Analysis of the role of the private sector in achieving carbon neutrality

Abstract

This research aims to establish the challenges, opportunities, and strategies of the private sector of Oman to attain carbon neutrality. Private enterprises are now the major emission cutters in Oman because the country is now diversifying its economy which was primarily dependent on oil. The study seeks to find out the obstacles encountered by firms in the private sector, the possibilities of reaching net zero emissions, and how the challenges can be managed to fully embrace the opportunities. This paper employed a qualitative case study research, that targeted three Omani firms, namely Khimji Ramdas, Towell Group, and Al Naba Group, these firms were chosen because of their extensive operations in sectors with high carbon footprints namely logistics, manufacturing, and construction. Information was collected from responses obtained from the management and sustainability directors and managers, accompanied by archival data from company documents and journals. According to the study, regulatory issues, financial factors, and technology barriers are the key barriers to carbon neutrality in the private sector. The lack of stringent environmental legislation and a coherent legal framework increases the challenges associated with planning for sustainability in Oman. Major players in the corporate world are reluctant to make investments toward achieving the carbon-neutrality goal because of the unpredictability of the legal provisions that govern this area. Furthermore, the initial capital costs of adopting carbon-neutral technologies and the scarce availability of green financial sources hamper the firms' abilities to fund sustainable projects. There are also technical challenges in that firms do not have access to new low-carbon technologies that are already existent and are indispensably needed in cutting emissions, especially in sectors such as manufacturing and transportation. However, the study reveals several opportunities for how the firms in Oman's private sector can transform to achieve a state of carbon neutrality. Some of the motives that are provided for by governments that may compel organizations into practicing sustainable processes include; tax credits and subsidies to organizations practicing in fields of renewable energy. New technologies and innovations – energy-efficient technologies in the manufacturing industries, renewable energy resources in power generation, and new technologies in the transport industry or agriculture, among others, provide other possibilities for

emissions intensity reduction in different industries. Also, the increasing customer concern for products and services that are more environmentally friendly creates a market niche for firms adopting green performances. In each of the companies under study, that is Khimji Ramdas, Towell Group, and Al Naba Group there are similar opportunities, for instance, the ability to explore new supply chain frontiers, exploring green building solutions as well as efficient energy logistics solutions. To fully exploit these opportunities, the study also outlines several measures that need to be undertaken so that companies can transition to Oman's carbon neutrality. As a result, collaboration with renewable energy-capable organizations as well as technology firms can enhance a firm's uptake of green technologies. Long-term strategies that call for expensive investments in renewable energy, electricity generation from solar energy, sustainable construction of buildings, and hybrid or electric vehicles should be seen as long-term possibilities to mitigate emissions considerably. Also, carrying out further sustainability practices by showcasing training and incentives to employees helps foster a corporate culture where carbon neutrality is an ideal being pursued. Therefore, it can be concluded that while Oman has various challenges hindering private sector carbon neutrality, there are sustainable opportunities as well. Once such barriers are acknowledged and avoided, private companies hold the potential to contribute meaningfully towards Oman's climate goals with the appropriate guided incentives. Future research should focus on finding policies, innovations, and specialization strategies that may be of assistance in the progression of efforts by the private sector concerning carbon neutrality.

Contents

1. Introduction

1.1 Problem Statement

Global warming, as a result of the enhanced concentration of greenhouse gases in the earth's atmosphere, continues to be one of the biggest global issues. When the scientific community has concluded that global Warming needs to be limited to 1. At 1. 5°C above the pre-industrial level, arguably, the need to be serious with climate interventions has not been more serious. Innovative and critical to these efforts is the idea of carbon neutrality or net-zero CO_2 emission, that is, the CO_2 emission that matches the corresponding removal or offset (IPCC, 2018). It is significant to attain carbon-free status as per carbon offsetting, which offers an opportunity to adjust global temperature and overcome the effects of climate change. Nevertheless, this objective cannot be achieved by the governments only; it requires a collective effort from other sectors, such as the private sector, which is a backbone of the global economies, including resource-dependent countries like Oman.

The reduction in the production and dependency on energy from fossil resources may pose great challenges to Oman, given the fact that the nation's economy has, for a long time, depended on oil and gas. The energy sector, the manufacturing sector, and the transport sector are some of Oman's biggest emitters of carbon. However, there is great potential for the private sector to promote the trend toward carbon neutrality through its innovative, investment and managerial activities. Challenges encountered when it comes to achieving carbon neutrality It is, however, crucial to note that the journey to carbon neutrality is made easy by facing serious challenges such as economic, technological, regulatory, and organizational challenges (Rockström *et al*., 2017). It is with such understanding that it will be possible to fully plan and implement the correct strategies required by the private sector to attain local and Kyoto Protocol targets.

1.2 Purpose of the Study

The objective of this research is to discuss the directions for Oman's carbon neutrality in relation to the challenges of private actors in this process. Since Oman is now focusing on the transition from oil and other hydrocarbons, the role of the private sector in the reduction of carbon emissions volumes grows significantly. The purpose of this study is, therefore, to establish research that will capture the

realization of carbon neutrality by private enterprises in Oman, the challenges faced by firms in their efforts to respond to the global call, and how firms can leverage opportunities within the landscape to create a sustainable future (Delmas and Toffel, 2008).

Thus, to advance the knowledge on what constitutes the major hindrances to carbon neutrality, this study aims to consider the prospects of the private sector and determine major obstacles anti-caused. Such challenges include economic challenges like the high costs involved in implementing carbon-neutral technologies, regulatory challenges arising from the disparity between regional and international laws, and technology challenges resulting from the availability of low-carbon technologies. Besides, it may also encounter threats like; organisational resistance and lock-in in the companies (Eccles, Ioannou and Serafeim, 2014).

On the other hand, the study will describe how the search for carbon neutrality impacts the opportunity of the private sector in Oman. They include financial aspects such as green financing and cost savings, as well as energy efficiency strategic aspects such as corporate image, competitive edge, and differentiation. The study will also discuss how companies, governments and civil society can jointly shape the conditions required for achieving carbon neutrality (Bocken *et al*., 2014a).

1.3 Research Questions

To achieve the objectives of this study, the following research questions will be addressed:

1. What are the challenges faced by the private sector firms in Oman for carbon neutrality?
2. What are the avenues open to the private sector in Oman to achieve carbon neutrality?
3. What strategies would enable the private sector in Oman to address the challenges and make the most of the opportunities in the journey toward achieving carbon neutrality?

1.4 Significance of the Study

This study is important in several aspects. First, it complements the existing literature by investigating the contribution of the private sector to Oman, which has a different economy and environment compared to other countries, to achieve carbon

neutrality. Although carbon neutrality has emerged as a popular topic for discussion in the globalized world, context-sensitive studies concerning developing and resource-constrained nations such as Oman are scarce (Kazancoglu *et al.,* 2021).

Second, the findings of this study will contribute to practical relevance by providing useful information for policymakers, business executives, and other stakeholders operating in Oman. The findings of this research can offer the necessary information about the issues and prospects related to carbon neutrality for the subsequent formation of specific policy measures and plans helping the private sector to green its operations. Moreover, the fact that the research focuses on the learnings and success factors can be immensely useful for companies who want to step up the game in terms of improved sustainability (International Energy Agency, 2020).

Last but not least, this work adds to the knowledge of how the private sector can change the landscape of climate action in the world. The findings derived from this study would contribute to the ongoing discourse on decarbonizing the international economy, particularly by businesses in countries with similar economic and climatic conditions as Oman (Pisciotta *et al*., 2022).

1.5 Definition of Terms

To ensure clarity and consistency throughout this study, the following key terms are defined:

1. Carbon Neutrality (Net-Zero Carbon Emissions): A situation where adjusted for the whole range of processes, carbon dioxide is emitted into the atmosphere and an equivalent amount of carbon is either removed or another equivalent amount of carbon is sequestered in order to achieve maximum net release of carbon emissions into the environment.
2. Greenhouse Gases (GHGs): Substances that absorb and emit heat in the earth's atmosphere, thus causing heat build-up, which leads to climate change. The main GHGs are Carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), as well as fluorinated gases.
3. Low-Carbon Technologies: Solutions that reduce carbon emissions per unit of energy or industrial output relative to business-as-usual levels; these include renewable energy sources, carbon capture and storage (CCS) and improvements to energy efficiency.

4. Sustainability: The satisfying of the current needs, not to the detriment of the rights and needs of the succeeding generations, in a way that has to do with environmental sustainability social, and economical prospects.
5. Green Financing: Portfolio investments made in several environmentally friendly activities such as low carbon activities, energy efficiency and renewable power activities.

1.6 Thesis Organisation

This thesis was, therefore, divided into seven chapters, with each of them constructed on the findings made in the previous chapters to identify the role of the private sector in achieving carbon neutrality in Oman. Chapter one focused on presenting a background to the study, problem definition, research objectives, questions, and the importance of the study. Chapter 2 of this paper discusses the literature on challenges and opportunities, as detailed below. Chapter 3 provided a discussion on the methodology of the study through a presentation of case studies of three Omani companies. Chapter four outlined the findings of the study, chapter five provided an analysis of the findings, and chapter six summarized and made suggestions regarding the study's understanding. The last parts are the bibliography and appendices.

2. Literature Review

2.1 Introduction

2.1.1 Overview of the Topic

Eradicating carbon emissions constitutes an essential component of fighting climate change through attaining carbon neutrality. It operates on the principle of carbon neutrality, that is, the emission of carbon dioxide must be equal to the removal of the same from the atmosphere. This goal is relevant because climate change and its ramifications of increasing heat, violent weather & disruption of the natural environment continue to escalate across the world. The Intergovernmental Panel on Climate Change (IPCC) noted that the average global temperature should not exceed 1. With respect to the Paris Agreement, global warming must be limited to 1. 5°C above pre-industrial levels, which means that carbon neutral society should be reached by the mid-century, which implies deep decarbonization and a shift in energy sources (IPCC, 2018).

The private sector engages significantly in this global endeavor due to the large input that it has to the production of greenhouse gas emissions. Sectors like energy, manufacturing and transportation contribute a lot to environmental depletion. However, these sectors can also actively drive the change and invest in a low-carbon future. In view of the rising role of sustainability as a determinant of business profitability, carbon-neutral private sector involvement is now an environmental imperative and economic opportunity (Rockström *et al*., 2017).

2.1.2 Purpose of the Literature Review

This literature review aims to find out how the private sector can support efforts toward achieving carbon neutrality, hence the need to look specifically at the hurdles and opportunities that companies have to go through to reduce carbon emissions and adapt to sustainability (Delmas and Toffel, 2008). The review will cover major challenges, such as the economic feasibility and implementation impacts of low-carbon technologies on the overall cost and on business processes and practicalities that arise from diverse regulatory contexts confronting multinational corporations. Further, the external review will discuss corporate inertia, which largely slows down the transition to sustainability, explaining how these factors influence the low rate of carbon decrease among private organisations (Eccles, Ioannou and Serafeim, 2014).

In addition to the challenges, some opportunities come with carbon neutrality that the review will seek to identify. Several organizations have used sustainability to boost the performance of their firms as it offered benefits like efficiency in energy consumption, green financial funding and the inclusion of environment-friendly services and products in their portfolios. It will discuss how these opportunities could be adopted, exploited and managed to improve competitive advantage, to drive new ideas and value for business stakeholders. Through these opportunities, the review will show that carbon neutrality is achievable and economically beneficial for the private sector to form the basis for subsequent literature and application-based research (Bocken *et al.,* 2014a).

2.2 Key Research Challenges in the Field

2.2.1 Complexity of Measuring Carbon Neutrality

Among the key issues that are questionable when it comes to the fight of private companies for carbon neutrality is defining and quantifying carbon neutrality. The general notion underlying the carbon neutrality concept of equalizing the total emissions of the carbon dioxide equivalent with the carbon offset or capture is rather simple to rationalize. This is due to several reasons, such as differences in industries' standards, the breadth of emissions under consideration and methods used in the assessment of carbon footprint (Fawzy *et al*., 2020).

It is because industries vary from each other in their process and products; therefore, carbon emissions' creation and calculation may also differ. For instance, the impact of carbon generated by a manufacturing firm is likely to be dissimilar to that of a service industry organization. Therefore, sector-specific norms are adopted, which may further confuse the comparison of carbon neutrality activities. Where in one industry, there may be a rather generous emphasis on the direct emissions known as Scope 1; in another, there may be an emphasis on the emissions linked with energy use in the company's operations, which is known as Scope 2, or there may be an emphasis on the entire supply chain and the emissions resulting from the use of the final product which is known as the Scope 3. This lack of uniformity in defining and measuring emissions has further made it difficult for the private sector to set unique and clearer goals for attaining carbon neutrality (Shiraiwa *et al.,* 2017).

In addition, there are differences in the methods used in assessing carbon footprints depending on the method used and the tools or frameworks applied. Some organisations may apply universal frameworks like the Greenhouse Gas (GHG) Protocol, and others may use other internal or regional methodological frameworks. These discrepancies in how different variables are measured result in different figures being reported, thus complicating the analysis of the progress being made toward achieving carbon neutrality. Further, the choice of the actual targets – absolute, intensity-based or through offsets – provides another layer to the measurement layer. Another crucial issue is the absence of cohesive and specific regulatory standards for analysis to decide whether a given company can be deemed carbon neutral or otherwise because there are a lot of ambiguity and perplexity in this regard, which pose challenges for the companies within the climate change and sustainable development (Shiraiwa *et al.,* 2017).

2.2.2 Regulatory and Policy Variability

Regardless of the country and the industry, the standards and the rules are not perfect, which is yet another problem for the private sector to overcome in order to achieve the goal of becoming carbon neutral. National governments have employed various strategies to reduce carbon emissions, including direct carbon taxes and cap and trade, voluntary carbon targets, and incentives towards the development of green technologies. Such a structural relationship of regulation makes it challenging for MNCs to exercise consistent carbon neutrality policies when they have operations due to differences in regulatory systems across nations (Paterson *et al.,* 2014).

For instance, thus are issues of environmental regulation; a company based in the European Union, where carbon price and emissions trading are well developed, will be under much more pressure than a company based in a country where the regulation on environmental issues may not be as robust. This tends to result in unequal emphasis on carbon reduction since the level of carbon neutrality may vary across the world, and more emphasis may be placed on a specific region than on another. In addition, the unpredictability of future changes in regulations, like the probability of the enhancement of climate policies in the future or the implementation of new carbon pricing strategies, is another level of distinctiveness for the long-term strategic planning of carbon neutral methodologies by several businesses (Linsenmeier, Mohommad and Schwerhoff, 2023).

Besides the spatial heterogeneity, specific industry constraints also pose another challenge to the private sector in attaining zero carbon emissions. Some industries, including aviation and shipping industries, are governed by global requirements that could be different from those found in other industries. This poses complexities, especially for firms that have to deal with more than one country's regulatory structures, policies and procedures. The failure to harmonize regulations across industries or regions, apart from raising the compliance costs for enterprises, also produces potential competitive disparities: Companies in regions with fewer rules may not be motivated to work toward carbon neutrality at the same pace as their counterparts in regions with more elaborate laws (Linsenmeier, Mohommad and Schwerhoff, 2023).

2.2.3 Economic and Financial Barriers

Another impact is the financial and economic hurdle, which puts much pressure on the private sector to pursue neutrality. Carbon-neutral business transformations may involve large capital investments in new technology, structural adjustments, and systems, most of which are expensive propositions for firms. This is especially more so for SMEs who suffer from limited financial capacity to finance such outlays in the short term, such as those required to initially embrace renewable energy, improve energy efficiency, and invest in CCS technologies (Wang *et al*., 2019).

Further, carbon-neutral investments also require recurrent operative costs associated with the upkeep and enhancement of the business's carbon-neutral technological portfolio. For instance, the incorporation of renewable energy into existing energy systems may lead to some other adjustments, such as changes in the physical layout of the existing grids and energy storage technologies, which may be expensive additions. Similarly to the previously mentioned disadvantages, the adoption of low-carbon manufacturing processes may result in higher costs that will influence the position of certain companies in certain markets. These economic threats are worsened by risks related to investment returns; the benefits, including lower energy expenses, brand image improvement, and green funding, might only be realized in the long term (Kazancoglu *et al.,* 2021).

Further, it results in the denial of high target achievement on carbon reduction due to the financial risks that come with the shift toward carbon neutrality. Businesses in intensely competitive sectors may avoid pursuing carbon-neutral technologies when such endeavors do not promise an immediate economic payback, or they do not agree with their competitors about the urgency of decarbonization. The absence of desirable, predictable, and tangible rewards in terms of financial subsidies or tax credits, carbon credits and allowances for meeting the carbon neutrality targets of organizations at different levels of development can also hamper private sector commitment, especially where government commitment to climate change action is low (Kazancoglu *et al.,* 2021).

2.2.4 Technological Limitations

This is another major technological problem in the reduction of carbon emissions in achieving carbon neutrality by the private sector. Although there have been

improvements in the application of low-carbon technologies like renewable energy, electric vehicles, and energy efficiency systems, such technologies have not been fully developed or adopted worldwide, let alone across all sectors. Actual technologies that support such goals are not always available and suitable in the context of given sectors and the circumstances in industries, which is why some industries still cannot reach climate neutrality (International Energy Agency, 2020).

For instance, the steel, cement, and chemical industries are some of the hardest to abate since they require high amounts of energy and release high emissions due to their processes. There are some new technologies, such as hydrogen, for steel making and carbon capture, utilization, and storage. All these are still in the development phase, and therefore, most of these solutions are not necessarily commercially available in the market yet. Likewise, the transportation sector has technological barriers that are associated mainly with electrifying long haulage and aviation, where batteries and substitutes cause weak energy density and scalability dilemmas (Bataille *et al*., 2018).

Other factors of the proposal that are useful to understand are the speed of innovation, as well as the speed of diffusion of such technologies among the private sector, impacting the potential to reach carbon neutrality. Some innovative initiatives involve high levels of investment in research and development; hence, a company cannot afford to develop new technologies once in a while, especially SMEs. Additionally, even in cases where innovations are invented, they may not be adopted due to issues to do with high costs, lack of skilled labour and the fact that it may require a total overhaul of most technologies, organisations and industries. Some key barriers include the slow progression of technology plus the difficulties in increasing the size, which relates to innovations in relation to the private sector's goal of decreasing carbon emissions and achieving carbon neutrality (Pisciotta *et al.,* 2022).

2.2.5 Data Availability and Transparency

These concerns include data availability and transparency, which we discuss below as major challenges that the private sector faces in its efforts to benchmark the progress toward carbon neutrality. Carbon emission data is critically important for companies as it helps to monitor the company's efficiency and define the areas of

possible improvements and the company's ability to report on its sustainability performance. Nevertheless, measurements and inventions of carbon emission information may be problematic because of disparities in the methods used to gather them, varying quality of the details, and, most importantly, the complications of measuring emissions through the supply chains (Desai, 2022).

One of the biggest issues of data availability is the accessibility of precise and detailed emission information, especially concerning scope 3 emissions, which involve the supply chain and use of a given product. These emissions often represent a large proportion of a company's total emissions but are the trickiest to track because there is less access to information about suppliers and partners. The emission factors used for Scope 3 are mostly estimated or based on industry averages, and it often results in gross discrepancies and prevents companies from setting reasonable reduction targets.

Finally, confusion over the reporting of carbon emissions and the steps toward, or completion of, carbon neutrality is another major issue, including transparency in the reporting process. While some firms may give comprehensive and accurate disclosure of their emissions, such firms may practice 'information camouflage whereby they exaggerate their eco-friendly performance or fail to reveal important information. This lack of transparency does not inspire trust in corporate sustainability reporting. Also, it inhibits the potential stakeholders, including investors, consumers and regulators, from evaluating the actual effectiveness of the measures being taken to attain a state of carbon neutrality.

Another factor that affects data availability and transparency is the absence of unified reporting models. The issue of carbon emission reporting is slightly complicated due to the existence of various reporting frameworks like the CDP and TCFD, although not all organizations employ these frameworks; thus, there are differences in the way carbon emissions data is reported and its analysis. The lack of some generally accepted guidelines for carbon reporting also prevents the building of a comparative scale for the performance of various organizations and sectors, let alone for evaluating advancement toward a carbon-neutral status (Griffin, 2017).

There are various issues affecting the private sector in its bid to achieve carbon neutrality, which include the lack of a standard approach to defining and quantifying carbon neutrality, Economic challenges, Technological challenges, and Data challenges. Many of these challenges can only be solved through collective action where all the players involved come up with standard methods, synchronize the laws and policies in place and encourage research into low-carbon technologies. By addressing these challenges, the private sector has the potential for both facilitating carbon neutrality across the world and preventing climate change.

2.3 Review of Existing Research, Projects, and Studies

2.3.1 Historical Context and Evolution

The idea of 'carbon neutrality' has changed its meaning over the years, and the private sector has especially taken on much importance for climate change. At the end of the twentieth century, environmentalism became an important agenda, although it was mainly concerned with cleaning up the environment and preserving natural resources. With the launch of the United Nations Framework Convention on Climate Change (UNFCCC) in 1992, the debate on climate change at the global level began, and GHG emissions emerged as an abiotic factor throughout the world, pushing the environment agenda forward (Pinkse and Kolk, 2012).

During this period, the private sector participation was limited and very reactive, and it participated mostly in responding to regulations on sustainability practices. However, the introduction of the Kyoto Protocol in 1997, globally given business emission trading and Clean Development Mechanisms (CDMs), has led to the consideration of CSMs by business entities much more seriously. Carbon reduction emerged from this period as an issue that requires an economic understanding of the scope of its costs and the possibility of creating business value through sustainability (Bebbington and Larrinaga, 2014a).

Ever since the early 2000, due to the increased awareness of company social responsibility or corporate social responsibility, CSR companies have begun voluntarily reporting on their environmental effects. Some of the benefits of sustainability mentioned in the analyses are competition gains such as cost leadership, brand premium, and risk diversification. In 2006, The Stern Review on the Economics of Climate Change pointed out that action on climate change had to

be taken early based on the economic prognosis, thus affecting corporate and policy mindsets throughout the world (Rogelj *et al.,* 2015).

The Paris Agreement, signed in 2015, was a major source of change in how companies approach the issue of being carbon neutral. This agreement sought to ensure that the global temperature did not rise far above 2 percent and called for global cooperation, a large part of which should involve the private sector. Further research looked into implementing meaningful frameworks and approaches to tackle climate change in corporations, stress on science-based targets and integrated management plans (Newell and Paterson, 2010).

More recently, companies have volunteered themselves to such goals and strategies due to growing pressure from stakeholders and investors and the realization of long-term positive impacts emanating from the legalization of carbon footprints. Recent research focuses on new strategies for carbon-cutting, the implementation of sustainable change in corporations' strategic plans and how technology helps the shift to the green economy.

2.3.2 Industry-Specific Studies

The roadmap to carbon neutrality is highly dependent on the nature of business since companies from various sectors have different sets of problems and possibilities. Much work has been done to conceptualize and analyze sector-specific realities.

The energy sector has been one of the critical sectors on which carbon neutrality studies have focused due to its contribution to global GHG emissions. The challenge of moving from fossil energy to renewable energy, such as solar, wind and hydroelectricity, has been widely studied. Some of the areas that have been assessed to determine the potential of decarbonizing energy include the feasibility of decarbonising the energy, the economics of decarbonising the energy and the technology needed for the decarbonising of energy (IRENA, 2019). For instance, studies have established that incorporating renewable power lowers emissions while simultaneously presenting affordable and fairly reliable solutions to conventional energy. Investigations have also extended to the use of storage systems as well as smart grid systems to boost the effectiveness and reliability of renewable energy systems (Jacobson *et al*., 2017).

Challenges abound in the manufacturing industry because the processes involved are largely energy-consumptive and involve the use of several carbon-intense inputs. Research in this area has therefore been geared towards enhancing energy intensity, promoting clean production processes and utilizing different materials (Allwood *et al*., 2011). Previous studies have noted that the possibility of achieving industrial symbiosis, in which waste or a by-product for one industry can be a resource for another, may have implications for lowering emissions. LCAs have been used to identify emission sources and come up with measures for minimizing the carbon footprint of products from the time they are procured to the time they are disposed of (Saidur, Rahim and Hasanuzzaman, 2010).

Transportation is another important subject, and its classifications include road transportation, aviation, and marine transportation. Studies have examined the shift of personal automobile use to EVs, second-generation biofuels, and hydrogen fuel cell vehicles as ways of electrifying road transport (Santos 2017). There is literature that has analyzed the advancement in infrastructure that is needed, consumer behavior that is expected and the policies that have to be put in place to enable this transition. Specific application areas that have been investigated include the use of sustainable fuel, advancement of aerodynamics, and enhancements of operations strategies in aviation as well as in ship transportation (Ajanovic and Haas, 2018).

The agriculture sector struggles with emissions coming from the usage of land, livestock, and fertilizers (Poore and Nemecek, 2018). There has been literature on emission reduction involving sustainable farming practices, including regenerative farming practices, precision farming, and plant-based food shifts. There have also been investigations done on ways of minimizing food wastage in the supply system and the appropriate strategies for enhancing the supply chain sustainability with the aim of cutting down on total carbon emissions (Springmann *et al*., 2018).

Scholars have studied the role of green practices in this sector, focusing on issues such as the utilization of eco-friendly construction materials, energy-efficient building structures, and green accreditation (Pomponi and Moncaster, 2017). Research has shown that the integration of sustainability into construction leads to an extremely low level of operational emissions and added value in the long term (Giesekam, Barrett and Taylor, 2016).

2.3.3 Corporate Strategies and Case Studies

Many major companies worldwide have implemented a range of different approaches to accomplish their goals of achieving carbon-neutrality, thus providing best and worst practices.

In 2020, Microsoft unveiled a strategy of carbon negativity by fiscal year 2030 and eliminating the company's carbon footprint through buying carbon offsets by 2050. The company has developed the following strategies to address its direct emissions: purchasing energy efficiency and renewable energy, investing in carbon removal, and using an internal carbon price to achieve emissions reductions. Research acknowledging Microsoft's strategy points to the efficiency of synergy between incentives and technological development as a means to realise ambitious plans of carbon neutrality (Baumgartner, 2014).

One of the world's largest consumer goods producers has pledged to achieve 'net zero' across its operations and supply chain by 2039. That is why Unilever's hierarchy of supply chain management contains three pillars, and the company is currently focusing on sustainable sourcing, the minimization of emissions in production and supply, and the de novo development of products with fewer emissions. Several business case studies discussed involving suppliers and implementing product innovation have stressed that deep emission reductions are possible (Hajmohammad and Vachon 2016).

Walmart's Project Gigaton is its target to avoid one billion metric tons of greenhouse gases in its supply chain by the year 2030. It targets the sectors of energy, waste, agriculture, forestry, and the use of products where suppliers may be afforded the chance to self-impose and self-regulate emission reduction objectives. Findings from this project, as elaborated further, prove how large firms can drive and support sustainable practices within extended networks, chains or value systems (Dechezleprêtre and Sato, 2017).

It is worth noting that not all corporate initiatives have yielded positive results. For instance, firms can have received much backlash for adopting cosmetic Kyoto-type targets like carbon offsets while not doing very much in terms of emissions reductions. Scholars have pointed out that on occasion, it was found that offset projects were not clear or never delivered on the claimed environmental gain, so the

need for credible and auditable offset strategies is thus stressed. These lessons stress the need to do more emission cuts than using carbon offsets and the validity of all parts of carbon neutrality approaches.

2.3.4 Global and Regional Initiatives

Multilateral and bilateral relationships are central to providing and assigning the needed direction and support to get the private sector to go green.

Science Based Targets initiative (SBTi) offers information about target benchmarks that enable corporate entities to design their emission reduction objectives in relation to the Paris Agreement. In many ways, the support provided by SBTi in setting sector-appropriate goals and the assurance of the targets, with the expectation that the business world is serious about achieving net zero emissions, play a critical role in setting businesses up for success. It has also been found that firms that commit to SBTi engage in higher quality and genuine and science-based climate risk management leading to enhanced corporate governance (Krabbe *et al.,* 2015).

CDP is an organization that operates a disclosure system that allows firms across the globe to report more about their environmental impacts (Clancy, Curtis and Ó'Gallachóir, 2018). Hence, CDP also supports benchmarking as well as competition among companies through offering such tools as plain English, which may help companies understand the pedestriana comparability mechanisms to assess their sustainability performances. Research has also indicated that firms that engage in CDP have improved environmental management practices and high investor confidence as pointed out by Tietenberg (2013).

Representing total electricity demand of the United States, this global platform unites top companies committed to sourcing 100% renewable electricity. By using RE100, companies can learn from each other's experiences and manage challenges that may arise from the adoption of renewable energy. Research has described how demand pooling through initiatives such as RE100 influences markets and policies and proactively shapes the shift to renewables (Weinhofer and Busch, 2013).

On a specific level of the EU region, the European Green Deal presents a strategic plan of how the EU region will achieve economy-wide net-zero greenhouse gas emissions by 2050. Measures such as policies and funding structures that form part of the deal facilitate the change a business must make to embrace sustainability.

Studies have looked into the effect of such regional frameworks in operationalizing regulatory clarity, resource backing and innovation within private entities (Reinecke, Manning and von Hagen, 2012).

Regional capacity can be effective when developing CO_2 reduction initiatives on a country-by-country basis, such as the Asia-Pacific Partnership on Clean Development and Climate, in addition to the African Renewable Energy Initiative. Research notes that issue-specific cooperation can sufficiently operationalise action and generate technology transfers for neighboring countries (Oberthür and Dupont, 2015).

2.3.5 Emerging Trends and Innovations

Over the past few years, some new trends and innovations have been taking place that are going to help the private sector reach carbon neutrality.

Green bonds, sustainability loans, and impact investment forms are some of the novel instruments leveraged in sustainable finance (Gianfrate and Peri, 2019). These financial instruments offer capital to projects that are carried out for environmental purposes with the aim of encouraging businesses to undertake carbon reduction projects. They found out that green financing positively contributes to environmental objectives and is also profitable with reasonable levels of risk relating to climate change (Tang and Zhang, 2020).

The cost of renewables has continued to slash down, and their efficiency has increased, making their uptake widespread among different businesses. The problem of intermittence has been tackled by innovations in storage systems like advanced batteries, which have helped renewable energy sources maintain a constant supply for continuity use (IRENA, 2020). The experience has revealed that utilities contracted in the form of PPAs for renewable energy by corporate entities have been instrumental in developing renewable energy capacity worldwide (Zakeri and Syri, 2015).

The global transition toward the circular economy, that is, the increase in resource utilization and decrease in the amount of waste, is ongoing. Several companies are coming up with strategies in the manufacture of products, designing, and overall business approaches in a bid to increase the product's shelf-life as well as enhance recycling and reuse (Geissdoerfer *et al*., 2017). The stylization of circular processes

indicates that they can reduce emissions significantly by focusing on resource-efficient as well as energy-efficient processes that give birth to new economic value propositions (Ellen MacArthur Foundation, 2019).

For this reason, the combination of digital technologies such as AI, IoT, and blockchain is helping to optimize carbon management. Smart analytics use AI to enhance the utilisation of energy, anticipate equipment failure, and manage the supply chain. Blockchain technology augments the transparency and the chain of custody in carbon accounting and the offset markets. Research indicates that digitalization is central to the process of enhancing and increasing the rate of carbon neutrality initiatives (Zhou, Fu and Yang, 2016).

Increased awareness of the fact that reforestation, afforestation, and wetlands restoration are in the process of carbon capture and improvement of bio diversity (Griscom *et al*., 2017). Such projects are seen to be highly effective when it comes to carbon neutrality plans in business organizations. Evidence shows that NbS brings about multiple benefits, which include restoration of ecosystems, improvement of human well-being, as well as climate change mitigation and adaptation measures (Seddon *et al.,* 2020).

Recent developments in CCUS innovations present new paths towards the decarbonization of difficult sectors. Current pilot projects and research investigations have sought to establish the viability and cost-effectiveness of pursuing carbon dioxide emissions for sequestration and use in other processes or disposal in underground reservoirs. Even at its nascent stage, CCUS is considered a key lever in driving the sixth wave, or deep decarbonization (Haszeldine *et al.,* 2018).

Business cooperation is encouraged by the collaborative platforms and networks that enable the exchange of knowledge and joint projects. Organizations such as the World Business Council for Sustainable Development (WBCSD) and the United Nations Global Compact offer structures whereby companies can work on sustainability issues and find common solutions. Research shows that these kinds of partnerships increase a shared focus on breaking down barriers that undermine solutions and scaling up impact (Mac Dowell *et al.,* 2017).

Altogether, the available knowledge, projects, and studies shown above depict a rather continuous and changing picture of the private sector's involvement in the

process of reaching for carbon neutrality. Global changes in the climate have shifted corporate roles from the sidelines to becoming major participants in climate change solutions. In the specific literature, we find targeted strategies and issues, and in the business cases, we find practical examples of successful and unsuccessful strategies. Thus, existing and planned worldwide and local programs and platforms represent an optimistic outlook for the future development of the presented concepts and thematic trends and initiatives provide frames and additional support for corporation actors' actions.

2.4 Identification of Research Gaps

2.4.1 Understudied Industries or Regions

An important area that is still in its infancy concerns narrow areas of specialization and geographic locations regarding carbon neutrality. Although there exist numerous publications about the energy, manufacturing or transportation industries, little attention has been paid to other industries, including agriculture, real estate and retail. For example, agriculture as a sector contributes to carbon emissions in a somewhat ambiguous manner while also being dependent on natural processes; there is limited research on issues such as sustainable agriculture practices and the possibility of replicating success stories. Likewise, the role of the real estate industry in carbon-saving measures using sustainable construction patterns still offers significant room for growth – especially in such fast-growing urbanization markets as Southeast Asia and Africa.

The issue has also raised regional disparities in the distribution of research work, which is something more focused on developed regions like North America, Europe and some parts of Asia. Three areas of the world that some people might suggest are not ready or capable of achieving carbon neutrality are Sub-Saharan Africa, Latin America & other smaller island nations; yet it seems no one wants to address how these same locations are so vulnerable to climate change. These regions might have different regulatory, economical and technological restraints that should be addressed, but as of now, there is little to no research on these areas. Filling this gap is important in order to make efforts toward achieving global and universal carbon neutrality across the world.

2.4.2 Lack of Longitudinal Studies

It is also worth noting that follow-up research is scarce on the yearly progress and effectiveness of carbon neutrality policies that have been implemented within private organizations. The majority of the prior research is cross-sectional, often assessing practices and outcomes in the short term and therefore does not offer information on the long-term effectiveness of such initiatives. Collecting data at multiple time points is critical because it offers insight into how the initiatives introduced progress, the issues that arise throughout the implementation process, and the overall issue of carbon neutrality strategies – the effectiveness of these methods in decreasing emissions (Hoffman and Jennings, 2015).

For instance, most literature provides countless case studies on firms that are recent converts to carbon neutrality declarations. However, relatively few of these reports explore whether these companies have been able to sustain their pledge and what the implications have been in the longer term. Such research would be incredibly useful in terms of understanding the organizational antecedents of these programs' success and failure, refining these approaches, and establishing best practices that can be followed in all industries (Slawinski and Bansal, 2015).

2.4.3 Inconsistencies in Methodologies

The research on carbon neutrality is also characterized by the difference in the methods used to measure and report on carbon emission, which makes it difficult to make comparisons and combine studies. There is no common understanding of the term' carbon neutrality'; different industries and regions have their definitions; they might have different reference years for the baseline, and above all, they may apply different approaches towards considering the indirect emissions, that is, the emissions from the whole value chain (Scope 3). These differences can cause different conclusions and the lack of opportunities to set best practices that are easy to implement in practice (Peters *et al.,* 2017).

For instance, some of these studies may consider purchasing carbon credits as part of their strategy toward carbon neutrality, while others solely consider the reduction of direct carbon emissions. The area of carbon offsets is even more problematic because regulators have not yet settled on how the offsets should be valued and whether they should be verified at all or how they should be done. Furthermore, the methods with which emissions or reductions are measured are also inconsistent and

can range from an LCA all the way to accounting software that includes a certain list of carbon reduction factors, often including its own set of assumptions as well. The introduction of programmed or systems for standardizing the research work, similarly with reference to The Research on open elements and social learning systems for enriched action, would increase the reliability of research work and the effectiveness of the carbon neutrality claims that could be outputted by the businesses (Fazey *et al.,* 2018).

2.4.4 Need for More Interdisciplinary Research

Last, of all, more investigations are required from multiple perspectives, including economic, environmental, and social, when assessing carbon neutrality in the context of private organisations. Unfortunately, relatively less has been said concerning the socio-economic impacts of carbon neutrality efforts despite significant literature on environmental and technological aspects. For instance, the effects of going carbon-neutral on employment and income distribution may dramatically affect the availability of employment and disposable income; however, these themes are not typical of in-depth analysis (Clift *et al.,* 2017).

Research-based on the integration of different academic disciplines can give a better idea of the pros and cons of carbon neutrality efforts and the possibilities of achieving them together. For example, research that employs economic, environmental science, and sociological theories would examine the manner in which carbon neutrality campaigns influence various stakeholders, ranging from employees, customers, community residents, and the global value chains. This kind of research would also provide insight into identifying what polices and practices regarding the environment are beneficial for society and what ones are actually indifferent or even worst for society while aiding the transition to a post-carbon economy, thus furthering a social and ecological special just transition (Bebbington and Larrinaga, 2014 b).

Thus, it is crucial to address these research gaps further to develop a more robust knowledge of the private sector's involvement in achieving carbon neutrality. Future research should continue to target understudied industries and regions, recommend more longitudinal investigations, strive for methodological harmonization, and integrate neighboring disciplines in order to generate enhanced and application-

oriented information that will contribute to the worldwide fight against climate change.

2.5 Summary and Implications

2.5.1 Synthesis of Key Findings

A literature review helped to expose some significant gaps in the understanding of the private sector regarding the carbon-neutrality agenda. One of the major issues that has been highlighted is the general difficulty of defining the scope and parameters of carbon neutrality and then measuring it within different sectors due to the use of different methodologies and standards. Another layer of difficulty exists in formulating these efforts due to different regulations and policies around the world that are not standardized. Other challenges also relate to the economic and financial aspects, such as the expense that comes with policies that support carbon-neutral gadgets, designs, and infrastructures that hinder profitability, especially for SMEs. Moreover, technological constraints have not yet been fully eliminated – the existing technologies today related to low-carbon living are also not free from some issues, such as scaling up, accessibility and efficiency. Last but not least, the literature also focuses on the problems of data availability and clarity, which affects the correct evaluation and comparison of carbon neutrality projects in the private sector (Geels *et al*., 2017).

Energy, manufacturing and transportation industries, particularly, have received more attention, while other sectors, including agricultural, real estate and retail industries, have received less attention in research studies. However, there are no many empirical analyses of the time-bound initiatives, and hence, it has been challenging to investigate the sustainability of carbon neutrality efforts. The review also highlights the gaps in the methods used in various studies, and hence, it is hard to compare the results from one study to that of the other or one region to the other. This absence of standardization presents a major problem for the formulation of strategies that would be useful in achieving the state of carbon neutrality in all countries. In addition, the literature stresses the approach to the interdisciplinary studies that are based on the economic, environmental, and social sets of values, which provide a less abstract view of the interaction between carbon neutrality in the

private sector and the mentioned approaches (Loorbach, Frantzeskaki and Avelino, 2017).

2.5.2 Implications for Future Research

Based on the literature analysis done in this paper, the following conclusions can be drawn: First, it is evident that more research is required on business sectors and geographical areas that have received little attention so far. Multiple studies focused on industries, including agriculture and real estate, or areas involving Sub-Saharan Africa and Southeast Asia, can shed light on the peculiarities of the mentioned sectors' efforts to become carbon-neutral. Furthermore, future research should consider focusing on the formulation of more longitudinal research aimed at evaluating the effects of established carbon neutrality programs in the private sector. Such research would aid in the understanding of other related factors that define the effectiveness of such processes over a period, which will enhance the knowledge of what contributes to the attaining of sustainable outcomes (Gusmão Caiado *et al.,* 2018).

Another important issue that should be addressed in the future is the further development of the pattern according to which the methods used in the research should be standardized. The current study pointed out that conducting investigations on carbon neutrality can be significantly improved if coherent frameworks and instruments for assessing carbon neutrality across industries are introduced. This could involve drawing up a special working party on industries or adopting consistent accounting standards for calculating carbon emissions. In addition, there is a deficiency of sufficient interdisciplinary studies that will consider relevant findings from one or another sphere of knowledge – from economical to environmental and social sciences. This approach could reveal the potential side effects of carbon neutrality efforts, which could present an understanding of fashioning solutions that would be environmentally plausible but socially just (Jackson, 2019).

2.5.3 Relevance to the Study

The literature review thus provides a critical background for the study of the role of the private sector in the achievement of carbon neutrality. Based on the analyzed challenges, the current literature, and the research gaps, this research paper outlines the research questions and objectives. These findings provide the basis for

subsequent debates regarding the problems and possibilities of developing private enterprise, in particular for the sectors and regions that have not been studied enough. This research is going to build upon these findings by undertaking an exploratory case study analysis of three private firms in Oman to determine how these organisations are addressing these challenges as identified in the literature and how these organizations are employing the actions necessary to achieve the state of carbon neutrality (Bocken *et al*., 2014b).

It also stresses on methodological and transdisciplinary methods that will be adopted in the research and data acquisition that is going to be used. As per the discrepancies noted in the literature, this study aimed to identify how the private sector could help in implementing the carbon neutrality strategy concerning context in Oman (Baumgartner and Rauter, 2017).

2.6 Conclusion

In conclusion, it is of paramount importance to highlight the major chance and experience the literature review revealed in relation to the presented topic, namely the involvement of the private sector in the process of attaining goal of carbon neutrality. Some of them are the challenges of quantifying carbon neutrality, differences in regulation, cost factors involving economics and finance, issues regarding technology and lack of data openness. Also, the review highlighted the lacuna that exists in the literature, including the participation of industries and regions that received little attention, inadequate longitudinal studies, and disparate research methods.

The conclusions of the current chapter will directly influence the overall method and application used in the following chapters of the thesis, more specifically, the case study of Three Private Sector Oman Companies. Knowledge obtained from the literature will inform the research framework in order to capture the main concerns and provide valuable information on carbon neutrality in the private sector. While conducting the presented research, this literature review step will prove useful in determining the comparison and analyzing the findings as well as enabling the drawing of more accurate conclusions.

3. Methodology

3.1 Research Framework

This research adopted the qualitative case study research strategy to study the private sector of Oman for carbon neutrality. This study should, therefore, take a qualitative approach because it often helps when exploring antecedents of carbon neutrality within the private sector, given its complex and subjective nature. Out of the various research strategies, the case study technique was specially selected to gain deep insights into the plans, hurdles, and prospects that various companies faced during the overall process of attaining carbon-neutral status. This method allowed to consider these concerns in their real-life context, which could not have been achieved without losing details and peculiarities that can be observed in the case of a purely quantitative approach (Miah, Rahman and Mamoon, 2021).

The case study method was chosen because this research approach is able to study modern-day phenomena in their context. Because the specification of carbon neutrality is a crucial and continuous task for every organization, the chosen method had to involve the multifaceted and unique nature of each enterprise's experience. The application of the case study approach helped to uncover the specifics of the transition to carbon neutrality in Oman for the companies under consideration, the nature and conditions of the industry, and the regulatory and organizational environment. Thus, the focus of the research was rather suggestive of how the findings could be more contextually situated and refined in their nature, which could help enhance and develop further thaning on the subject of sustainability in the context of the private sector (Jawad ad Scott-Jackson, 2016).

The criteria used to select the three companies were set in advance of the analysis. First, the companies were required to be significant companies in Oman’s private sector with large operations in sectors that are associated with high carbon activity levels – transport and logistics, construction, manufacturing, and other services. Second, an organization had to reveal that it had sustainable development policies or was ready to create such policies to cut greenhouse gas emissions. Last but not least, the inclusion criteria also meant that the participants had to agree to be part of the study and share necessary data and people with the research team (Study, 2022).

Out of the all these companies, Khimji Ramdas, Towell Group and Al Naba Group were selected as they were most relevant to the research objectives. Khimji Ramdas

has engaged in trading, distribution, and manufacturing business, and thus it is suitable for studying how trading, distribution, and manufacturing organizations approach sustainability. Through a case study analysis that involved engaging Towell Group, which is in construction and services, as well as Al Naba Group, which is in logistics and manufacturing, the paper identified the main challenges in the carbon-intensive construction industry as well as difficulties that energy-intensive or transport-intensive industries might experience. These case studies were instrumental in addressing the research questions since they involved different fields of private sector with diverse carbon impacts (Alrawahi *et al.,* 2023).

3.2 Data Collection

The primary data were collected by administering open-ended questionnaire survey, documentary review, and company documents. Survey data were administrated in the form of semi-structured interviews with the top management and sustainability officers of the selected companies, as well as those employed to oversee carbon neutrality plans. This approach facilitated provision of diverse answers to the questions as long as all major research questions were covered. This involved developing interviews that would reveal general strategies, risks, and opportunities for the company more so on carbon reduction (Study, 2022).

Specifically, when designing the interview protocol, it was very important to adhere to the research objectives. Stemming from these objectives, research questions were asked to elicit participants' perceptions on the following: Specific carbon neutrality goals, their company's actions toward these goals, the methods used, and the challenges experienced. The interviews also aimed to gather information on what the companies thought about the other industry structures in Oman and their relations with governmental sustainability programmes. The use of semi-structured questions ensured some interviewing flexibility, most importantly, the ability to ask follow-up questions as well as clarify on difficult issues, as it helped to elicit a variety of detailed data (Miah, Rahman and Mamoon, 2021).

Secondary data were collected to supplement the primary data so that they could add value to the analysis. The papers used included industry reports, government reports, and reviewed literature on carbon neutrality especially in Oman and the Gulf Cooperation Council countries. The secondary data formed a background in which

the actions and policies set by the companies could be seen most evidently concerning the national and international sustainability frameworks (Jawad and Scott-Jackson 2016).

Secondary data about the companies were also collected through company reports and sustainability reports to corroborate the information collected from the interviews and to see the official positions of the companies and their management about those matters. These documents include sustainability reports, annual reports and other public information for carbon reduction targets. Combing Primary interview data with the secondary data helped to provide a richer and more unhindered analysis that would help to answer the research questions given several perspectives (Miah, Rahman and Mamoon, 2021).

3.3 Data Analysis Process

Interview and document data were analyzed by thematic analysis method. The interviews and other documents were coded and analyzed for emergent patterns of the difficulties, opportunities, and measures associated with carbon neutrality. This study used an iterative approach in coding where the coding process was repeated several time to make more consensual coding. Some of the initial codes were derived from the research questions posed as well as from the interview guide used, but other codes were developed systematically from the data resulting in the generation of new ideas. A qualitative data analysis software was used to facilitate management of data including code tracking, text retrieval and cross tabulation of themes over interviews and documents among others. The use of the software made it easier to identify the emerging patterns and the voluminous data gathered was eased (Nowell *et al*., 2017).

Having established the themes that were relevant to Khimji Ramdas, Towell Group, and Al Naba Group individually, a cross-case analysis was made to compare the results. The purpose was to find differences and similarities in their strategies towards carbon neutrality. This made it easier to discern general trends within the Oman private sector also identify sector specific approaches. The method of cross-case analysis allowed the research to generalize the findings obtained and made about the position of the private sector in achieving carbon neutrality. Thus, the strategies, challenges and opportunities identified in each case have offered a better

insight into how companies operating in Oman are coping up with global demand for carbon reduction and what hampers or enhances their intentions and practices in this respect (Nowell *et al.,* 2017).

3.4 Ethical Considerations

In addition to being methodologically sound, the present study was also conducted following ethical practices; all the participants in the study provided informed consent to be interviewed. Study information entered to the participants included a description of the study objectives and the role of the participants, the confidentiality of their information, and their right to withdraw at any particular time of the study. This made it easier to explain and it also ensured that participants get an opportunity to make an informed decision of whether to participate in the study or not (Braun and Clarke, 2019). The following steps were however taken in order to ensure that the companies and people involved in the study had their privacy protected. Thus, despite the fact that all the data collected from the participants and news articles were reported in detail, every piece of data was stripped of all identifiers and much care was taken to ensure that the data reported did not enable identification of the participants and the companies under study. Where possible pseudonyms were adopted and any information that was regarded as sensitive complied with the appropriate ethical research conduct. In conducting the current study, the researchers sought for approval from the relevant authorities and institutions to gathers the data. It entails the submission of a research proposal that contains the rationale, aim and objectives, methodological approach and issues of ethics in the proposed study. It helped the research to meet the ethical standards especially concerning corporate practises and sustainability (Nowell *et al.,* 2017).

3.5 Summary

This chapter has explained the research setting, data collection techniques and data analysis procedures in the study. The reason for adopting the case study approach for this topic and Oman's private sector is the gains that comes with the approach due to its specificity. Questionnaires and structured interviews were used in data collection; while documents and secondary sources were used to support the findings of the research; thematic and cross—case analysis formed the basis of data analysis. It was therefore developed in such a way that would effectively capture the

opportunities and challenges for the firms, as well as the strategies used by the private entities within the context of the set research questions. The next chapter will provide the results of the research including the discussion of the key issues highlighted from the analysis of the case studies of Khimji Ramdas, Towell Group, and Al Naba Group. These findings will thereafter explain how Oman's private sector has embarked on the transition towards achieving a state of carbon neutrality and responses to the research questions formulated earlier.

4. Findings

4.1 Introduction

As the chapter's topic suggests, this chapter focused on the collected research regarding the private sector's contribution to Oman's path towards carbon neutrality. The findings were structured to align with the research objectives and questions, offering a comprehensive analysis of the challenges, opportunities, and strategies identified within the three selected companies: There are various business houses involved in this project, namely Khimji Ramdas, Towell Group and Al Naba Group. These companies have been selected because of their widespread activities across different industries and, therefore, will allow the authors to advance more generalisable conclusions about the generalisability of carbon neutrality initiatives within Oman's private sector (Alrawahi *et al.,* 2023).

The chapter started with outlining the research objectives and questions, which formed the basis for further analysis. The primary research questions were: (1) what issues affect Oman's private sector firms concerning carbon neutrality? (2) What opportunities are available to Oman's private sector firms for achieving carbon neutrality? (3) What strategies can help the private sector overcome the challenges and harness the opportunities? (Charabi *et al.*, 2020).

These objectives were operationalised through three research questions: It was crucial to establish the main problems that Oman's private sector encountered en route to carbon neutrality. What were the possibilities for the Oman private sector to contribute towards carbon neutrality? What can Oman's private sector achieve and overcome to realise carbon-neutrality? These questions guided the data collection and analysis processes, ensuring that the findings were directly relevant to the

study's overarching aim: to offer a clear comprehension of the role of the private sector in Oman in the shift toward carbon neutrality (Muthalaly *et al.,* 2022).

The three companies looked at for this study, which included Khimji Ramdas, Towell Group and Al Naba Group, were among the most significant business houses in Oman and were involved in several industries. Khimji Ramdas, a trading, distribution and manufacturing company, was one of the largest diversified business groups. It had many operations in Oman, so it had a significant role in Oman's economic system. All these years of endeavour towards becoming sustainable, he played an essential part in realising the SWOT's extent of responsibility toward carbon neutrality in the private sector (Khimji.com, 2024). Another major business group of Oman is Towell Group, which has significant operations in the trading, construction, and service sectors. Namely, the construction sector was considered to be one of the most carbon-intensive, and thus, studying the case of Towell Group as a representative of this industry would be crucial when discussing the prospects and obstacles of achieving the carbon neutrality goal in industries that consumed the most energy (Group, 2024). Last but not least, Al Naba Group, a conglomerate of Oman, works in facilities management, manufacturing logistics and providing logistic signals on the logistics industry, a significant source of carbon dioxide emission and the measures that could be adopted in this field to minimise the carbon footprint (Alnabaholding. com, 2015).

In this way, choosing these three companies allowed us to reveal numerous factors that affect the private sector's striving for carbon neutrality in Oman. The information presented in this chapter was categorised in response to the set research questions, which started with an assessment of the issues that can hinder the growth of such companies, then the prospects that this entity can exploit to overcome the challenges, and finally, the measures that had been adopted or can be implemented to actualise the underlying prospects (Charabi, Al-Awadhi and Choudri, 2018).

Conclusively, this chapter provides an overview of the following chapter, focusing on the private sector's contribution to achieving carbon neutrality in Oman. In this way, aligning the deliberations with the objectives and questions formulated within the research framework made for easy comprehension of the subsequent analyses and discussions. Here, what was learned from the case studies of Khimji Ramdas, Towell

Group, and Al Naba Group not only provides an understanding of companies' values and issues but also provides knowledge about the overall situation of the private sector in Oman and its potential to meet the challenge of carbon neutrality.

4.2 Challenges Faced by the Private Sector in Achieving Carbon Neutrality

The goal of becoming carbon neutral is not easy for companies in the private sector, particularly in Oman, which is a resource-based economy. This section highlights three OFCs' general and firm-level barriers, i.e., Khimji Ramdas, Towell Group, and Al Naba Group, and their journey towards carbon neutrality. Data for the analysis was gathered from interviews, company reports and documents.

4.2.1 Common Challenges Across the Three Companies

All three organisations, Khimji Ramdas, Towell Group, and Al Naba Group, operate in different sectors. However, they face similar challenges that hamper their efforts to achieve the set goal of zero-carbon emissions. These common factors can be limitations by government regulations, restrictions in funding, and lack of advanced technology support (Said Al-Rasbi, 2023).

4.2.1.1 Regulatory Challenges

Among the challenges highlighted for the three firms, the biggest threat is the regulatory framework in Oman. Nevertheless, the current system lacks suitable policies or propositions encouraging the Omani government and companies to pursue sustainability and invest in carbon reduction strategies. The main external factor is that companies are uncertain regarding future regulations, affecting strategic growth planning. Also, the favourable comparative environmental standards imply that, compared to the global environment standards, no stiff pressures exist to force organisations to adopt steep carbon neutrality (Said Al-Rasbi, 2023).

4.2.1.2 Financial Constraints

Another frequently cited problem is the cost of such changes to achieve carbon neutrality within the company's activity. Adapting sustainable processes, such as installing appliances with better efficient use of electricity or acquiring renewable energy, requires a large amount of capital initially. For companies that ply their trade in competitive markets, such as Khimji Ramdas, Towell Group and Al Naba Group, it can be challenging to invest in such noticeable changing initiatives because returns

in the short run for such measures are not easily measurable. However, This financial challenge is made worse by the small giggantism of green financing products available for Oman, which could otherwise facilitate these investments (Said Al-Rasbi, 2023).

4.2.1.3 Lack of Technological Infrastructure

These companies' lack of sophisticated technological facilities is a significant disadvantage. Carbon neutrality means the application of modern developments, especially CCS technology, renewable power sources, and effective energy-saving technologies in product production. However, the advancement of the technological ecosystem in Oman is slow, and the expansions of such innovations are restricted. This challenge is more marked in industries such as manufacturing and construction, which require integrating green technologies to minimise emissions (Said Al-Rasbi, 2023).

The table below summarises the common challenges faced by the three companies:

Challenge	Khimji Ramdas	Towell Group	Al Naba Group
Regulatory Challenges	Uncertainty in regulatory framework	Inadequate environmental regulations	Lack of incentives for sustainable practices
Financial Constraints	High costs of sustainable investments	Limited access to green financing	Financial risks associated with long-term investments
Technological Infrastructure	Limited access to advanced technologies	Slow adoption of green building technologies	Challenges in implementing energy-efficient processes

4.1 Common Challenges Faced by the Three Companies (Said Al-Rasbi, 2023)

4.2.2 Company-Specific Challenges

These obstacles are general, but each enterprise has its problems associated with the sectors it operates within and the contexts in which it operates.

4.2.2.1 Khimji Ramdas: Supply Chain Complexities and Sector-Specific Emissions

Applying the strategy in Khimji Ramdas also has its demands and varies depending on the type of the sector in which the company works: trading, distribution, and manufacturing sectors suggest different demands and challenges in achieving

carbon neutrality. However, the company's supply chain emissions are a significant factor that creates a management hurdle for Khimji Ramdas. The numerous suppliers and distributors of the company, many of whom conduct their business in areas without strict regulations on carbon emissions, make it challenging to tackle the issue of carbon emissions all through the company's supply network. In addition, due to the diverse business sectors that comprise the company, the emissions from sectors such as manufacturing have distinct profiles and do not demand consistent approaches where carbon reduction is concerned (Acquaye *et al*., 2017).

Moreover, the challenge that arises when implementing sustainability measures across sectors of the company due to the involved integration of different sectoral strategies is a major one. For example, while the trading division may set its objective in curbing transport-related emissions, the manufacture division requires a solution to production-related emissions. It is also difficult to formulate a tightly-knit carbon neutrality strategy since the emission sources will not be unified (Wang and He, 2018).

4.2.2.2 Towell Group: High Carbon Footprint and Limited Green Building Technologies

Towell Group's work in the construction and services industry makes it vulnerable to issues, which include high carbon intensity in construction. The construction industry remains one of the largest emitters of carbon due to the materials used in construction, such as cement and steel, and the energy demand required for construction. Therefore, it is crucial for Towell Group to reduce the emissions level in this sector any further. However, the traditional construction method and the use of material make it unattainable (Huang *et al.,* 2022).

Lastly, it can also be appreciated that the application of ecologically friendly technologies in new constructions in Oman is comparably low. This seems to me an obvious threat to Towell Group which is the market’s inability and/or lack of awareness in sustainable buildings practices and new technologies such as energy-efficient designs and materials. The contractors’ and clients’ low level of awareness of the advantages of the green buildings make it necessary for the company to spend more in the use of these technologies in the structures (Sun, Wei and Li, 2022).

4.2.2.3 Al Naba Group: Transportation Emissions and Energy-Intensive Manufacturing

Being famously involved in the logistics and manufacturing processes Al Naba Group has environmental concerns with regards to transport emissions and power consumption in the manufacturing floor. This is mainly because the logistics sector is one of the leading producers of greenhouse gasses, mainly caused by the use of fossil fuels as a means of transport. Al Naba Group has many logistic activities, and several vehicles for transportation and delivery issues are primary concerns for minimising CO_2 emissions. The organisation must look at other types of fuel including electric or even hybrid cars. However, the cost incurred in developing such technologies is comparatively very high while Oman does not possess structures for such systems (Quan *et al.,* 2020).

The issue of concern in the manufacturing context is the aspects of energy density of the production processes in Al Naba Group. Some of the major manufacturing sectors include the food processing sector and the production of manufactured inputs which both require high energy and therefore contributes to high carbon emissions. They try to implement energy efficient manufacturing processes, but the switching and acquiring cost of equipment is costly and there is constrained energy in Oman. Furthermore, there is also insufficient public policy incentives for the industry to direct resources towards emission cuts, which is also challenging even for such critical capital outlays (Zhang, Wang and Zheng, 2018).

The figure below categorizes each company according to its individual issues, and showcases the areas which require most attention in carbon reduction.

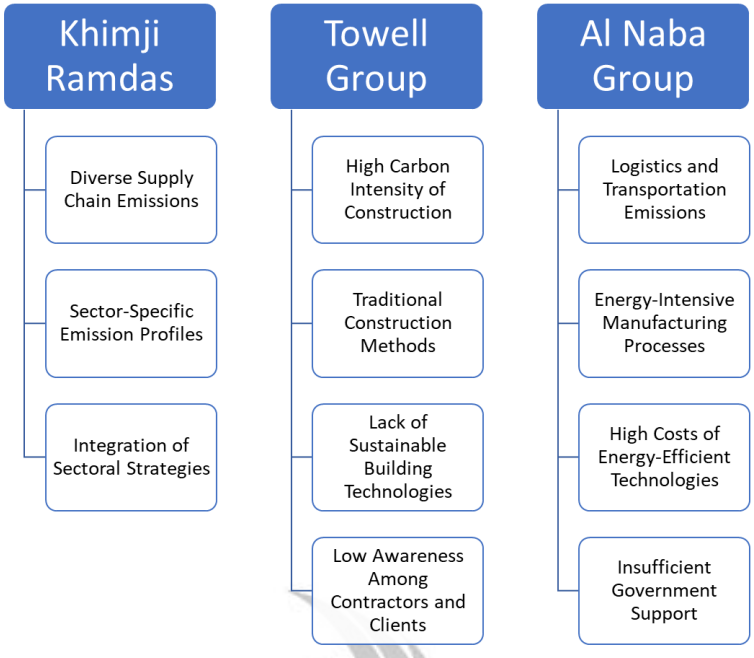

Figure 1. Visual Representation of Challenges Faced by Khimji Ramdas, Towell Group and Al Naba Group

Hence, the identified general and industry-specific barriers make the journey towards carbon neutrality for the private sector organisations in Oman a bumpy road. By observing the characteristics of operations management in Khimji Ramdas, Towell Group, and Al Naba Group, there are challenges that impact all three establishments: regulatory issues, constraints of funds, and weak technological systems in any business. Further, each firm has industry-specific issues: supply chain issues in trading and distribution and a high carbon impact in construction and logistics. Therefore, Many of these challenges warrant special efforts, huge calls for investments and proper policy measures. The following sections of this research will look at the possibilities these companies can harness and the measures they can take to counter these barriers and realise a net zero emission status.

4.3 Opportunities for the Private Sector to Achieve Carbon Neutrality

As Oman continues to align itself with these global sustainability goals, the private sector will be presented with many opportunities to achieve carbon neutrality. For principals such as Khimji Ramdas, Towell Group, and Al Naba Group, such opportunities go hand in hand with sound environmental management and competitiveness in the global market that is increasingly becoming ecological. This

section looks at the different general and firm-specific opportunities these three Omani conglomerates can exploit to bolster the push for carbon neutrality.

4.3.1 Common Opportunities Identified

The necessities of the sectors where these firms operate differ, but some opportunities may help them become carbon-neutral companies. These opportunities result from government policies, technology and the rising market trends for environmentally friendly products (Ahmed, 2024).

4.3.1.1 Government Incentives

Self-sufficiency has slowly become a goal in Oman, and the government has now developed several measures to support carbon cutting in the civil industry. Such encouragements include the provision of tax credits, the feasibility of granting subsidies for renewable power use, and the provision of grants for carrying out research in areas of interest of green power. Government incentives exist if a company chooses to invest in energy efficiency or renewable energy projects, making it easier for an organisation to undertake such costs. For instance, Khimji Ramdas could investigate solar energy systems in its factories powered by government incentives, and Towell Group could consider tax credits on green building rating systems (Ahmed, 2024).

4.3.1.2 Technological Advancements

Another essential factor with potential is the technological advance that opens the door to all three companies. New technologies in renewable sources of energy, energy-conserving technologies in machinery and digital control solutions that help minimise carbon emissions also give companies a way of lowering their carbon footprint. Internet of Things (IoT) technologies and data analytics can enhance logistics in organisations such as Al Naba Group by lowering fuel consumption and emissions. Likewise, the changes in the sustainable material front and embracing green construction technologies put Towell Group in a position to take the construction industry by constructing environmentally friendly structures (Ahmed, 2024).

4.3.1.3 Market Demand for Sustainable Products

The market is shifting more to the sustainable side, and business organisations prioritising sustainability are now receiving more preference. Consumers are

increasingly concerned with products and services with a low carbon footprint, thus putting economic pressure on businesses to become carbon neutral. As for Khimji Ramdas, it is indeed an opportunity to diversify its product portfolio by providing environmentally friendly products and adopting a green manufacturing process. Likewise, Towell Group could enhance its constructional projects with the concept of green buildings that would be attractive to clients with this conscience (Ahmed, 2024).

The table below summarises the joint opportunities available to the three companies:

Opportunity	Khimji Ramdas	Towell Group	Al Naba Group
Government Incentives	Subsidies for renewable energy in manufacturing	Tax incentives for green building projects	Grants for energy-efficient logistics
Technological Advancements	Adoption of energy-efficient machinery	Use of sustainable building technologies	Integration of IoT for logistics optimisation
Market Demand for Sustainable Products	Diversification into eco-friendly products	Promotion of green building certifications	Expansion into sustainable logistics services

4.2 Common Opportunities Available to the Three Companies (Ahmed, 2024)

4.3.2 Company-Specific Opportunities

In addition to the everyday opportunities, each can identify the advantages unique to their fields and contexts of operation.

4.3.2.1 Khimji Ramdas: Diversification and Innovation in Trading and Manufacturing

The prospect of diversification and innovation is tremendous for a conglomerate of businesses like Khimji Ramdas. The company can use the relevant business connections in trading and manufacturing areas to launch environment products. This could range from creating eco-friendly packaging chemical or natural-based products with low carbon footprint, among other natural resources used in producing its products. Thus, by expanding sales of such products, it will be possible to establish Khimji Ramdas as a leader in sustainability among Oman's private companies (Antari and Wulandari, 2019).

Furthermore, the company's supply chain management is another area that the firm can embrace as a potential. Smart technologies like blockchain tracking supply

chains or artificial intelligence for demand analysis will help the company increase efficiency and cut unnecessary costs. Besides pursuing environmental objectives and emission reduction, this also improves the company's competitiveness (Nguyen *et al*., 2020).

4.3.2.2 Towell Group: Opportunities in Green Building Practices and Sustainable Materials

The construction industry has been slow in embracing environmental issues. However, as a significant player in the construction business, more companies, including the Towell Group, could benefit immensely from moving to greener pastures. Sustainable materials, including low-carbon concrete, recycled steel, and efficient insulations, can help construction firm Towell Group lower its carbon footprint. Using these materials, the company can set itself apart from other players and satisfy the increasing demand for green structures (Huang *et al.,* 2022).

Moreover, a new area that Towell Group can consider venturing into is eco-friendly construction. Many approaches, including the modular construction approach, which cuts down on wastage and energy consumption and uses renewable electricity sources in construction sites, have a great potential to reduce emissions. As Towell Group becomes one of the leaders in the sphere of green construction within Oman, it becomes possible to attract more clients that set a high value on the sustainability of the projects they invest in (Wang, Yu and Cao, 2021).

The company can also benefit from seeking green building certifications, for instance, LEED or BREEAM for green building certifications. These certifications add value, bringing prestige to the projects in which they participate, but they also conform to international sustainable development indexes and are, therefore, attractive to large-scale investors.

4.3.2.3 Al Naba Group: Opportunities in Energy-Efficient Technologies and Sustainable Logistics Practices

The solid orientation in logistics and management of facilities has Al Naba Group's distinct prospects for improving sustainability strategies. Therefore, there are corresponding challenges and one significant opportunity: energy technologies' efficiency. For instance, the company can use energy-efficient lighting, heating, ventilation, air conditioning systems, and energy-efficient equipment/machines in

different departments/units of the company's facilities. In the case of electricity or hybrid vehicles, there is an excellent opportunity to bring a massive change in foreign consumption and emissions in the logistics sector (Mariano *et al.,* 2017).

Furthermore, the change with more extent can encourage Al Naba Group to identify opportunities for implementing sustainable logistics activities. This could include efficient management of delivery fleets to ensure that they consume as little fuel as possible and inventory management whereby goods are ordered only when needed, thus reducing the amount produced, leading to wastage and use of environmentally friendly packing materials. Implementing these strategies has accredited Al Naba Group to decrease its environmental impact as much as it responds to climate-sensitive clients' need for eco-friendly supply chain services more than ever (Rehman Khan *et al.,* 2018).

Another potential area is facilities management, where the company can provide energy audits to its clients and plan for sustainability. Thus, when offering advisory services to other businesses in the Al Naba Group, the company can enhance its expertise in energy efficiency and low carbon emissions, creating new services and outlets for income generation.

The graph below visually compares the opportunities across the three companies, highlighting the areas where each company can leverage its strengths to achieve carbon neutrality.

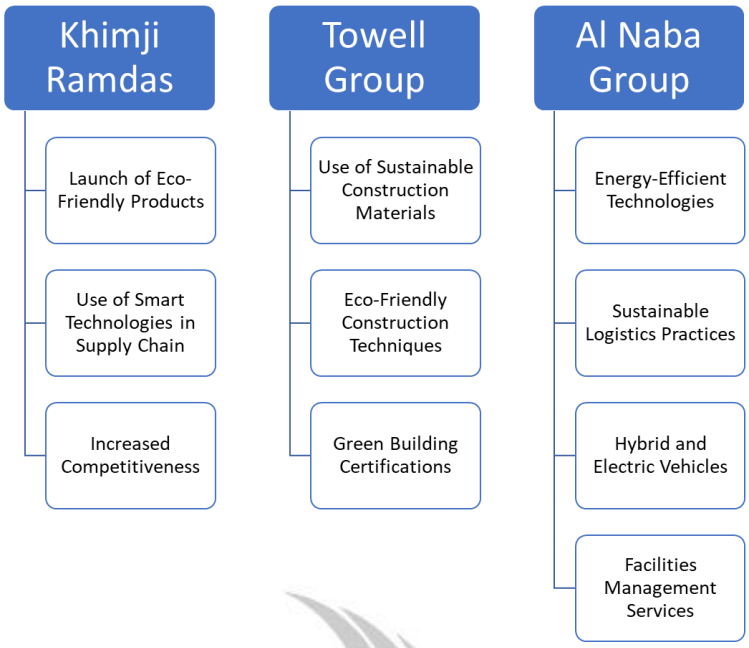

Figure 2. Visual Comparison of Opportunities Across Khimji Ramdas, Towell Group, and Al Naba Group

In summary, it is stated that there are opportunities for Oman's private sector to adopt the outlined strategies to achieve carbon neutrality despite the challenges mentioned above. For Khimji Ramdas, several factors, such as opportunities for product differentiation, supply chain management, innovations, and sustainable business models, can lead to a low-carbon economy. In contrast, suppliers such as Towell Group can use sustainable construction practices and materials due to the growing green building market. Being a logistics and facility management company, Al Naba Group has a great opportunity to pioneer in implementing energy-saving technologies and using eco-friendly solutions in logistics.

If properly harnessed, these opportunities can serve dual purposes of enabling these firms to minimise their greenhouse gas emission and improve their competitive position when the market places more value on sustainability. As more rules and technologies shape Oman's landscape in the coming years, the government will need the private sector to invest more to make the nation carbon neutral.

4.4 Strategies for Addressing Challenges and Capitalising on Opportunities

As the private sector in Oman tries to get closer to obtaining carbon neutrality, the businesses, including Khimji Ramdas, Towell Group, and Al Naba Group, experience specific difficulties and try to use opportunities that the situation offers. This section aims to understand the primary approaches that have proved

successful within these companies while also considering individual approaches that best fit the settings where these companies operate.

4.4.1 Effective Strategies Across Companies

Getting to zero carbon calls for systemic changes by adopting new technologies, developing strategic relationships, and altering organisational cultures. The following strategies have been realised across the Крауд implementing the carbon neutrality challenges while exploiting the opportunities across Khimji Ramdas, Towell Group, and Al Naba Group (Harthi, 2024).

4.4.1.1 Strategic Partnerships for Green Technology

Among all these strategies, a visible one has been linking up with technology suppliers, research and development establishments and governmental organisations to source and adopt environmentally friendly technologies. For instance, all three firms rely on partnerships with renewable energy firms to determine how to incorporate solar and wind energy in their production processes. Such collaborations have made such technologies available and specialised skills for adequately implementing and exploiting such technologies (Harthi, 2024). For instance, Towell Group developed a strategic alliance with a prominent renewable energy supplier to place solar panels on the construction sites to minimise the use of fossil fuels and thus achieve less emissions. Likewise, Al Naba Group partnered with a logistics tech firm to create energy-efficient transport management throughout its operations, leading to a decrease in fuel usage in its logistics.

4.4.1.2 Investment in Renewable Energy

Renewable energy sources have become one of the strategic sectors of importance to these companies. This way, they have cut down their carbon footprints by shifting from conventional to renewable energy sources while also cutting down their energy expenditure in the long run. For instance, Khimji Ramdas has taken pro-active measures to finance solar energy to meet manufacturing plants' requirements. This investment also shields the company from price risk and contributes to the carbon neutrality targets set by the company and where the company wants to be (Harthi, 2024). Other companies like Towell Group and Al Naba Group have also come a long way. Specifically, Towell Group has paid much attention to implementing renewable energy in their construction projects to design and develop new structures

with energy-efficient and renewable considerations. Al Naba Group has procured hybrid electric vehicles and electric logistics solutions that show the company's concern toward minimising emissions in the transportation industry.

4.4.1.3 Employee Engagement in Sustainability Initiatives

The other approach towards sustainability that has been embraced by most of these companies is promoting a sustainability culture within the organisation. These companies have successfully involved their employees in sustainability projects, which has led to integrating sustainable practices into their businesses. This entails using training methods, workshops and incentives to promote achieving the company's sustainable goals (Harthi, 2024). For Instance, Khimji Ramdas implemented an energy and waste management awareness campaign among the company's employees. It also created a Green Team composed of members from different departments whose primary role is to look at and recommend sustainable projects. In the same manner, Towell Group and Al Naba Group involve their employees; Towell Group has established a sustainability award scheme for new green ideas and Al Naba Group holds training sessions for energy efficiency to sustainable logistics.

The table below provides an overview of the effective strategies implemented by these companies:

Strategy	Khimji Ramdas	Towell Group	Al Naba Group
Strategic Partnerships for Green Tech	Collaboration with renewable energy firms	Partnership for solar energy in construction	Partnership for energy-efficient logistics
Investment in Renewable Energy	Solar energy projects for manufacturing	Incorporation of renewable energy in buildings	Hybrid and electric vehicle investments
Employee Engagement	Green Team and internal sustainability campaigns	Sustainability awards for green initiatives	Regular training on sustainable practices

4.3 Effective Strategies Implemented by The Companies (Harthi, 2024)

4.4.2 Company-Specific Strategies

As in all companies, each has widely used general strategies, but at the same time, each has its own more specific strategies according to their business model and operations.

4.4.2.1 Khimji Ramdas: Enhancing Supply Chain Sustainability and Reducing Emissions in Manufacturing

Khimji Ramdas, one of the critical areas for improvement has been supply chain sustainability. For instance, the company has stringent sustainability criteria for the suppliers it uses, implying that the raw materials it uses are sustainably sourced and that the suppliers also meet the company's environmental stewardship milestones. This has entailed developing collaborations with suppliers to enhance efficiency and minimise wastage, leading to a lower carbon footprint in the supply chain (Raman, Mahmud and Shaharudin, 2023). Also, Khimji Ramdas has applied sophisticated manufacturing technologies to address similar issues. For example, the company has begun sourcing energy-efficient equipment and 'right-first-time' quality improvement to reduce unnecessary resource consumption. These efforts are supported by a well-developed monitoring system that helps to localise the emissions over the supply chain and recognise new opportunities for optimisation (Zeng, Li and Zeng, 2022).

4.4.2.2 Towell Group: Reducing the Carbon Footprint of Construction Projects and Increasing Sustainable Practices in Services

Towel Group has focused more on addressing its carbon footprint, especially in its construction projects. Several have been implemented over the past decade, some of which are implementing green building practices such as using green materials, energy-efficient building designs and efficient waste disposal systems. It has also incorporated Building Information Modeling (BIM) technology in its projects, thus improving planning and limiting construction material wastage (Alrawahi *et al.,* 2023).

Thus, along with construction operations, Towell Group has implemented activities to improve sustainability in services. Some of the core challenges in this area include: the integration of methodologies in facility management that promote environmental stewardship, for instance the utilization of energy efficient lighting and heating, ventilation and air conditioning systems, promotion of green building certification. Towell Group promotes carbon neutrality and helps create value for its clients through these services provided (Muthalaly *et al.,* 2022).

4.4.2.3 Al Naba Group: Improving Energy Efficiency in Logistics and Reducing Emissions in Manufacturing

As a logistics and facilities management company, Al Naba Group's strategies/management plans involve identifying and achieving a more sustainable and environmentally friendly organisational energy consumption. In the operations area, the company has also made improvements in delivery routes to minimise fuel consumption and greenhouse emissions. Also, there is an emphasis on using hybrid and electric vehicles in Al Naba Group's fleet, which helps to minimise emissions (Bhagwat *et al*., 2023). Al Naba Group has adopted cost-effective power technologies and manufacturing techniques, including harnessing power from renewable energy sources and incorporating efficient power management systems. It has also pursued research and development to discover new products and technologies that minimise the emission of greenhouse gases. These initiatives align with the overall plan of trying to market the Al Naba Group as the premier logistics and manufacturing company in Oman that will embrace sustainable development practices in the design of its solutions (Dey, Yilmaz and Seok, 2022).

The figure below provides a comparative analysis of the strategies employed by the three companies:

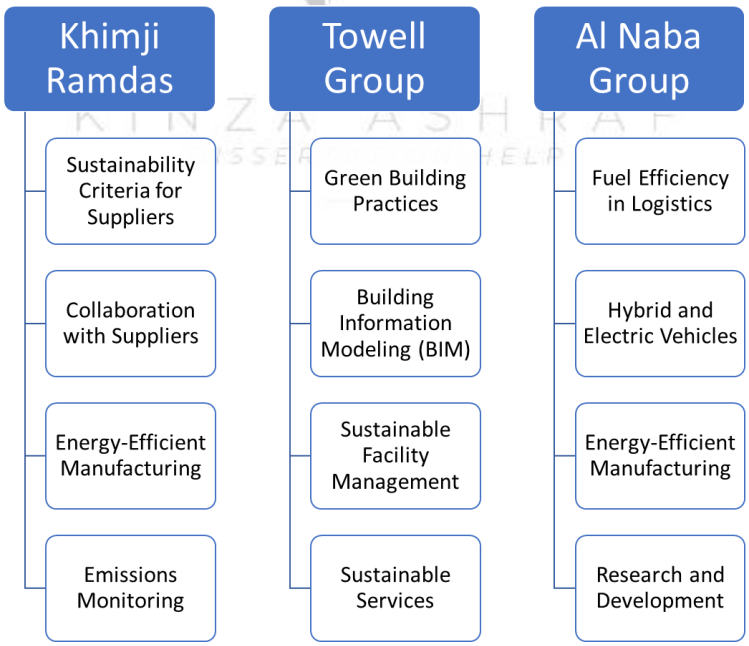

Figure 3. Comparative Analysis of Strategies Across Khimji Ramdas, Towell Group, and Al Naba Group

The above strategies are some of the strategic approaches that Khimji Ramdas, Towell Group, and Al Naba Group have adopted to undertake the challenge of carbon-neutrality and harness opportunities simultaneously. Through these strategic partnerships, investment in renewable energy, and employee sustainability, these companies are minimising their emissions and demonstrating potentiality for other companies in the Sultanate of Oman.

Out of the case analysis of Khimji Ramdas, the issues related to supply chain sustainability and emissions in manufacturing depict how sustainability has to be viewed in systemic processes where every link is made optimal for environmental returns. Towell Group's strategies of green building and sustainable service exhibit the opportunity that the construction industry has on reducing carbon emissions. On the other hand, Al Naba Group's focus on energy efficiency, logistics, and manufacturing shows that technology and innovation are critical enablers of the company's sustainability aims.

The broader and deeper these companies go into sustainability and efforts, they will find other ways of reducing their environmental impacts and enhancing their competitive edge. As a result, the insight gathered from their experiences can be a valuable asset to other enterprises in Oman and other parts of the world in bringing about carbon neutrality.

4.5 Summary of the Findings

4.5.1 Recap of Key Findings

This chapter has provided the main conclusions of the research conducted for Khimji Ramdas, Towell Group, and Al Naba Group regarding the threats and opportunities that can be found in transitioning towards a carbon-neutral organisation. The analysis has shown generic risks and opportunities among these companies. However, it is also clear that the strategies to manage risks and harness opportunities depend much on the industry, pointing to the fact that the strategies should be industry-specific.

Some of the issues pointed out by the study would apply to all three companies in their quest to achieve carbon neutrality. This is the biggest problem in the provided case; now is the time to examine it in greater detail. However, the global emphasis on decreasing carbon emissions and the Oman companies' management of carbon

neutrality remain in the relatively young regulation stage. Therefore, Companies have not been able to invest significantly in sustainability since there has been little pressure from outside the organisation. Besides that, there is still a barrier of financial restraints that the implementation and execution of strategies can have. Moving to carbon-neutral status means the capital expenditure for new technologies, improved infrastructures, and optimised processes, which could be costly for many companies, particularly those with small-profit margins (Zhang, Wang and Zheng, 2018).

Second, there is no technological infrastructure and expertise, as is the case in most organisations. For instance, incorporating new power sources, such as solar and wind energy, into the existing business settings requires the payment of large amounts of capital and particular expertise, which could be scarce within these companies. Specific to Khimji Ramdas are supply chain issues and the need to manage sectoral emissions. Towell Group has issues such as a high carbon footprint of construction activity and a lack of locally available technologies for green building designs. As a logistics and manufacturing company, Al Naba Group is likely to have negative impacts in the form of emissions from the transport fleets and energy consumption required to process goods (Quan *et al.,* 2020).

However, the study also revealed several opportunities that may help the private sector to shift to carbon neutrality. Among the most perceived opportunities across the three companies was government incentives. As for the regulations are yet fragile, but the Omani government has recently started to implement policies and practices that support sustainability; for example, the state started to offer tax incentives to companies investing in renewable energy and green technologies (Rehman Khan *et al.,* 2018).

Technological developments are, therefore, another significant opportunity. The knowledge of green technologies, ranging from the more efficient machinery to the advanced analytics to add value to logistics, helps companies reduce their environmental impacts. Also, increased consumer concerns about environmentally friendly products and services make it compulsory for companies to work toward sustainable practices, which have double effects on improving their efficiency, competitiveness, and image (Mariano *et al*., 2017).

For instance, Khimji Ramdas can look at opportunities for diversification and innovation in the trading and manufacturing business, where it can introduce environmentally friendly offerings with change management processes due to its vast market standing. Based on the trend of market demands and clientele, Towell Group is poised to accommodate the introduction of green building measures and environmentally friendly building materials. Al Naba Group, in its field of logistics and facilities management, should consider energy-efficient technologies and sustainability in logistics practices, which are more feasible and economical with technological upgrading (Wang, Yu, and Cao, 2021). This evidence indicates strategies that each has adopted in dealing with the challenges and exploiting the opportunities to achieve carbon neutrality. Some practices include partnerships, adopting renewable energy sources, and involving employees in sustainability. These strategies have helped counter organisations' regulatory and financial constraints and positively transformed the companies' technological profiles (Dey, Yilmaz and Seok, 2022).

For instance, Khimji Ramdas has set time to improve supply chain sustainability by changing supplier criteria to encourage sustainable practices and improving energy utilisation technologies. Sustainable services and green building practices are also practised at Towell Group, as the firm considers energy-efficient designs and building materials while undertaking construction projects. Al Naba Group is enhancing efficiency in logistics and manufacturing through efficient travel of vehicles used in the operations through best laid routes that incorporate hybrid and electric vehicles.

These strategies show that industry type is critical to strategy formulation and implementation (Bhagwat *et al.,* 2023). The relevance and success of these strategies depend on the characteristics of threats and opportunities in each company's environment, thus underlining the importance of company-specific strategies that reflect the context of the companies' operations and their sustainability objectives. In addition to that, innovation and technology are also critical for realising the vision of carbon neutrality. Fresh technologies for producing energy, manufacturing, and distributing goods and services are essential in combating emissions and optimising efficiency.

4.5.2 Implications for the Private Sector in Oman

This study has several theoretical implications for the private sector in Oman, as explained below. As a result, the study shows a need to develop a much more effective policy that supports the change towards carbon neutrality. Despite success stories seen in the case of Khimji Ramdas, Towell Group, and Al Naba Group, the weak force of sustainable regulation may slow the sustainable implementation nationwide among all the private companies. Omani policymakers should ensure the adoption of robust provisions and policies related to carbon neutrality regulation and incentives so that firms find it convenient to fund suitable measures (Wamuziri, 2024).

This particular work also focuses on the coordination role of the private sector, governments, and technology suppliers. Strategic partnerships have helped address some technological and financial barriers to achieving carbon neutrality. Intercompany cooperation can be practical as organisations can pool resources, knowledge, and technologies, making it cheap to undertake sustainable efforts (Chaichaloempreecha and Limmeechokchai, 2022).

In addition, it is concluded that the firms in Oman ought to concentrate on formulating industry-level 'Best Practices' that can capture the strengths and counter the threats pertinent to the incumbents in Oman. No broad-based strategy is critical since the private sector is a melting pot of different organisations. Instead, companies should evaluate their activities, think about the specific fields that make sense to introduce sustainable practices and create strategies that will fit the company's goals (Muthalaly *et al.,* 2022).

Last but not least, innovation and technology adoption should be prioritised to reach the carbon neutrality goal. As the case studies have shown, there is incredible potential associated with enhancements of technological processes that can lower emissions and enhance efficiency. Regarding cost, the first movers, or the firms that integrate these technologies in their production lines, will likely benefit from the low cost of the technology and the correlated market advantage (Charabi *et al.,* 2020).

4.5.3 Transition to the Next Chapter

Therefore, the paper offers insights into the public and private constraints, benefits, and approaches to carbon neutrality in Oman's private organisations. The next

chapter will present these findings in light of the existing literature and theoretical framework, extending knowledge and awareness regarding how these strategies may be implemented and disseminated in the private sector in Oman and other contexts. This discussion will also outline how these research findings and implications affect policymakers, industry elites and other stakeholders' implication and recommendations for future research and practice.

5. Discussion

5.1 Introduction

This chapter is devoted to discussing the significant implications arising from the study, which aimed to investigate the prospects and obstacles of the private sector in Oman to attain carbon neutrality. Therefore, the main aim of this chapter is to situate these findings within the existing literature for comparison and recommendation. Three core objectives drove the study: They are issues affecting the Omani private sector organisations as they struggle to go green, where these organisations can source for green credit, and how these challenges can be overcome with the help of available opportunities.

5.2 Discussion of Major Findings

This research revealed three overall findings that significantly enhance understanding of the path toward carbon neutrality among Oman's private companies. These are the general issues encountered by the companies under investigation, issues specific to particular companies, and issues that may become opportunities for the companies to attain carbon neutrality. The following sections present a breakdown of these findings in a step-by-step manner, highlighting the overall challenges faced by the companies and then the company-specific ones before concluding with the opportunities.

5.3 Challenges Faced by the Private Sector in Achieving Carbon Neutrality

The research showed that Khimji Ramdas, Towell Group, and Al Naba Group's operational environments differ significantly yet experience the same issues on the way to carbon neutrality. Most of these difficulties were founded on the problems of regulation, funding, and insufficient use of late technological support.

One of the most apparent regulatory issues legally limiting the three companies' dynamics and development was Oman's heavily restricted regulatory environment.

Even though the government seems to promote sustainability, the current regulations have not been effectively implemented to promote businesses' struggle towards achieving carbon neutrality. This aligns with other studies done worldwide, showing how institutional environments support or hamper sustainable practices. For example, in a particular area of activity, essential regulations may lack definitions or be insufficient or not specified; in this case, uncertainty is generated, which mainly inhibits the long-term planning needed to invest in sustainability measures. The consequences of these regulatory hurdles are critical, stressing the importance of developing better policy frameworks that encourage companies to reduce their carbon emissions and giving a roadmap to companies planning to attain net-zero emissions.

Another problem often reported in the study was the cost factor linked to the company's conversion to carbon neutrality. On the one hand, the high costs of installing sustainable practices and a shortage of green financing made it challenging for these companies to invest in carbon reduction technologies. This conclusion supports other studies highlighting financial constraints as the most prominent factor hindering international sustainability initiatives. The paper also points out the need for enhancing financial solutions, including affordable green funding and promotion programs, to help the private sector overcome these financial barriers and advance the milestone toward carbon neutrality.

The study identified that another factor hindering carbon neutrality is the absence of attributes related to high-end technology. The firms investigated encountered challenges in acquiring and implementing advanced technology solutions and supporting systems, including renewable energy solutions and efficient manufacturing systems. This challenge was particularly apparent in industries such as manufacturing and construction, where technological advancement is mandatory to decrease emissions. This is evidenced by the literature, as the management of organisations across the globe has noted that it presents challenges in implementing new technologies, especially in emerging technological environments. As this formulation suggests, the universal significance of technology regarding emissions and long-term environmental change cannot be ignored.

Besides the general problems, company-specific problems, such as the specifics of the operational environment for Khimji Ramdas, Towell Group, and Al Naba Group, were established. Khimji Ramdas said that due to the nature of the business spread across many sectors, supply chain emissions have proved to be a significant problem. The threat arose due to the company's connection with numerous suppliers and distributors, many of whom have factories located in areas with lenient emission regulations, making it hard to control the carbon footprint throughout the supply chain. This challenge fits with the evidence about multi-sector actors, particularly across value chains, where achieving consistent, coherent sustainability strategies is difficult due to the diversity of operations (Acquaye *et al.,* 2017). Given the differences in emission types across firms, the study establishes a need to take meaningful measures to ensure that corporate emission reduction goals are met.

As a construction and services sector company, Towell Group was experiencing major operational issues because of the high carbon impact on construction projects. It became challenging for Towell Group to decrease their carbon footprint because of the conventional techniques and materials used in construction and the still budding green building technologies in Oman. This aligns with research on the construction industry, which is recognised globally for emitting high carbon gases and relatively slow in embracing sustainable initiatives (Huang *et al.,* 2022). Some of the recommendations made during the study include calling for publicity of green building technologies and sensitising the contractors and clients to embrace green building technologies in the construction processes.

Industries of Al Naba Group deal with transportation emissions and energy needs as the significant part of the group is logistics and manufacturing. Several issues, such as the extreme logistics undertaken by the company, which has an extreme dependence on fossil fuels, were linked with the company's carbon footprint. More so, its manufacturing activities were energy-intensive, which created another problem in lowering the emissions. These problems correlate with the global issues in the companies of logistics and manufacturing industries concerning the use of alternative fuels and energy-saving technologies in order to minimise emissions (Quan *et al*., 2020; Zhang, Wang and Zheng, 2018). That is why the study defines

the role of funding in the formulation of such fuels, as well as energy-efficient technologies.

5.4 Opportunities for the Private Sector to Achieve Carbon Neutrality

Some of the possible strategic options for the company and other firms like Khimji Ramdas, Towell Group, and Al Naba Group to enhance the sustainability performance of Oman's private sector and the path to achieving carbon-neutrality have been outlined during this analysis of Oman's private sector and its prospects. These opportunities have been classified into general opportunities between the three firms and the Firm Specific opportunities by the operations of each firm.

Of these discovered opportunities, there was the growing potential of new governmental incentives towards sustainability adoption in the private sector. The Omani government has already implemented policies to reduce the emission of carbon and adopt technologies that are environment friendly. They are tax credits, financial subsidies for production of renewable energy, and research grants for the purposes of sustainability. For instance, as a result of its business growth strategy, Khimji Ramdas can leverage on incentives that are granted to manufacturers who integrate solar power systems in their operations. Similarly, Towell Group could also be eligible to tax incentive so long as it applies the green system integration in the projects that it undertakes (Ahmed, 2024). This also upheld the global trends because the governments stood in the middle of the effort that sought to make the corporations implement sustainable practices. Earlier researchers have found that reasonable policy provisions enable organisations engaged in sustainability activities without using their capital (Antari and Wulandari, 2019). The existence of such incentives was anticipated to reduce the above mentioned financial barriers are Oman as it became easier for firms to opt for carbon neutrality.

Technology was also mentioned as another key area of opportunity in efforts to achieve carbon-neutrality. It was established that the portfolio of innovative changes in renewables, efficient machinery, and smart technologies could be effective in reducing carbon effects in the three incumbent firms. For instance, Al Naba Group managed to harness the best out of its logistics activities through the IoTs as well as analytics which would aid in reduction of fuel as well as emissions. Similarly, Towell Group can embark on the construction industry innovation by embedding green

building technologies that can first illustrate the concepts of energy conservation and environmental sensitive material (Ahmed, 2024). This opportunity resonates with findings from various international studies which point towards technology as one of the key enabler of the sustainability change (Nguyen *et al.,* 2020). Advanced technology has helped surmount some hurdles to attaining carbon neutrality, especially in manufacturing and construction industries requiring high energy usage. The increased demand for carbon-neutral products was named as one of the driving forces for carbon neutrality arising from the increased market forces for sustainable products. Before, people cared less about products and services harming the environment, but that has changed, and there is a market pull toward environmentally friendly products. For Khimji Ramdas, the trend opened up a new opportunity to develop its product portfolio and move to the production and marketing of environmentally friendly products which would improve its competitive standing and attract clients concerned with the environment's safety (Ahmed, 2024). This was in line with the global trends where sustainability had taken a central stage in consumers' decision-making processes (Mariano *et al.,* 2017). Many businesses that achieved congruency with these preferences assisted in environmental causes and enhanced their competitive position.

The business was the trading and manufacturing setup of Khimji Ramdas, a diversified business conglomerate that had freedom in fashioning its operations as no other business could have. This means that the company can invest in the promotion of environmentally friendly packaging, organic foods and environmentally friendly raw materials for manufacturing. With this approach, the Khimji Ramdas could be well on its way to becoming the sustainability benchmark for Oman’s private sector; and could appeal to domestic and international markets; (Antari and Wulandari 2019). Furthermore, the company was also able to implement other forms of efficient supply chain automation solutions inclusive of the blockchain and artificial intelligence-based analytical tools. They could enhance the amount of transparency in the supply chain system as well as its efficiency and minimize emissions and costs (Nguyen *et al*., 2020). Therefore, utilizing these opportunities, the company would be able to manage problems related to the carbon neutrality program and shift to the market conditions.

This broad experience in construction made it possible for Towell Group to undertake core commitments of early leadership in green building. As for other sustainable materials, the use of low-carbon concrete would reduce the emission of greenhouse gases in the projects. Moreover, there is a likelihood of indulging in green concept for construction like using modular construction and incorporating renewable energy in the construction area. These practices assist in reducing the emission while addressing clients, who needs an environmental-friendly construction system (Huang *et al.,* 2022). Thirdly, Towell Group could enhance the prospects of the projects by getting them accredited for instance LEED or BREEAM certification. Obtaining these certifications would not only adhere to global sustainability standards but also help Towell Group woo international investors, thus putting it a step ahead in the construction industry (Wang, Yu and Cao, 2021).

The industry of Al Naba Group involved logistics and facility management and was quite differentiated in terms of the prospects to enhance sustainability initiatives. The firm can install efficient power lighting and air-conditioning systems in its buildings to cut down on power usage. Further, using electric or hybrid vehicles in logistics activities can significantly reduce fuel consumption and greenhouse gas emissions (Rehman Khan *et al.*, 2018). Another aspect where Al Naba Group could be the global leader in sustainable logistics was by determining efficient delivery routes, inventory management through replenishment of stock only when necessary and utilisation of environmentally friendly packaging materials. Such practices helped achieve the carbon neutrality of the company's activities and satisfied the client's need for environmentally friendly logistics services (Mariano *et al.,* 2017).

5.5 Strategies for Addressing Challenges and Capitalising on Opportunities

Another green supply chain management that was used for example by Khimji Ramdas, Towell Group and Al Naba Group was the partnership approach to sourcing and installing technology. These include engaging technology companies, universities, research institutions and government to integrate other green technologies like renewable energy. It was an important function in reducing the national and international technological barriers and offering the right know how to the companies in maintaining the sustainable management practices (Harthi, 2024). For instance, Towell Group had worked closely with one of the largest renewable

energy companies to ensure construction sites were fitted with appropriate solar systems significantly cutting the use of fossils. Likewise, Al Naba Group worked with a logistics technology company to provide and implement efficient transportation technologies, which helped to reduce fuel consumption and emissions. These partnerships exhibited how cooperation leads to the realisation of sustainable development objectives, a phenomenon witnessed in cross-national strategic partnerships in sustainability (Harthi, 2024).

Exploring new renewable power sources appeared to be one of these corporations' major focal growth strategies. For example, Khimji Ramdas invested in solar energy projects to meet the electricity needs of its production facilities, thus promoting its carbonless strategy and mitigating volatile energy prices. By doing this, not only was it relevant to save the company's costs in the long run, but it also allowed it to brand itself as a champion in sustainable manufacturing initiatives (Harthi, 2024). Towel Group and Al Naba Group also invested in renewable energy; Towel integrated this energy into construction materials. This brought about changes in the design of new structures to incorporate efficiency for sustainable use of energy and energy conservation. On the other hand, Al Naba Group targeted hybrid and electric car investments to tackle the emission issue in logistic services. These investments also matched the successful global case studies wherein adopting renewable energy contributed to the carbon footprint (Harthi, 2024).

Another worthy approach was the inclusion of the employees in sustainability practices. Many businesses, such as Khimji Ramdas, Towell Group, and Al Naba Group, identified the need and the need to establish a culture of sustainable development in their organisations. Many began implementing several programs to engage employees in the conservatioń of the environment, including training sessions, workshops and incentive programs (Harthi, 2024). For instance, the Khimji Ramdas group launched an effort to save energy and minimise wastage with its workers: it formed a Green Team responsible for identifying projects to support sustainability improvement. Towell Group and Al Naba Group implemented similar measures. At the same time, Towell introduced sustainability awards for ideas, and Al Naba Group regularly provided training on energy efficiency. Such measures exemplified the central role of employees in lean manufacturing as a process of

corporate sustainability that was embraced by the firms involved, as the Organization Culture for Sustainability concept of Harthi (2024) has shown.

Khimji Ramdas examined ways to increase the operations supply chain's sustainability and decrease manufacturing emissions. Sustainability measures for self and suppliers covered the responsible procurement of inputs and suppliers' compliance to set standards stringently. Some of them included enhancing the supply chain's energy usage efficiency and minimising wastage from suppliers, which ultimately decreased the overall carbon emission levels (Raman, Mahmud, and Shaharudin, 2023)—further, the company known as Khimji Ramdas implemented new manufacturing technologies to minimise emissions and energy utilisation. The purchase of efficient equipment and improvement in production processes have been useful in reducing waste and emissions. The company also installed a monitoring plan to measure emissions across the entire value stream, enabling further enhancement (Zeng, Li, and Zeng, 2022).

Within their construction projects, Towell Group focused on minimising carbon emissions and promoting sustainable practices in their service delivery. Some of them are: The company incorporated eco-friendly features such as using environmentally friendly building materials for construction, energy-saving features in the building designs, and a way to manage waste. Adopting information communication technology, such as Building Information Modeling (BIM), was said to have improved outcomes by increasing efficiency and productivity and diminishing material liberalities on construction projects (Alrawahi *et al.*, 2023). Towell Group implemented sustainable aspects for its facilities management services, including efficient lighting, heating, and ventilation. They also tried to get carbon neutrality figures by advertising some buildings' sustainability certifications that created value for clients by helping them discharge their sustainability objectives (Muthalaly *et al*., 2022).

Through its logistic and manufacturing activities, Al Naba Group developed measures to increase energy use efficiency and minimise emission outputs. It was easier to control the routes of deliveries hence less fuel was used and there were minimal emissions made. Besides, it adopted a new source of power in the form of a hybrid and electric powered vehicles, which the company uses to this day, thus

reducing emissions (Bhagwat *et al.,* 2023). Energy users and conservation in manufacturing energy management incorporated energy-efficient technologies and systems such as renewable energy in the Al Naba Group. Such initiatives were backed up by investigations for research and development that was looking for novel materials as well as processes which can cause reduction of emissions. This strategic focus made Al Naba Group a pathway in the sustainable logistics manufacturing for Oman based firms (Dey, Yilmaz, and Seok, 2022).

These strategies demonstrated some approaches which disclosed different action plans indicating how the companies fully implementing the efforts in combating the challenges and embracing opportunities or the quest for achieving the ultimate goal of acquiring the required carbon neutrality for the respective organisations. These strategies explained the measures that the Khimji Ramdas, Towell Group, and Al Naba Group have taken to counter the difficulties and take advantage of opportunities to achieve their organisations' carbon neutrality status. Through strategic partnerships, investments in renewable energy, and employee engagement, these organisations minimised their negative footprint and facilitated the creation of benchmarks for other establishments in Oman.

5.6 Recommendations

5.6.1 Recommendations for Researchers

The result of this study pointed out several directions for further research that the current study is intended to contribute. Firstly, one of the significant restrictions affecting the pursuit of carbon neutrality was investigated more in terms of its regulatory aspects than in the financial means for overcoming these restrictions. Subsequent research could encompass the ability to design and compare various financial instruments, including green bonds or carbon credits, that can help ease the financial burdens most companies experience in Oman's private sector (Prabhu, 2022). Further, technology has become one of the significant opportunities for meeting the carbon-neutral target. However, the existence and deployment of these technologies were uneven across sectors. Oman's current and future technologies in manufacturing should also be investigated, as well as the factors affecting the implementation of these technologies, such as renewable energy systems and energy-efficient systems or processes. Last, since the study provides some

implications of the regulatory obstacles in literature, it is required to investigate the efficiency of existing regulations and advance reforms that would encourage corporations' appreciation of sustainability (Sartzetakis, 2021).

5.6.2 Recommendations for Key Stakeholders

The results indicated that the government had an essential involvement with companies in promoting or enabling them to achieve carbon neutrality. As a result, it was suggested that the policymakers in Oman should consider changing the current legal requirements to offer better guidance and greater motivation for the companies. This may range from providing incentives such as tax credits to firms that adopt environmentally friendly measures, raising subsidies for the renewable energy sector and enhancing green funding solutions for everyone. Also, the government may participate in the co-development of and promote sustainable technologies (Prabhu, 2022).

Based on the study's findings, firms were encouraged to be more active in dealing with the challenges. Regarding the second and how it could be achieved, this might entail entering into affiliations with technology vendors and research centres to acquire and apply green technologies. Companies should also embrace the use of green energy and technologies in terms of energy usage in production to reduce their energy consumption and increase their overall productivity in the long run. Other organisations that benefit from employing their people in sustainability strategies include Khimji Ramdas, Towell Group, and Al Naba Group (Sartzetakis, 2021).

As indicated in the research, the investors were reminded that market demand for sustainable products and services is rising. If investors channelled funds to such entities, they would promote sustainability initiatives while earning sustainable income in the long run. In the 2024 outlook, it is stated that expenditures in green technologies and renewable energy projects could have significant returns, both in the context of decreasing emissions and increasing the competitiveness of the companies (Bmo.com, 2024).

6. Conclusion

6.1 Introduction

The thesis of this research was based on understanding the private sector, and more specifically, the piece titled 'Analysis of the Role of the Private Sector in Achieving Carbon Neutrality in Oman.' This study was informed by the following research questions: What challenges exist for Oman's private sector firms in managing carbon neutrality? What opportunities are available to these private sector firms to achieve carbon neutrality? What strategies do these Oman's private sector firms need to adopt in managing carbon neutrality? In light of the concerns of sustainability at the international level and the urgency required in combating climate change, the issue of a reduced carbon footprint by the private sector is significant. This research aimed to fulfil this objective by focusing on Oman, given that it is a different economy with a different set of economic, regulatory and environmental conditions.

6.2 Brief Thesis Summary

The primary objectives of this study were threefold: The first research question seeks to know the challenges faced by the Oman private sector firms in striving for carbon neutrality; the second research question aims to assess the available opportunities for the Oman private sector firms to achieve the goal of carbon neutrality; and the third research question focuses on the strategies that would help the Oman private sector firms in overcoming these challenges and nurturing the available opportunities. The study was based on three large-scale Omani firms: Khimji Ramdas, Towell Group, and Al Naba Group, which covered the manufacturing, construction, and logistic sectors. In this context, the study focused on analysing these companies to reveal the general and individual issues that can be considered a barrier to companies' transition to carbon neutrality and potential strategies and opportunities that may be useful to overcome these barriers.

6.3 Key Findings and Conclusions

The study established that the problems affecting the private sector in Oman are complex and intertwined, including regulatory issues and financial and technological constraints. One of the main regulatory issues we discovered was the highly restrictive and sometimes vague regulatory framework in Oman; even though the country's government has publicly pledged its support towards sustainability, it still does not offer adequate backing to corporations' quest for carbon neutrality. These regulatory challenges have led to new uncertainties which hinder sustainable

planning and investment in sustainable development measures. Other challenges unique to this category of companies were also realised, the most prominent being financial constraints, with the high cost of sustainable initiatives and lack of access to green funding evident. These financial constraints limit the amount of funding companies could put into researching advanced technologies and practices that would enable them to minimise their negative environmental impact. Also, poor technological development was deemed a significant impediment, more so for industries such as manufacturing and construction, which require tight technological features for the emissions bottom line (Said Al-Rasbi, 2023).

Nevertheless, the study reveals several prospects that Omani companies can build on in their strive to improve carbon neutrality. The main prospect is the growing activation of the authorities offering stimuli to make companies more environmentally friendly. These incentives, including tax credits and subsidies to developers of renewable energy projects, can go along way in helping to offset the costs associated with carbon reduction with the overall aim of achieving an optimum reduction in costs associated with carbon reduction. Another major factor is again the technological developments that have great potential. Renewable energy technologies, energy-efficient machinery, and digital technologies are some of the antecedents that can assist companies in lowering their carbon footprint. This is another area under which companies can realign their products to meet market demands and increase their competitive advantage to help meet environmental objectives, as Ahmed (2024) observes.

The study recommended that Omani companies may use to overcome these challenges: Mergers and acquisitions and strategic outsourcing surfaced as the most effective methods ensuring that companies establish partnerships with technology suppliers, research organisations and government agencies to obtain and adopt environmentally friendly technologies. The other strategic priority was developing and adopting renewable energy sources with companies such as Khimji Ramdas investing heavily in solar power for their manufacturing needs. Another strategy emphasised was the involvement of employees in the sustainability activities that will be implemented within an organisation; this creates sustainability consciousness, culminating in achieving carbon neutrality (Harthi, 2024).

6.4 Limitations

However, the limitations of this study must be highlighted. The study has some weaknesses, as follows. About the weaknesses, one of the most significant challenges was data collection. In the present research, three firms were selected for investigation; however, these may not be an accurate cross-sectional representation of the Oman Private Sector, limiting the scope of generalizability of the findings. In addition, only Oman was chosen as the area of focus, which could make it challenging to apply these conclusions outside of Oman when other countries may have different regulatory systems and economic and environmental conditions. It is also revealed that there are some methodological limitations in the issue of using only qualitative data as, though detailed, it can bear a lower level of generalizability compared with the quantitative data. In addition, the study did not use longitudinal data as this would have provided a much richer insight into how companies establish policies regarding reaching the state of carbon neutrality ('OUP accepted manuscript', 2017).

6.5 Suggestions for Future Research

Given the results and weaknesses of this research, recommendations are made to guide future research endeavours. First, more empirical and theoretical studies are required to refine policies and financial instruments to encourage the private sector towards carbon neutrality. This could involve focusing on traditionally untapped financial products, such as green bonds, and legislation that lays out better rules and higher incentives for minimising CO_2 emissions in organisations. Second, subsequent research must address the advancement and implementation of new technologies, especially in production processes, which are vital in fighting emissions. Further research could also explore the strategies within the sectors since it is apparent that each Oman private sector can adopt strategies that suit its operations in achieving sustainability. Last of all, longitudinal studies should be used to analyse the changes in the companies' development and dynamics of strategies and problems as the firms are on the way to realise the goal of carbon neutrality (Sartzetakis, 2021).

6.6 Final Remarks

Therefore, the role of the private sector in attaining carbon neutrality in Oman has been emphatically highlighted in this research. These results shed light on various potential problematic and promising aspects of the process that organisations experience on their way to sustainability. The following are the strategies suggested by the study to help Omani firms remove the barriers discussed above and leverage the opportunities highlighted to foster Oman's environmental goals in general. Even as Oman and the rest of the world struggle to find ways of coping with climate change, the findings of this study are valuable and relevant in informing future research endeavours in corporate sustainability. The conclusions drawn from this study have a bearing on all the forge decision makers, policy makers, companies, and researchers who have a part to play in ensuring that the private sector is helpful in achieving the noble goal of carbon neutrality in this world.

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