective risk management of the electrification process. Risk management plays a substantial role in the planning project of a company's electrification by discovering, evaluating, and mitigating different probable hazards that could influence the overall operation of the process (Wikansari et al.,

2023). To mitigate the risk of leaders unaware of the benefits of electrification, the organization should invest in research and development. Senior officials' contribution influences R&D investment (Liu et al., 2022).

The first limitation of this study was that the sample size of consumer experience with electric products in the studied industry is too small to gauge the possible success of mass production. Researchers indicated that ecological considerations often have a lesser impact on purchasing decisions, such as price, information, labels, and emotional traits. Store-related elements are external factors that encourage or discourage green purchasing behavior (Wijekoon & Sabri, 2021). The risk is that the organization could spend more on changing new products to appeal to consumers. To mitigate the risk, I used qualitative and quantitative research to predict future rewards and risks best. Delay of gratification is a type of self-control that involves making decisions based on the future and refers to the ability to resist the temptation of immediate, smaller rewards to attain more significant, more valuable goals in the long term (Ding et al., 2021).

The second limitation of the study was that it was not statistically representative. In contrast to sampling methods in quantitative research, which focus on obtaining random and statistically representative samples to generalize findings to larger populations, qualitative research involves a distinct set of considerations to gain a more profound understanding of explicit phenomena (Ting et al., 2023). The risk here is losing market share by not including all customer segments and shareholders in current and future customer-based strategic thinking. The mitigation strategy would include designing product solutions that benefit all stakeholders. The product design process prioritized users' emotional responses to enhance consumers' purchasing motivation, and design thinking included emotional elements in designs, leading to products that better meet user demands (Kwon et al., 2021).

The final limitation was accessing company confidential information for the study. Companies that excel in data-driven operations demonstrate more significant levels of consumer engagement, and the number of cases for marketers expanded, resulting in new demands, capabilities, and skills in previously exclusive areas of data science experts (Xavier & Picoto, 2023). The risks include leaking the organization's confidential information or secrets. The risk mitigation strategy entailed obtaining confidentiality forms from the legal department to use data and participant protection. In research, informed consent is a vital ethical and legal responsibility with two primary purposes: to respect and uphold participants' autonomy and to protect them from potential harm (Godskesen et al., 2023).

The delimitations included the time constraints of this study, which limited the research to managers from one organization. Evidence for informing policymaking can derive from many sources. I could use customer testimonials and input from lower-level employees of the organization. However, economic experiments are valuable in three ways: they can effectively identify casual responses to policy changes that cannot exist only in observational data, they can include observation

from behaviors that are unobservable through administrative records or other sources, and they can provide valuable insights into the motivations behind individuals' decisions to participate in programs (Rosch et al., 2021). The scope included just the Small Ag segment of the studied company to narrow down the study to fit within the time constraints of the research project. The studied organization operates in many market segments within their industry. The applicability of user research in research and innovation projects restricted human and time assets is not immediately apparent (Staffans et al., 2022).

1.4. Significance of Study

This research included examining data gathered by specific methods using theory to assess research questions that analyze marketing strategies concerning the effectiveness of electrification in the agriculture industry. Substituting fossil fuel-based technologies and processes with electrically powered alternatives guarantees that farms and heavy machinery sectors actively contribute to environmental sustainability initiatives (Ali & Anwar, 2021). This study offered significant insights into how organizations might enhance their market share and gain a competitive advantage in the future, particularly among younger generations of customers.

2. Introduction to the Review of Literature

Electrification in agriculture on the farm and in the heavy machine industry is essential in reducing environmental carbon dioxide emissions. In manufacturing, farms and companies can reduce greenhouse gas emissions and become more sustainable by replacing fossil fuels with electric power. Replacing technologies and processes that use fossil fuel with electrically powered equivalents ensures that farms and heavy machine industries contribute towards environmental sustainability efforts (Ali & Anwar, 2021). This study included identifying and discussing leadership practices. According to Zapata Riveros et al. (2021), business model innovation refers to the strategic process of generating and capturing fresh value by modifying one or more elements of an established business model. The concepts emphasized the elements influencing brand preference and presented practical solutions in industrial endeavors. These endeavors can aid in decarbonizing various industrial processes and helped me reveal benefits for accelerating the adoption of electrification. This study included the stakeholder theory to analyze the effectiveness of electrification in the farm and heavy machine industries. Farming evolved from the ancient days of manual labor and hand plowing. With the advent of modern technology, the agriculture industry achieved significant advancements that revolutionized crop production and livestock rearing. The electrification of farming equipment makes farming more efficient, sustainable, and profitable than ever. The constructs reflect leadership effectiveness in understanding consumers and aligning business strategies to satisfy all stakeholders. The adoption of electrification by manufacturers requires practical marketing skills that would ensure the projects meet the current needs and adhere to various

governmental regulations (Chen et al., 2022). The small-Ag market segment will experience a high demand for its products by achieving zero carbon emissions.

Literature Review

Business Practices

A business model outlines how a company generates value for specific clients while maintaining a favorable financial profit equation. According to Zapata Riveros et al. (2021), business model innovation refers to the strategic process of generating and capturing fresh value by modifying several elements of an established business model. Business marketing is essential because it requires an understanding of consumers and the execution of strategic objectives. Freudenreich et al. (2020) concluded that value generation is the focal point of business model research. Bag et al. (2023) suggested that a corporation must exhibit marketing prowess by delivering products to suit market demands and allocating resources to keep pace with market advancements.

Risk Management

When actively leading effectively, organizational leaders should participate in effective risk management of the electrification process. Risk management plays a significant role in planning a company's electrification project by identifying, assessing, and mitigating various potential hazards that may affect the overall operation of the process (Wikansari et al., 2023). Proficient project managers understand that adopting an initiative-taking stance toward risk management is consistently superior to relying on random occurrences (Mitch, 2023). Sadeh et al. (2022) suggested that project managers face difficulties in identifying effective strategies to reduce the impact of the most significant risks because they lack sufficient authority to take effective action. Sadeh et al. (2022) contended that senior executives' provision of organizational support to project managers could enable a pragmatic approach to mitigating risks beyond conventional risk management approaches in high-risk projects. Climate and energy policies attempting to reduce greenhouse gas emissions may lead to public health co-benefits related to air quality. Nevertheless, the allocation of these additional advantages has not included thorough examination despite the chance to customize mitigation endeavors to attain optimal rewards (Zhu et al., 2022). Recent research proves that strong risk management practices are crucial for a company's effective electrification strategy.

Achieving Profitability

If a company leader does not consider its stakeholders' sustainability needs, the company will have low product profitability. Mid-level and senior-level managers in the company should evaluate consumer behavior before beginning the electrification process (Freeman, 2023). According to Daft et al. (2021), industry experts and analysts should view dynamic offerings as an effective tool to regain profitability and stay relevant. This approach focuses on being very responsive to customer needs and adopting design approaches like online shops (Daft et al., 2021).

Villar et al. (2023) found that customer-centric supply chains place the preferences and needs of customers at the forefront during every stage of sourcing, production, and delivery of goods and services. Implementing client-centric supply chains entails transitioning from mass production to personalized production, enabling the development of distinct and tailored products and services for each consumer (Villar et al., 2023). Considering stakeholders' need for sustainability and implementing client-centric strategies can enhance enterprises' profitability, improve customer interactions, and sustain long-term success (Villar et al., 2023).

Capturing Market

Lowering manufacturing costs should lead to the company lowering the number of products for consumers in the Small-Ag market, which would further attract consumers. The firm's electrification process will ensure that the employees engage in minimal duties that promote ease in achieving the company's goals (Valentinov & Hajdu, 2021). The growing significance of consumers' demand for low-carbon options is evident. Shi et al. (2023) found that consumers' strong preference for low-carbon products increased demand, prompting more producers to reduce emissions to generate higher revenue. Manufacturers must execute emission reduction activities to conduct environmentally friendly improvements and create highly efficient goods with minimal emissions (Shi et al., 2023). Their level of risk aversion primarily determines the anticipated increase in utility for producers, the preference of buyers for low-carbon products, and the carbon price. Shi et al. (2023) concluded that introducing and incorporating embedded services from energy service companies in a well-performing market enhances the manufacturers' expected usefulness and sustains economic growth.

When companies in the manufacturing industry achieve sustainability, an increase in employee engagement and improvement in operations performance occurs. Jiang and Luo (2024) determined that at the corporate level, CSR communication can influence employees' values and identities, affecting their attitudes and behaviors. Through sustainability, manufacturing companies can reduce carbon dioxide emissions in the environment and become more efficient, reducing overall operational costs (Rajagopal et al., 2022). Companies would achieve regulatory compliance, reduce costs, and pay penalties. Consumer demand for products becomes high once the company focuses on achieving sustainability. Businesses in the manufacturing industry would benefit from the bottom line (Rajagopal et al., 2022). In the end, the business would eventually receive rewards for following the path of sustainability.

Chen et al. (2022) stated that electric development makes manufacturing more competitive and environmentally friendly. The process increases safety in the workplace by preventing employees from inhaling toxic products that may result from the manufacturing process. A company would have a reduction in maintenance costs because of the higher lifespan of its products. Electric machines and motors are often small and lightweight, reducing the energy an enterprise would need to conduct its operations (Chen et al., 2022). Abdul-Manan et al. (2020)

found that using larger batteries will provide greater levels of electrification, potentially resulting in reduced overall emissions. [Abdul-Manan et al. \(2020\)](#) posited that for every kWh, deteriorating returns relate to increasing battery size. In Europe, strict regulations regard companies' carbon emissions. Companies avoid robust fines through electrification and stay ahead of the curve in conforming with environmental regulations ([Chen et al., 2022](#)). Companies that adopt electrification in the manufacturing industry support their employees by considering their health and well-being.

[Atuonwu and Tassou \(2021\)](#) stated that electrification creates quiet operation practices. Companies in the manufacturing industry produce noise higher than 65 decibels, which extends to noise pollution. [Han et al. \(2022\)](#) confirmed that the elevated noise level emitted by agricultural machinery during operation is a substantial risk factor that diminishes the wellbeing and productivity of workers. Companies could reduce the noise rate by more than half through the electrification of processes. Noise pollution is an invisible danger. An individual may not quickly notice that there is noise pollution, but it has a massive impact on an individual's health. Electrification removes the need for noisy machines since most processes interconnect ([Atuonwu & Tassou](#)). The internal combustion engine in regular vehicles produces three times the noise of an electric car when moving at 200 miles per hour ([Atuonwu & Tassou](#)). The only noise electric vehicles make comes from tires rubbing the ground and the overall resistance to driving by the wind.

Electrification of processes and products leads to an increase in operational precision. Electrification of industries in a specific location reduces the rate of firm turnover, whereby firms would want to invest in the location with fewer firms leaving the region ([Atuonwu & Tassou, 2021](#)). In the context of Agriculture 5.0, adopting electric-powered agricultural machines and using renewable energy sources is crucial for the long-term development of smart farming. [Ghobadpour et al. \(2022\)](#) stated that the utilization of fully autonomous robots in the agriculture industry is a growing trend in response to the rising need for food and environmental concerns. Hence, a positive impact exists on productivity around the area because of the elevated levels of competition. Electrification enhances the need for employees to ensure that the company they are working for supports a competitive advantage in the market by adapting to innovative technologies and market trends ([Atuonwu & Tassou, 2021](#)).

[Ghobadpour et al. \(2022\)](#) stated that electric tractors offer numerous benefits, such as promoting precision agriculture, enhancing working conditions, mitigating environmental effects, and boosting crop profitability. A contradictory view arises from the lack of charging capabilities. [Paniyil et al. \(2021\)](#) stated that the issue of EV charging must be resolved to facilitate a seamless shift away from fossil fuel-powered electric machines. The government would direct its efforts to the companies since elevated levels of productivity by different companies mean that the country would attract investors. According to [Ghobadpour et al. \(2022\)](#), by

2050, the global population is forecast to reach 10 billion, and the expectation is for agricultural production to continue its growth trajectory. In emerging economies, electrification and infrastructure growth coincide. Difficulties exist in separating the demand side of products from the supply side of products.

Electrification is an essential strategy for reducing carbon dioxide emissions from manufacturing industries. Bag et al. (2023) concluded that climate change is accelerating beyond prior estimations, and these effects are irreversible. Most of the reductions in emissions come from de-carbonizing industries and the installation of heat pumps in different regions. To achieve the full benefits of de-carbonization, electricity generation should shift to low-carbon sources such as renewable energy (Talvitie et al., 2021). The expansion of power grids is also necessary to accommodate the continuous demand for electricity by the manufacturing industry. High competition in the market and the overall long lifetime of equipment causes the electrification of the manufacturing industry to remain slower than in other areas. Nawaz et al. (2022) indicated that industrial products must meet precise quality criteria to comply with safety regulations. Given the increase in demand and supply for electricity in the coming years, the power grid should hold the variability and vast scale of power (Talvitie et al., 2021). Hence, the need to reduce the overcrowding rate in electricity systems is clear. Governments can play an influential role in providing clear pathways for operators in the grid system to allow timeliness in making investments (Talvitie et al., 2021). A concrete geographical capacity can address the manufacturing industry's future needs for electricity.

The technical potential for electrification in the manufacturing industry is high. Governments should focus their efforts on research and development, whereby a decrease in the cost of alternative technologies may occur. The diversity of the manufacturing industry may cause industrial producers not to see the benefits of electrification effectively. Quantifying electrification benefits and adjusting standards to accommodate new equipment would shift the paradigm in light industries (Saidani & Kim, 2021). Going electric in the manufacturing sector translates into high initial investment costs. In overcoming the high initial investment costs barrier, incentives should encourage the manufacturing industry to shift towards electrification (Saidani & Kim, 2021).

The conduct of resource evaluation ensures that each industry adapts the mechanism that would ensure it achieves the best performance result by adjusting the electrification process. Local and state administrations are responsible for determining the specific industry in their area to implement measures that facilitate attaining a uniform level of electrification within these businesses (Schoeneberger et al., 2022). The incentives should appear on the wholesale market through high and low-price periods. The incentives may also arise through new systems, services, and markets, which will support the stability of transmission networks. Companies in the manufacturing industry must develop technical and management capabilities to take advantage of the incentives (Saidani & Kim, 2021). Govern-

ments should realign subsidies and taxes, enabling favorable adaptation of electrification. [Bag et al. \(2023\)](#) argued that the interaction between a company and the inherent environment is essential for the company's competitive advantage. Governments should have policies that comprehensively approach the electrification of the manufacturing industry.

[Saevarsdottir et al. \(2020\)](#) stated that electrification ensures that companies can control temperatures. Electric motors and other electric equipment produce less energy than traditional manufacturing equipment. Existing literature demonstrates the widespread utilization of diverse technologies in global research endeavors ([Ghobadpour et al., 2022](#)). An analysis published by [Oliveira et al. \(2021\)](#) indicated that 37% of robotic systems are four-wheel drives, whereas 22.06% are used explicitly for weeding chores. Operators of electric equipment benefit from maximum torque immediately after using the equipment. The torque output continues linearly until the back electro-motive force begins to counteract at a reasonable pace ([Saevarsdottir et al., 2020](#)). The process ensures that as the equipment operates, room temperature maintenance exists; hence, no negative impact occurs on the person managing the equipment. The electrification of processes ensures no wastage of fuel during warm-ups or idle periods ([Saevarsdottir et al., 2020](#)). Non-electrified equipment must warm up before use before reaching the optimal room temperature for operation. Electrification of processes ensures that equipment starts operations immediately, which saves on the cost of fuel and the entire process. Lithium batteries cannot withstand freezing below room temperature ([Saevarsdottir et al., 2020](#)). Electrification can produce high production levels, even in freezing conditions.

To maintain the electrification process, the manufacturing industry should consider shoring or reshoring their manufacturing process. Companies should keep their manufacturing operations within the nation's borders, which would reduce costs. [Zapata Riveros et al. \(2021\)](#) argued that business model innovation involves an iterative process of trial and error. Managers experiment with different variations of business models rather than just predicting the future. The entire manufacturing team should move if a company leader moves its operations abroad. All stakeholders should support the decision ([Woody et al., 2022](#)). Companies should include considerable investments in renewable sources of energy. Renewable energy would diversify the energy supply and reduce dependence on imported fuel. Renewable energy would reduce the air pollution rate because of the manufacturing process in industries ([Woody et al., 2022](#)). The government fosters innovation by emphasizing the significance of technological adaptation in industries ([Parpulova, 2022](#)). Innovation emphasizes the correlation between novel concepts and approaches and the requisite organizational framework to address them effectively ([Parpulova, 2022](#)). Companies should also forge partnerships with utilities and stakeholders to ensure that various processes within the company align with de-carbonization efforts. The stakeholder engagement approach effectively exchanges ideas and improves the outcomes of different projects relat-

ing to de-carbonization (Woody et al., 2022). Partnerships within different companies in the manufacturing industry will ensure that the companies help each other develop and evaluate ideas regarding de-carbonization.

Theories

Edward Freeman (1984), a professor of business administration, first popularized the concept of stakeholder theory in 1984. Stakeholder theory defines a company as a collection of relationships between individuals or groups in business activities, and these relationships are essential for the firm's functioning and have an effect (Freudenreich et al., 2020). Kortetmäki et al. (2023) proposed that stakeholder research examined the relationship between organizations and nature from descriptive, instrumental, and normative perspectives and developed two approaches: considering nature as a stakeholder and recognizing nature as a shared concern among human stakeholders. According to stakeholder theory, collaborative value creation suggests that the connections between a central business and its stakeholders should rise above simple transactional interactions (Freeman, 2010; Freudenreich et al., 2020). The stakeholder theory posits that entities beyond shareholders own valid interests in the firm and that the inputs of all stakeholders retain inherent worth and must factor into business decision-making.

The stakeholder theory assumes that manufacturers, suppliers, and other vendors in the manufacturing industry are the relevant stakeholders in ensuring effective processes in the company. Potential stakeholders can derive substantial advantages from examining instances, as it can offer them intricate insights into the dynamics inherent in each circumstance (Marcon et al., 2023). Hence, when one stakeholder is against carbonization because of its high cost, it would not be easy for other stakeholders to proceed without considering everyone's input (Vourdoubas, 2021). The concepts of the stakeholder theory include employees, customers, communities, suppliers, and investors. Employees manufacture, sell, and deliver products in the market. Therefore, employees must work together and follow specific processes to ensure the company's efficient products meet customers' demands (Vourdoubas). Employees are crucial to the success or failure of a business. Kim et al. (2023) stated that employee stress levels are the primary determinant of job satisfaction attitudes. The loyalty and satisfaction of customers contribute to a large volume of sales. Satisfied customers are essential to a business since they can provide referrals to the business (Freeman, 2023). Suppliers provide the company with the necessary raw materials to conduct the company's processes effectively. Investors give the company capital to grow and continuously expand their operations (Vourdoubas, 2021). Hence, each stakeholder in the manufacturing industry must achieve high productivity levels.

Manufacturers must apply marketing knowledge to identify and comply with requirements and regulations to develop projects that satisfy market needs and legal criteria throughout the implementation of electrification. Stakeholder theory suggests that individuals or groups with legitimate interests in an organization pursue advantages, and no predefined hierarchy of benefits exists (Marcon et al.,

2023). Freeman (2023) evaluated how the stakeholder theory contributes to the success of a business. Under the stakeholder theory, anyone affected by a company and its performance of functions is a stakeholder in the company. The stakeholders in the company include the suppliers, customers, the community, environmental groups, and diverse governmental groups (Freeman, 2023). The stakeholder theory intertwines with corporate responsibility. Company leaders must consider the needs of their beneficiaries before engaging in activities that can affect them. Kim et al. (2023) stated that promoting employee job satisfaction is crucial for organizations to retain skilled staff and attain optimal production.

Satisfied and motivated employees lead to outstanding organizational performance. Customers purchase the product or use the service; hence, they determine whether the product or service will remain on the market for an extended period. Community stakeholders provide direct information on the effect of a company's products or processes on the community (Vourdoubas, 2021). Suppliers effectively provide raw materials for a company. When a company considers the needs of its suppliers, the suppliers will concentrate on ensuring that the company has high-quality raw materials that will promote efficiency. Freeman (2023) stated that the local community makes up most people who purchase products in the local area of a business; therefore, the managers should consider their needs. The government and other regulatory bodies effectively provide control and protect the public from actions by the company that may harm the public.

Valentinov & Hajdu (2021) encouraged businesses to take advantage of the stakeholder theory in the small-aggregate market. Considering the stakeholder theory, the Small-Ag market should adopt electrification, ensuring customers receive high-quality products without jeopardizing processes (Valentinov & Hajdu). Each stakeholder had different concerns when the firms in the Small-Ag market adopted electrification. To achieve zero carbon emissions, leaders should consider the health of employees and the local community (Valentinov & Hajdu). The employees and the local community will experience a substantial reduction in various conditions such as cancer, heart disease, obesity, and diabetes. The decrease in the rate of air pollution will play a significant role in ensuring a decline in conditions such as asthma (Marcon et al., 2023). Customers would gain confidence in purchasing products from the companies because of considering people's health. Satisfied customers would mean more business purchases, increasing the company's requirement for raw materials. According to Marcon et al. (2023), suppliers would back the company's efforts to reduce carbon emissions and lead in providing effective materials that enhance production. The government continuously supports zero carbon emissions. Therefore, the efforts of different firms in Small Ag market segments to adopt electrification would satisfy the government.

3. Research Methodology

The study included a case study as the primary method but incorporated narrative and phenomenology to increase validity. A case study is a research strategy used

to gain a thorough and multifaceted understanding of a complex topic inside its real-life context. The design of the study was flexible. Flexible designs typically include a qualitative method to identify key concerns in the field, such as summarizing the literature to highlight significant issues (Chamusca et al., 2023). Triangulation in this research study occurred using several related datasets, methodologies, an investigator, and a theory to answer the study questions effectively.

3.1. Participants, Population and Sample

The eligible participants for this study were mid and senior-level organizational leaders from the organization under investigation. The number of participants was thirty. The chosen participants' hierarchal status served as their expert validation. Mid-level managers are instrumental as they manage the daily activities of an organization. Middle managers implement firm-level strategies and design and manage operational strategies (Funke et al., 2023). Senior-level managers are influential and play a role in setting marketing strategies and direction for organizations. Green marketing requires innovative solutions to contemporary issues that support business decisions and generate revenues (Ali, 2021).

The eligible participants for this study were mid-level organizational leaders from the organization under investigation. I conducted interviews with knowledgeable decision-makers who are actively involved in the organization's electrification strategy. The research study included purposive and snowball sampling as non-probability sampling approaches. I used a sample size of 15 participants to reach thematic repetition.

3.2. Data Collection and Analysis

The collected data helped to substantiate the research questions and subsequent inquiries regarding the extent and objective of this study. The research questions provided insight into leadership awareness, which results in successful strategy formulation. The collection of primary data involved the use of semi-structured, open-ended questions. Descriptive research-producing publications served as a research method to provide detailed accounts of the characteristics of the population or topic. I employed the semi-structured interview method, using open-ended interview questions. I requested archive data from an internal team within the organization for triangulation. I systemically investigated an observable topic in quantitative research by marshaling complex data using mathematical elements gained from surveys.

I used inductive analysis to detect developing patterns, themes, and ideas. This section presents a comprehensive examination of the data analysis process employed in the study, encompassing the utilization of coding and themes. I intended to identify emergent themes by analyzing field notes from interview sessions and listening to participant recordings. The field notes documents included multiple reviews to interpret meanings accurately. Triangulation was successful because the qualitative interview data was thoroughly examined. The primary quantitative method I employed involved data gathered from conducting surveys. As part of

the triangulation process, I used the MAXQDA software application.

3.3. Reliability and Validity

Qualitative research considers validity and reliability as crucial aspects related to credibility. The reliability of findings is the fundamental basis of qualitative research of superior quality. Validity pertains to the accuracy and trustworthiness of a description, decision, explanation, or interpretation. To achieve validity, I employed purposive sampling. Bracketing interviews can enhance understanding and involvement with participants' experiences by uncovering overlooked personal memories.

Hayashi et al. (2021) found that process validity is a method construct that encompasses all research phases, pre- and post-data collection and analysis. To achieve validity, I employed purposive sampling as a sampling technique. According to Firdaus et al. (2024), purposive sampling is a methodological strategy in which specific environments where researchers intentionally choose individuals or activities to gather information that cannot come from alternative options. Mid- and senior-level managers were eligible participants for the study, as they must have five-plus years of experience in the industry and within the organization studied. Getting access to beliefs from proven managers will offer potential interpretive conclusions.

Baltes and Ralph (2022) stated that purposive sampling includes identifying readily available and information-dense cases, venues, organizations, or contexts that researchers can use to gain knowledge about their study topic. The minimum number of years of service in industry and with the organization is to establish validity. Salzano et al. (2023) concluded that within the realm of qualitative and mixed methodologies research, a continuous discussion over the most effective procedures to ensure the reliability and credibility of the findings should occur. To ensure the study's validity, I will uphold the precision of the study's tools, data, and findings.

I received archive data from an internal team within the organization for triangulation. The process was successful because I thoroughly examined the qualitative interview data. One-on-one interviews include a qualitative descriptive framework (Brown et al., 2024). The primary quantitative method I employed involved data gathered from conducting surveys. I used the MAXQDA software application to provide a more visually illustrative depiction of the data as part of the triangulation process. When saturation occurred using the obtained data, the participants reviewed the gathered data to find errors and provide context. Feedback was possible, ensuring accuracy. The baseline for saturation was 15 participant interviews, with the possibility of conducting thirty. According to Hennink and Kaiser (2022), most data sets reached saturation between 9 and 17 interviews, excluding outliers.

3.4. Bracketing

Bracketing, in the context of qualitative research, refers to the deliberate act of

suspending ideas and preconceived notions to accurately capture and represent the intended sense, observation, or experience of the studied participants. According to Bayuo et al. (2024), bracketing refers to setting aside preconceived notions or personal prejudices about the studied phenomena. Thomas and Sohn (2023) indicated that bracketing is a core aspect of phenomenological philosophy and is universally acknowledged as a customary practice in phenomenology and other qualitative research practices. Before conducting the study, I requested an interview with an individual with expertise in qualitative analysis. Conducting a bracketing interview can enhance understanding and involvement with participants' experiences by uncovering overlooked personal memories.

4. Application to Professional Practice, Findings and Conclusions

The research included identifying chances for an organization in the agricultural and heavy equipment sector to distinguish its product range from competitors and examined innovative methods for the industrial segment to decarbonize without compromising market share expansion. The study included concentrating on the geographical region of the Southern United States. This section presents the findings relevant to professional practice. I systematically examined a measurable subject in quantitative research using mathematical methods and empirical data derived from surveys. Data triangulation helped to address the study issues adequately. The study included examining sample size and investigating data collecting. Interviewing methodologies helped to assess and ensure dependability and authenticity. A presentation of the data analysis plan showed emerging solution concepts. I disclosed plans for the collection of primary and secondary data. The results indicated that customer-focused company strategies and strong leadership are essential for attaining market supremacy and fostering recurring purchases of electrical products. The results indicate that hybrid alternatives should be considered. The findings suggest how this study could improve company processes by evaluating, adopting, implementing, and reinforcing a customer-centric strategy and strong organizational leadership.

This case study revealed four themes, surpassing the three initially expected topics. I observed parallels between the preceding literature review and the research findings, indicating that customer-centric business strategies and strong leadership are essential for attaining market domination and fostering recurrent purchases of electric items. I identified similarities between the prior literature review and the research findings, suggesting that customer-centric business strategies and robust leadership are crucial for achieving market dominance and encouraging repeat purchases of electrical products. The findings revealed how this study could enhance business practices by evaluating, adopting, implementing, and reinforcing a customer-centric strategy and robust organizational leadership. The initial stage is to comprehend customer desires, the global impact of sustainability, and its advantages for enterprises. Upon acquiring a more profound com-

prehension of consumer requirements, strategic managers can implement prospective customer-centric outcomes into the organization's long-term strategic planning, encompassing product branding, marketing programs, and ingenuities to all stakeholders.

The research questions introduced in this study are strategically placed around the problem statement and urge a thorough and investigative approach during the in-depth interview methodology. The interview questions were specifically crafted to target many defined research inquiries. The research questions in this study contributed to future research by identifying how electrification can distinguish the Small-Ag market segment from its competitors, proposing strategies for the Small-Ag market segment to achieve net-zero carbon emissions while increasing market share, and examining the advantages of decarbonization in the industry. The research questions synergistically assisted marketing experts in comprehending their consumers and formulating efficacious strategies. Qualitative studies are more suitable when the researchers aim to comprehend the behavior of human interactions in their authentic settings (Alam, 2021).

4.1. Improving Business Practices

The organization is a leading agricultural, construction, and forestry machinery manufacturers. Although the company started its operations by manufacturing fossil fuel-driven machinery, the changing sustainability and corporate social responsibility concerns have compelled it to align its product offerings with the changing dynamics. The studied organization focuses on developing electric products as it shifts to sustainability commitments, especially to align with the growing environmental concerns and meet its sustainability goals. The company's sustainable development goal is to reduce or lower emissions across the automotive and agricultural industries. The agricultural industry is one of the sectors experiencing significant consequences of escalating climate change (Magill, 2023). As a result, players in this sector responded to the increasing climate change risks by increasing their demand for sustainability production equipment and infrastructures to reduce their carbon footprints. Organizations in the industry have also shifted to sustainability equipment to enhance productivity, a paradigm shift requiring the organization to produce electric tractors, loaders, and other machinery. The shift in its production framework represents a vast opportunity to differentiate its product line and acquire competitive advantages in the market. Notwithstanding the industry's contributions to economic and social advancement, unsustainable practices led to environmental contamination and ecological destruction (Tunji-Olayeni et al., 2024). Globally, consumers have increasingly become environmentally savvy, and the organization is shifting its production to meet consumers' tastes and preferences and to align with market trends. As electric products expand market share, leveraging the opportunity to differentiate themselves, grow their market share, and contribute to global sustainability efforts.

The organization studied can also leverage the increasing demand for electrical products to differentiate itself from the rest of its competitors, expanding its market share. A qualitative study by [Alanazi \(2023\)](#) observed that the increasing governmental regulations and the shifting consumers' tastes and preferences increased pressure on firms to adopt sustainable practices within their supply chains. [Ibrahim et al. \(2022\)](#) also observed that the demand for electric machinery, including vehicles, will continue expanding until 2050 as the world shifts to sustainable practices. Therefore, these researchers indicated that the electric product market increasingly rapidly aligns with the changing governmental and consumer dynamics.

The studied organization has stood as one of the most innovative entities in the industry, a unique comparative advantage that it can leverage to differentiate its products from rivals. A recent study by [Saleem et al. \(2022\)](#) examined the role of technological advancements in enhancing organizational adaptability. The study found that organizational adaptability enhances flexibility and drives innovation. The organization's studied organizational structure fosters cross-functional collaboration to derive creativity and innovation across employees in various departments, such as research and development (R&D), supply chain management, and marketing teams. The strategy is critical in transitioning manufacturing frameworks from fossil fuel-driven to electric-driven engines. Therefore, company leaders can quickly respond to market demands and technological advancements by encouraging cross-functional collaborations.

4.2. Recommendations for Further Study

Enhancing sustainability and optimizing efficiency are prevalent subjects. Sixty percent of survey respondents assigned the highest rating of five when inquired about the likelihood of the organization electrifying items and distinguishing themselves from competitors in the Small-Ag sector. Existing studies, such as [Zhang et al. \(2022\)](#), reviewed the scalability of electric vehicles, primarily cars, neglecting how firms manufacturing electric agricultural machinery can scale their productivity. The studies primarily concentrated on understanding the scalability of firms like Tesla and Ford. Consequently, future studies should research how the organization can optimize its supply chain for electric products, particularly by securing sustainable and ethical battery sources. Future research should concentrate on technological innovations driving the production of electric machinery and factors driving consumers to align with electrical agricultural machinery. [Hendriksen \(2023\)](#) conducted a quantitative study exploring the role of artificial intelligence in driving innovation within electric vehicle manufacturing. While this study identified the role of technological innovations in driving the production of electrical products, it did not identify how farms manufacturing agricultural machinery can leverage these innovations. Therefore, future researchers should focus on how organizational structure and leadership can cultivate innovative cultures among firms such as the studied organization to enhance their ca-

pabilities to continue innovating electric agricultural machinery. Kim (2023) noted that while the world has witnessed a significant increment in demand for electric products, especially electric machinery, not all consumers and countries have embraced electric products. Kim observed that developed countries embraced electric machinery more than underdeveloped and developing regions. However, several factors define the rate of adoption of electric products, such as reliability and performance. Therefore, future studies should concentrate on understanding whether the reliability and performance of electric agricultural machinery influence their adoption across regions.

4.3. Summary and Conclusions

Implementing electrification by manufacturers can promote decarbonization; however, inadequate supporting policies, infrastructure, and market readiness hinder extensive market acceptance. The utilization of electrification technologies by manufacturers requires adept marketing skills to find and cultivate initiatives that conform to market and regulatory standards (Chen et al., 2022). Employing a flexible case study methodology, fifteen individuals engaged in interviews, an additional fifteen completed online surveys, and examining secondary data was a literature review. The concern is the possible repercussions of inadequate electrification adoption in the Small-Ag (Commercial and Consumer equipment) sector of the agricultural and heavy construction machinery industry, which could impede the achievement of net zero carbon emissions by the mid-21st century and jeopardize future market share growth. The research questions aided marketing professionals in understanding their audiences and developing effective strategies. Examining the existing literature indicated that electrification in agriculture and the heavy machinery industry is vital for reducing carbon dioxide emissions into the environment. Replacing fossil fuel-dependent technologies and processes with electrically powered alternatives ensures that the agriculture and heavy machinery sectors progress in environmental sustainability initiatives (Ali & Anwar, 2021). I scrutinized and evaluated leadership techniques. A business model outlines how company decision-makers generate value for specific customers while maintaining a positive financial profit margin. Zapata Riveros et al. (2021) characterized business model innovation as the strategic process of generating and securing new value by modifying many elements of an existing business model. I thoroughly examined related studies and anticipated themes that would emerge. The findings revealed that the minor aggregate market segment will experience substantial product demand by achieving zero carbon emissions, allowing companies to capture market share.

This case study included four themes, exceeding the three anticipated subjects defined by comprehensively understanding consumer demands; strategic managers may incorporate prospective customer-centric outcomes into the organization's long-term strategic planning. This process encompasses product branding and the marketing of projects to all stakeholders. The firm leaders can capitalize

on the increasing demand for electrical products to distinguish themselves from competitors, augmenting their market share.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

References

- Abdul-Manan, A. F. N., Won, H., Li, Y., Sarathy, S. M., Xie, X., & Amer, A. A. (2020). Bridging the Gap in a Resource and Climate-Constrained World with Advanced Gasoline Compression-Ignition Hybrids. *Applied Energy*, 267, Article ID: 114936. <https://doi.org/10.1016/j.apenergy.2020.114936>
- Alam, M. K. (2021). A Systematic Qualitative Case Study: Questions, Data Collection, Nvivo Analysis and Saturation. *Qualitative Research in Organizations and Management: An International Journal*, 16, 1-31. <https://doi.org/10.1108/qrom-09-2019-1825>
- Alanazi, F. (2023). Electric Vehicles: Benefits, Challenges, and Potential Solutions for Widespread Adaptation. *Applied Sciences*, 13, Article 6016. <https://doi.org/10.3390/app13106016>
- Ali, B. J., & Anwar, G. (2021). Strategic Leadership Effectiveness and Its Influence on Organizational Effectiveness. *International Journal of Electrical, Electronics and Computers*, 6, 11-24. <https://doi.org/10.22161/eec.62.2>
- Ali, M. (2021). A Social Practice Theory Perspective on Green Marketing Initiatives and Green Purchase Behavior. *Cross Cultural & Strategic Management*, 28, 815-838. <https://doi.org/10.1108/ccsm-12-2020-0241>
- Atuonwu, J., & Tassou, S. (2021). Decarbonisation of Food Manufacturing by the Electrification of Heat: A Review of Developments, Technology Options and Future Directions. *Trends in Food Science & Technology*, 107, 168-182. <https://doi.org/10.1016/j.tifs.2020.10.011>
- Bag, S., Srivastava, G., Gupta, S., Zhang, J. Z., & Kamble, S. (2023). Climate Change Adaptation Capability, Business-To-Business Marketing Capability and Firm Performance: Integrating Institutional Theory and Dynamic Capability View. *Industrial Marketing Management*, 115, 470-483. <https://doi.org/10.1016/j.indmarman.2023.11.003>
- Baixinho, C. L., Ferreira, Ó., Medeiros, M., & de Oliveira, E. S. F. (2022). From Evidence Synthesis to Transfer: Results from a Qualitative Case Study with the Perspectives of Participants. *International Journal of Environmental Research and Public Health*, 19, Article 5650. <https://doi.org/10.3390/ijerph19095650>
- Baltes, S., & Ralph, P. (2022). Sampling in Software Engineering Research: A Critical Review and Guidelines. *Empirical Software Engineering*, 27, Article No. 94. <https://doi.org/10.1007/s10664-021-10072-8>
- Bayuo, J., Aziato, L., Wong, K. C. A., Su, J., Abu-Odah, H., & Wong, F. K. Y. (2024). Phenomenography: An Emerging Qualitative Research Design for Nursing. *Journal of Advanced Nursing*, 80, 821-834. <https://doi.org/10.1111/jan.15874>
- Brown, E. D. V., Wallace, S. E., Heintz, M. M., & Riley, J. (2024). Understanding Health Professionals' Experiences of Interprofessional Mentored Research during Clinical Training: A Qualitative Descriptive Study. *Journal of Allied Health*, 53, 10-19.
- Chamusca, I. L., Ferreira, C. V., Murari, T. B., Apolinario, A. L., & Winkler, I. (2023). Towards Sustainable Virtual Reality: Gathering Design Guidelines for Intuitive Authoring Tools. *Sustainability*, 15, Article 2924. <https://doi.org/10.3390/su15042924>

- Chen, T., Hsiao, Y. W., Baker-Fales, M., Cameli, F., Dimitrakellis, P., & Vlachos, D. G. (2022). Microflow Chemistry and Its Electrification for Sustainable Chemical Manufacturing. *Chemical Science*, *13*, 10644-10685. <https://doi.org/10.1039/d2sc01684b>
- Copley, J. (2023). Decarbonizing the Downturn: Addressing Climate Change in an Age of Stagnation. *Competition & Change*, *27*, 429-448. <https://doi.org/10.1177/10245294221120986>
- Daft, J., Albers, S., & Stabenow, S. (2021). From Product-Oriented Flight Providers to Customer-Centric Retailers: A Dynamic Offering Framework and Implementation Guidelines for Airlines. *Journal of Revenue and Pricing Management*, *20*, 615-625. <https://doi.org/10.1057/s41272-021-00345-8>
- Ding, N., Frohnwieser, A., Miller, R., & Clayton, N. S. (2021). Waiting for the Better Reward: Comparison of Delay of Gratification in Young Children across Two Cultures. *PLOS ONE*, *16*, e0256966. <https://doi.org/10.1371/journal.pone.0256966>
- Firdaus, A., Aksar, I. A., & Gong, J. (2024). Small World Sampling: Qualitative Sample Reliability and Validity for Efficient and Effective Recruitment of Journalists as Research Participants. *Journalism*, *25*, 466-485. <https://doi.org/10.1177/14648849221124997>
- Freeman, E. (1984). *Stakeholder Management: Framework and Philosophy*. Pitman.
- Freeman, E. (2010). Managing for Stakeholders: Trade-Offs or Value Creation. *Journal of Business Ethics*, *96*, 7-9. <https://doi.org/10.1007/s10551-011-0935-5>
- Freeman, R. E. (2023). The Politics of Stakeholder Theory: Some Future Directions. In S. D. Dmytriiev, & R. E. Freeman (Eds.), *R. Edward Freeman's Selected Works on Stakeholder Theory and Business Ethics* (pp. 119-132). Springer International Publishing. https://doi.org/10.1007/978-3-031-04564-6_5
- Freudenreich, B., Lüdeke-Freund, F., & Schaltegger, S. (2020). A Stakeholder Theory Perspective on Business Models: Value Creation for Sustainability. *Journal of Business Ethics*, *166*, 3-18. <https://doi.org/10.1007/s10551-019-04112-z>
- Funke, A., Wilden, R., & Gudergan, S. (2023). Only Senior Managers Lead Business Model Innovation, or Do They? Levels of Management and Dynamic Capability Deployment. *Industrial Marketing Management*, *114*, 181-195. <https://doi.org/10.1016/j.indmarman.2023.08.011>
- Ghobadpour, A., Monsalve, G., Cardenas, A., & Mousazadeh, H. (2022). Off-Road Electric Vehicles and Autonomous Robots in Agricultural Sector: Trends, Challenges, and Opportunities. *Vehicles*, *4*, 843-864. <https://doi.org/10.3390/vehicles4030047>
- Godskesen, T., Björk, J., & Juth, N. (2023). Challenges Regarding Informed Consent in Recruitment to Clinical Research: A Qualitative Study of Clinical Research Nurses' Experiences. *Trials*, *24*, Article No. 801. <https://doi.org/10.1186/s13063-023-07844-6>
- Han, H., Im, W., Choi, H., Cho, S., Lee, S., & Park, Y. (2022). Effect of Sound Insulation on Noise Reduction in an Agricultural Tractor Cab. *Scientific Reports*, *12*, Article No. 22038. <https://doi.org/10.1038/s41598-022-26408-3>
- Hayashi, P., Abib, G., Hoppen, N., & Wolff, L. D. G. (2021). Processual Validity in Qualitative Research in Healthcare. *INQUIRY: The Journal of Health Care Organization, Provision, and Financing*, *58*. <https://doi.org/10.1177/00469580211060750>
- Hendriksen, C. (2023). Artificial Intelligence for Supply Chain Management: Disruptive Innovation or Innovative Disruption? *Journal of Supply Chain Management*, *59*, 65-76. <https://doi.org/10.1111/jscm.12304>
- Hennink, M., & Kaiser, B. N. (2022). Sample Sizes for Saturation in Qualitative Research: A Systematic Review of Empirical Tests. *Social Science & Medicine*, *292*, Article ID: 114523. <https://doi.org/10.1016/j.socscimed.2021.114523>

- Ibrahim, M., Rassölkin, A., Vaimann, T., & Kallaste, A. (2022). Overview on Digital Twin for Autonomous Electrical Vehicles Propulsion Drive System. *Sustainability, 14*, Article 601. <https://doi.org/10.3390/su14020601>
- Jiang, H., & Luo, Y. (2024). Driving Employee Engagement through CSR Communication and Employee Perceived Motives: The Role of CSR-Related Social Media Engagement and Job Engagement. *International Journal of Business Communication, 61*, 287-313. <https://doi.org/10.1177/2329488420960528>
- Kim, L., Pongsakornrungrungsilp, S., Horam, N., & Suong, S. (2023). How to Make Employees Happy: Evidence from Thai University Lecturers. *Problems and Perspectives in Management, 21*, 482-492. [https://doi.org/10.21511/ppm.21\(1\).2023.41](https://doi.org/10.21511/ppm.21(1).2023.41)
- Kim, S. (2023). Innovating Knowledge and Information for a Firm-Level Automobile Demand Forecast System: A Machine Learning Perspective. *Journal of Innovation & Knowledge, 8*, Article ID: 100355. <https://doi.org/10.1016/j.jik.2023.100355>
- Kortetmäki, T., Heikkinen, A., & Jokinen, A. (2023). Particularizing Nonhuman Nature in Stakeholder Theory: The Recognition Approach. *Journal of Business Ethics, 185*, 17-31. <https://doi.org/10.1007/s10551-022-05174-2>
- Kwon, J., Choi, Y., & Hwang, Y. (2021). Enterprise Design Thinking: An Investigation on User-Centered Design Processes in Large Corporations. *Designs, 5*, Article 43. <https://doi.org/10.3390/designs5030043>
- Laureanti, R., Barbieri, R., Cerina, L., & Mainardi, L. (2022). Analysis of Physiological and Non-Contact Signals to Evaluate the Emotional Component in Consumer Preferences. *PLOS ONE, 17*, e0267429. <https://doi.org/10.1371/journal.pone.0267429>
- Liu, X., Zhou, J., Wu, Y., & Hao, N. (2022). The Influence of Party Organization Involvements in Corporate Governance on Innovation: Evidence from China's Private-Owned Enterprises. *Sustainability, 14*, Article 16334. <https://doi.org/10.3390/su142416334>
- Magill, K. (2023). *John Deere Will Build a North Carolina Battery Factory*. Manufacturing Dive. <https://www.manufacturingdive.com/news/john-deere-kreisel-electric-battery-factory-north-carolina-site-selection/690998/>
- Mahasuweerachai, P., & Suttikun, C. (2022). The Effect of Green Self-Identity on Perceived Image, Warm Glow and Willingness to Purchase: A New Generation's Perspective Towards Eco-Friendly Restaurants. *Sustainability, 14*, Article 10539. <https://doi.org/10.3390/su141710539>
- Marcon, M., Provensi, T., Sehnem, S., Campos, L. M. S., & Queiroz, A. A. F. S. L. (2023). The Internalisation of the Circular Economy and ESG in Brazilian B Corps from the Perspective of the Stakeholder Theory. *Sustainable Development, 31*, 3513-3527. <https://doi.org/10.1002/sd.2601>
- Mayer, A. (2020). Social Support for De-Carbonizing the Energy System: The Role of Expressive Partisanship. *Environmental Science & Policy, 109*, 83-94. <https://doi.org/10.1016/j.envsci.2020.03.013>
- McCoy, L., Wang, Y., & Chi, T. (2021). Why Is Collaborative Apparel Consumption Gaining Popularity? An Empirical Study of US Gen Z Consumers. *Sustainability, 13*, Article 8360. <https://doi.org/10.3390/su13158360>
- Mitch, M. (2023). Four Risk Mitigation Strategies for Effective Project Management. *Informa Quarterly Official Bulletin of the Records Management Association of Australia, 39*, 13-15. <https://magazine.arma.org/2023/02/four-risk-mitigation-strategies-for-effective-project-management/>

- Nawaz, Z., Imran, M., Nawaz, S., Ali, A., & Sangi, A. R. (2022). Strategic Prioritization of Action Plan Towards De-Carbonization and Sustainable Energy Transition for Developing Nations. *International Journal of Sustainable Development and Planning*, 17, 549-558. <https://doi.org/10.18280/ijstdp.170220>
- Oliveira, L. F. P., Moreira, A. P., & Silva, M. F. (2021). Advances in Agriculture Robotics: A State-Of-The-Art Review and Challenges Ahead. *Robotics*, 10, Article 52. <https://doi.org/10.3390/robotics10020052>
- Paniyil, P., Powar, V., & Singh, R. (2021). Sustainable Intelligent Charging Infrastructure for Electrification of Transportation. *Energies*, 14, Article 5258. <https://doi.org/10.3390/en14175258>
- Parpulova, M. (2022). Green Hydrogen—The Missing Piece in the European Energy Mix. *Yearbook of UNWE*, 60, 87-93. <https://doi.org/10.37075/yb.2022.2.07>
- Perez, A., Howell Smith, M. C., Babchuk, W. A., & Lynch-O'Brien, L. I. (2023). Advancing Quality Standards in Mixed Methods Research: Extending the Legitimation Typology. *Journal of Mixed Methods Research*, 17, 29-50. <https://doi.org/10.1177/15586898221093872>
- Pillay, S. (2021). The Influence of Electronic Word-of-Mouth Adoption on Brand Love Amongst Generation Z Consumers. *Acta Commercii*, 21, a928. <https://doi.org/10.4102/ac.v21i1.928>
- Rajagopal, D., Sawant, V., Bauer, G. S., & Phadke, A. A. (2022). Benefits of Electrifying App-Taxi Fleet—A Simulation on Trip Data from New Delhi. *Transportation Research Part D: Transport and Environment*, 102, Article ID: 103113. <https://doi.org/10.1016/j.trd.2021.103113>
- Rezaei, S., & Behnamian, J. (2021). A Survey on Competitive Supply Networks Focusing on Partnership Structures and Virtual Alliance: New Trends. *Journal of Cleaner Production*, 287, Article ID: 125031. <https://doi.org/10.1016/j.jclepro.2020.125031>
- Rosch, S., Raszap Skorbiansky, S., Weigel, C., Messer, K. D., & Hellerstein, D. (2021). Barriers to Using Economic Experiments in Evidence-Based Agricultural Policymaking. *Applied Economic Perspectives and Policy*, 43, 531-555. <https://doi.org/10.1002/aepp.13091>
- Sadeh, A., Zwikael, O., & Meredith, J. (2022). Organizational Support as an Effective Risk Mitigation Approach. *International Journal of Managing Projects in Business*, 15, 1123-1143. <https://doi.org/10.1108/ijmpb-02-2022-0045>
- Saevarsdottir, G., Kvande, H., & Welch, B. J. (2020). Reducing the Carbon Footprint: Aluminium Smelting with Changing Energy Systems and the Risk of Carbon Leakage. In A. Tomsett (Ed.), *Light Metals 2020* (pp. 726-734). Springer International Publishing. https://doi.org/10.1007/978-3-030-36408-3_98
- Saidani, M., & Kim, H. (2021). Quantification of the Environmental and Economic Benefits of the Electrification of Lawn Mowers on the US Residential Market. *The International Journal of Life Cycle Assessment*, 26, 1267-1284. <https://doi.org/10.1007/s11367-021-01917-x>
- Saleem, M., Abbas, S., Ghazal, T. M., Adnan Khan, M., Sahawneh, N., & Ahmad, M. (2022). Smart Cities: Fusion-Based Intelligent Traffic Congestion Control System for Vehicular Networks Using Machine Learning Techniques. *Egyptian Informatics Journal*, 23, 417-426. <https://doi.org/10.1016/j.eij.2022.03.003>
- Salzano, R., Hall, H., Webster, G., & Brazier, D. (2023). Community Validation as a Method to Establish Trustworthiness in Qualitative Lis Research. *Proceedings of the Association for Information Science and Technology*, 60, 1110-1112. <https://doi.org/10.1002/pr2.961>

- Schoeneberger, C., Zhang, J., McMillan, C., Dunn, J. B., & Masanet, E. (2022). Electrification Potential of U.S. Industrial Boilers and Assessment of the GHG Emissions Impact. *Advances in Applied Energy*, 5, Article ID: 100089. <https://doi.org/10.1016/j.adapen.2022.100089>
- Shi, C., Chen, L., Yu, W., & Zhang, Z. (2023). Will the Embedded Service in Supply Chains Play a Role in Lowering Manufacturer's Carbon Emission and Maintaining Economic Growth? *Frontiers in Environmental Science*, 10, Article 1088162. <https://doi.org/10.3389/fenvs.2022.1088162>
- Staffans, A., Nummi, P., Prilenska, V., Grisakov, K., Fabritius, H., Ilves, L., Kangassalo, P. et al. (2022). Narrowing the Implementation Gap: User-Centered Design of New E-Planning Tools. *International Journal of E-Planning Research*, 11, 1-22. <https://doi.org/10.4018/ijep.315804>
- Talvitie, J., Alanko, I., Bulatov, E., Koivula, J., Pöllänen, T., & Helaja, J. (2021). Phenanthrenequinone-Sensitized Photocatalytic Synthesis of Polysubstituted Quinolines from 2-Vinylarylimines. *Organic Letters*, 24, 274-278. <https://doi.org/10.1021/acs.orglett.1c03934>
- Thomas, S. P., & Sohn, B. K. (2023). From Uncomfortable Squirm to Self-Discovery: A Phenomenological Analysis of the Bracketing Experience. *International Journal of Qualitative Methods*, 22. <https://doi.org/10.1177/16094069231191635>
- Ting, H., Turner, D., Tan, K., Tan, S. R., Wong, M., & Gong, J. (2023). Less Is More? Review and Recommendations for Qualitative Sampling Strategy Using the S.C.A.D.E Approach. *Asian Journal of Business Research*, 13, 1-9. <https://doi.org/10.14707/ajbr.230154>
- Tran, K., Nguyen, T., Tran, Y., Nguyen, A., Luu, K., & Nguyen, Y. (2022). Eco-Friendly Fashion among Generation Z: Mixed-Methods Study on Price Value Image, Customer Fulfillment, and Pro-Environmental Behavior. *PLOS ONE*, 17, e0272789. <https://doi.org/10.1371/journal.pone.0272789>
- Tunji-Olayeni, P., Kajimo-Shakantu, K., & Ayodele, T. O. (2024). Factors Influencing the Intention to Adopt Green Construction: An Application of the Theory of Planned Behaviour. *Smart and Sustainable Built Environment*, 13, 291-308. <https://doi.org/10.1108/sasbe-06-2022-0126>
- Tutar, H., Şahin, M., & Sarkhanov, T. (2023). Problem Areas of Determining the Sample Size in Qualitative Research: A Model Proposal. *Qualitative Research Journal*, 24, 315-336. <https://doi.org/10.1108/qjrj-06-2023-0099>
- Valentinov, V., & Hajdu, A. (2021). Integrating Instrumental and Normative Stakeholder Theories: A Systems Theory Approach. *Journal of Organizational Change Management*, 34, 699-712. <https://doi.org/10.1108/jocm-07-2019-0219>
- Villar, A., Paladini, S., & Buckley, O. (2023). Towards Supply Chain 5.0: Redesigning Supply Chains as Resilient, Sustainable, and Human-Centric Systems in a Post-Pandemic World. *Operations Research Forum*, 4, Article No. 60. <https://doi.org/10.1007/s43069-023-00234-3>
- Vourdoubas, J. (2021). Possibilities for De-Carbonizing the Heating and Cooling Sector in the Island of Crete, Greece. *European Journal of Environment and Earth Sciences*, 2, 49-56. <https://doi.org/10.24018/ejgeo.2021.2.3.143>
- Wang, Z., & Liu, H. (2023). Can Export Market Diversification Mitigate Agricultural Export Volatility? A Trade Network Perspective. *Emerging Markets Finance and Trade*, 59, 2234-2251. <https://doi.org/10.1080/1540496x.2023.2171725>
- Wijekoon, R., & Sabri, M. F. (2021). Determinants That Influence Green Product Purchase Intention and Behavior: A Literature Review and Guiding Framework. *Sustainability*, 13,

Article 6219. <https://doi.org/10.3390/su13116219>

- Wikansari, R., Ausat, A., Hidayat, R., Mustoip, S., & Sari, A. (2023). Business Psychology Analysis of Consumer Purchasing Factors: A Literature Review. In *Proceedings of the International Conference on Economic, Management, Business and Accounting, ICEMBA 2022, 17 December 2022, Tanjungpinang, Riau Islands, Indonesia*. EAI. <https://doi.org/10.4108/eai.17-12-2022.2333186>
- Woody, M., Vaishnav, P., Keoleian, G. A., De Kleine, R., Kim, H. C., Anderson, J. E. et al. (2022). The Role of Pickup Truck Electrification in the Decarbonization of Light-Duty Vehicles. *Environmental Research Letters*, 17, Article ID: 034031. <https://doi.org/10.1088/1748-9326/ac5142>
- Xavier, J., & Picoto, W. N. (2023). Regulation of Data-Driven Marketing and Management Theory: Bibliometric Analysis, Systematic Literature Review and Research Agenda. *International Journal of Law and Management*, 65, 461-482. <https://doi.org/10.1108/ijlma-02-2023-0022>
- Zapata Riveros, J., Speich, M., West, M., & Ulli-Ber, S. (2021). Combining Business Model Innovation and Model-Based Analysis to Tackle the Deep Uncertainty of Societal Transitions—A Case Study on Industrial Electrification and Power Grid Management. *Sustainability*, 13, Article 7264. <https://doi.org/10.3390/su13137264>
- Zhang, X., Li, Z., Luo, L., Fan, Y., & Du, Z. (2022). A Review on Thermal Management of Lithium-Ion Batteries for Electric Vehicles. *Energy*, 238, Article ID: 121652. <https://doi.org/10.1016/j.energy.2021.121652>
- Zhu, S., Mac Kinnon, M., Carlos-Carlos, A., Davis, S. J., & Samuelson, S. (2022). Decarbonization Will Lead to More Equitable Air Quality in California. *Nature Communications*, 13, Article No. 5738. <https://doi.org/10.1038/s41467-022-33295-9>