Accounting and Corporate Management (2025)
Clausius Scientific Press, Canada

DOI: 10.23977/acccm.2025.070207
ISSN 2523-5788 Vol. 7 Num. 2

Navigating Future Challenges: A Qualitative Analysis of Business Sustainability and Innovation Strategies—A Case Study of Origin Energy

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Keywords: Business Sustainability, Climate Change, Vulnerability Reduction

Abstract: By the methodology of qualitative analysis, the report examines the strategies for business sustainability and innovation in response to potential in the future changes and impacts. It explores the types of changes companies should prepare for, emphasizing demographic shifts, technological advancements, cybercrime threats, climate change, and geopolitical instability. These changes are expected to among l threats all business operations and, result in profitability. Therefore, for concepts of mitigation, adaptation, and resilience are introduced hence the context of sustainability, highlighting their roles in addressing vulnerabilities. Meanwhile, the report focuses on a case study of Origin Energy, a leading Australian energy company, analyzing challenges businesses are faced with, including demographic changes, climate change, and technology advancements. Examining the company's efforts to mitigate energy sector-specific risks, capitalize on opportunities, and address areas of vulnerability. Finally, they are critically discussed implications for competitive advantage, emphasizing the of integrating sustainability, technological innovation, and government collaboration into long-term strategic planning to provide valuable insights for businesses navigating complex and dynamic environments.

1. Business Risk Management and Resilience Building in an Era of Global Change

In an era of unprecedented global change, businesses are increasingly confronted with a range of complex risks that threaten their sustainability and long-term growth and hence they are required to adopt forward-thinking strategies. Rapid advancements in technology, demographic transitions such as aging populations and urbanization, climate change, and geopolitical instability create a challenging operating environment for organizations worldwide. These forces could not only disrupt existing business models but also amplify vulnerabilities in sectors that rely on resource-intensive operations or are highly regulated, such as the energy industry due to its strong reliance on natural resources, susceptibility to extreme weather, and pressures to decarbonize.

Therefore, reducing vulnerability and building resilience are critical to ensuring business sustainability in this evolving landscape. Companies must proactively evaluate and anticipate risks, adapt their strategies, and invest in innovative solutions to safeguard their operations and maintain

competitive advantage.

2. Preparing for Future Changes and Impacts

The earth is rapidly changing at an unprecedented pace, posing threats to the firm's survival and business success. The following changes are expected to be encountered.

3. Society which means

Nowadays, countries such as Canada, China, and Italy are experiencing an aging population, meaning the proportion elderly in individuals within the total population is continuously increasing. This will lead to a shortage of young and talented labor to input creative ideas for the business. In such case, the older employees may be asked retain the workforce to fulfill the placement, requiring in increasing fill investments in training to help them gain new skills. Let alone as investments on additional accessibility and safety measures, especially in factories (Sciubba, 2022)[5]. Moreover, since different age groups have different consumption preferences and behaviors, the aging population means an instable customer base with ranging customer demands for products and services. Urbanization and an increasing transition out of poverty bring both opportunities and challenges for businesses. On one hand, consumer demand for goods and services can be substantially increased as urban areas expand, driving business growth; one the other hand, this rising demand, coupled with limited resources, can cause in supply chain issues and intensify competition for essential materials and energy.

4. Technology advancement

According to Figure 1, critical events as low emissions. The state-of-the-art technologies such as AI, cloud computing, and all kinds of SaaS applications have been widely applied to the business development and expansion. These technologies can the company growth (Santhosh, 2018)[6]; for example, by advanced big data analytics, companies can gain insights into market dynamics and consumer behavior, benefiting the management to make data-driven business decisions. Moreover, technological applications enhance employees' working productivity and efficiency, and facilitate new business models, such as remote work. However, it also requires the company to make a continuous investment to pace with the technology iteration.

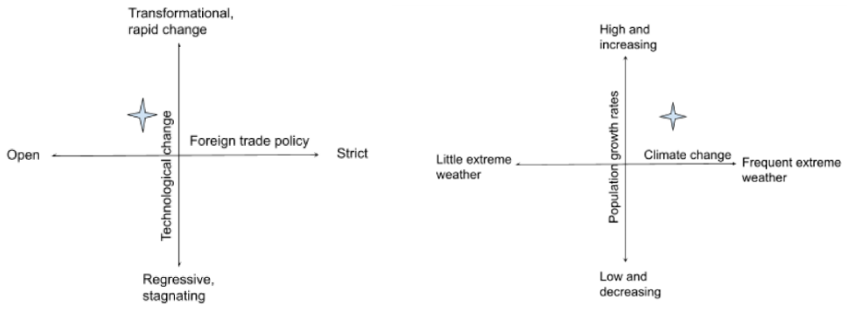

Figure 1: Critical events as low emission.

5. Cyber crime

With the progress of digitalization within the business, companies are increasingly required to tackle challenges raised by cybercrime. Cybercrime can cause severe financial losses and damage a company's reputation within the industry (Sushmith, 2023)[7]. For example, contemporary business

has collected loads of user data, about personal information and behavior. If these data are not by the business secured, they are subject to hackers attacks and data breaches, leading to penalties and fines faced by companies. Besides phishing scams can also lead to direct financial losses if, for instance, a single one employee clicks the scam link, enabling the scammer the access to the internal network.

6. Climate change

Climate change/natural resource depletion has a far-reaching impact on business from perspectives, use of utility disruption, decarbonization efforts, and adaptive compliance. Firstly, increasing temperatures and extreme weather requires more energy consumption for cooling infrastructure and may disrupt utility services causing to higher operational costs and potential supply chain issues for companies. Secondly, businesses are expected to adapt their operations for decarbonization, through for example investing on renewable energy and reducing greenhouse gas emissions based on UN SDGs framework and national sustainability goals. Subsequently, market-based instruments such as carbon pricing and carbon tax further facilitate companies adjusting their operations in response to the adaptive regulation

7. Geopolitical instability

The increasing trend of protectionism and the volatile political situation in leading countries bring about geopolitical instability, especially for businesses playing in the global market. Political conflicts and sanctions can lead to an increasing tariff and a delayed lead time of goods, impacting on the operational costs and thus the profitability as well as the reputation. Furthermore, possible in regulations and policy resulting from geopolitical tensions require multinational companies to adapt to new rules for regulatory compliance in a timely manner in order not to impact their daily operations.

8. Mitigation, Adaptation, and Resilience: Distinct but Interconnected Roles

Concepts of mitigation, adaptation, and resilience are discussed under the context of sustainability, and they have distinct roles in responding to impacts climate change. Mitigation is the action that firms take to reduce greenhouse gas emissions and other causes of climate change, aiming to down progression of climate progress so that can occur not that frequently extreme weather events. For example, through improving energy efficiency, companies can subsequently optimize resources and save operational costs via transition to renewable energy and to recyclable raw materials in production, companies can also reduce carbon footprints, aligning with the sustainable related regulations, and enhancing market recognition. At a national level, both market-based instruments (e.g., carbon pricing, carbon taxes, and emissions trading) and non-market-based instruments (e.g., command and control regulations, reporting) have been raised restrain and the carbon dioxide emissions of organizations.

Adaptation is a gradual process of adjustment undertaken by companies by over time to modify the coping range with the results brought by the climate change, and to minimize potential damage to the operations. Adaptation may also involve taking advantage of benefits resulting from climate change (IPCC, 2018)[3]. For example, agricultural companies can seek solutions to diversify crops in farming and food production to make them more adaptive to the warmer climates. Besides, infrastructure should be strengthened. For example, flood defenses, to protect against climate-related damage. In all, companies should take climate change impact into account while making long-term strategic planning, with the purpose of increasing the ability to respond to potential challenges caused by climate change may pose.

Resilience refers to the ability of organizations to cope with and quickly recovery from situations

that create vulnerability, which is climate impacts under this context. Different from adaptation, highlighting adjustment to effects of climate change, resilience puts an emphasis on the preparation. As well as, the capacity of bounce back, climate-related damages, i.e, with combining impact resistance and rapidity at the same time For example, the organization demonstrates resilience to climate change through developing early warning systems to monitor and predict the weather events (IPCC, 2018)[3] and designing contingency plans to ensure the smooth operation of business if is about to happen occurs.

9. Company Profile and Analysis of Sector Vulnerability

In this case study, Origin Energy, a leading company in the energy sector, has been selected. Origin Energy operates across multiple segments, including electricity generation, natural gas extraction, and retail energy services. This case study will analyze how Origin Energy addresses the challenges associated with the vulnerabilities of the energy sector.

10. Introduction of Origin Energy

By exploring, producing, generating, and retailing power to households, Origin Energy is a dominant energy supplier in Australia, with portfolios covering the entire energy value chain. Specifically, Origin Energy supplies electricity, natural gas, LPG, and solar energy to meet customer demands. For the full fiscal year ending 30 June 2024, Origin reported a statutory profit of $1,397 million, an increase from $1,055 million in the previous fiscal year (Origin Energy website, 2024)[4].

11. Vulnerabilities of the Energy Sector

a) Demographic changes

The progress of urbanization leads to an increasing energy consumption in cities due to growing residential and commercial activities. Under circumstance, energy companies should adjust their infrastructure and supply chains, and optimize resources to meet the ever-changing demand in urban areas. Besides, the aging population may result in the skilled worker lead to a shortage, in the energy sector, especially in technical and engineering positions, which requires companies to invest on employee training programs and also workforce strategies to retain talents

b) Climate change

The energy sector is particularly vulnerable to climate impacts. To begin with, order to the generation and transmission to households. Energy companies invest loads of money on infrastructure. However, these infrastructures are subject to impact of extreme weather events (e.g., hurricanes, floods) as well as rising temperatures. The impacts cause critical damage to infrastructure, including power plants, pipelines, and transmission lines, let alone possible supply chain disruptions of necessary materials used in the energy production, while the latter affects energy production and transmission efficiency and may result in an increasing operation cost during extreme heat and drought periods.

Moreover, companies in the energy sector are struggling to align with shifting government’s regulations and policies. For instance, companies are required to invest on new technologies to replace the use of non-renewable energy and reduce the emissions of greenhouse gas due to stricter regulations. Meanwhile, the government's introduction of carbon pricing mechanisms, including carbon taxes and cap-and-trade systems, necessitates a different operational strategy and increases costs for energy suppliers.

c) Technology advancement

Technological advancements create both opportunities and challenges in almost every sector,

including the energy sector. Speaking of vulnerability, in order to keep pace with technology. In digital and automation systems and remaining their market positions, energy suppliers have to integrate new technologies with their solutions to upgrade and maintain infrastructure. For example, AI can facilitate the application of smart grids, which are electricity supply networks that use digital communications technology to detect and react to changes in energy usage (FDM insights, 2024)[2]. Through analyzing historical and real-time usage data to predict consumption, AI helps energy suppliers optimize resource allocation and energy distribution. Subsequently energy companies are also faced with challenges related to recruiting and retaining technology related talents and modifying organization structure to integrate the technology with companies' long-term strategies.

12. Company Actions on Risk Mitigation and Remaining Vulnerabilities

Origin Energy has taken effective measures to mitigate sectorial risks and develop opportunities, and analysis is conducted from the perspectives of actions in response to demographic changes, climate change, and technological advancements.

a) Demographic changes

In terms of vulnerability about skilled talent shortage resulted from demographic changes, Origin supports their employees through the transition to net-zero emissions by providing career planning, and upskilling programs, and redeployment opportunities for those roles that have been replaced or affected by the transition. The strategy can retain existing talents and provide them with the necessary training to ensure their adaptation to the company's strategy shift. Besides, by creating a workplace where all employees are included, respected, and safe at work. Origin has a low chance of being challenged by talent shortage issues. Apart from support for existing employees, Origin actively attracts potential candidates and builds the company reputation via donating $3.8 million and contributing 8,700 hours to support community partners, including higher education organizations. By the end of FY2024, the company reached 7,600 students with STEM majors in regional and remote areas (Origin Energy website, 2024)[4]. This measure also eliminates the possibility of a skilled talent shortage in the future.

However, Origin Energy is struggling with vulnerability due to the unstable electricity demand in urban areas, a challenge brought on by another demographic trend—urbanization. Given that urbanization increases the energy demand, while creating periods of unreliable supply are encountered origin issues in these demands. To address potential supply shortfalls, the company might need to boost its electricity generation output, possibly leading to a higher emission. This case is particularly pronounced in rapidly growing urban areas, where the strain on existing infrastructure and the need for additional energy can aggravate on the environment impacts.

b) Climate change

With a long-term goal of reaching net-zero Scope 1, 2, and 3 emissions across the energy value chain by 2025, Origin is working actively to decarbonize the business also acknowledging that the path to achieving the target is not linear. Origin company has set 3 decarbonization priorities: reduce emissions from existing operations, invest and grow its portfolio of renewables and cleaner energy, and enable customers to decarbonize. By far, Origin has finalized the investment decision and started the construction of a battery storage for a better solution within Australia. Additionally, Origin company acquired three renewable development properties, including wind farm and battery development projects, to devoting efforts to renewable energy solutions. Furthermore, Origin completed a Front-End Engineering Design for hydrogen energy, rendering them be led to the company being awarded the funding of $70 million from the Australian Government also be selected for the government's Hydrogen Headstart Program (Origin Energy website, 2024)[4]. These measures not only help reduce the greenhouse gas emissions and align with the Paris Agreement goals, but also

encourage innovation and seize on opportunities to ensure a leading position in emerging technologies of battery storage and hydrogen. As a result, based on Origin's 2024 Sustainability Report, issued by Origin total Scope 1, 2, and 3 emissions realized a decline by 10% from FY23, attributed by lower gas sales.

However, Origin remains vulnerable to challenges in infrastructure operation and maintenance. For example, groundwater is brought to the surface for the gas extraction at LNG's upstream operations, while 85~90% of this water can be processed and then applied to use of crop irrigation, livestock drinking water, and injection into aquifers. In the end of 2023, a mistaken of the untreated water release process occurred due to a failed pipe and resulting in 0.4 megaliters of untreated water entered a dam and wooded area (Origin Energy website, 2024)[4]. Fortunately, the incident did not cause any environmental harm after investigation, and Origin received a Penalty Infringement Notice from the government. The case implicated that this Origin should take more effective measures in reviewing each section of the water processing procedure, when there is an usage of water due to a rising temperature. In addition, as mentioned by Origin's Climate Transition Action Plan (2024)[1], the company is still challenged by an inability to obtain infrastructure and land, including the development of transmission and distribution networks, possibly impeding the advancement of certain renewable and cleaner energy projects.

c) Technology advancement

According to Origin's Climate Transition Action Plan (2024)[1], another of the path business sustainability is the lagging adoption of the latest technologies due to a tight timeline or a weak cost-effectiveness. These technologies incorporate batteries, virtual power plants (VPP), and green hydrogen at commercially viable scales. At the same time, competitors, including new market entrants, may develop more advanced technologies to better meet market demands than Origin.

13. Implications for Competitive Advantage: A Critical Discussion

For the vulnerable sector to the climate change, particularly the energy sector, spending efforts on reducing carbon dioxide emissions not only to mitigate the climate change impacts with global goals (e.g., UN SDGs) and regulatory requirements but also have political implications, which means such these actions can help attract environmentally conscious stakeholders and maintain a leading market position.

Secondly, even leading players such as Origin Energy are concerned about the technological innovations imitated by competitors that may potentially make the company fall behind. This implies that integrating the latest technology into a better consumer solution is a key differentiator in the competitive landscape. Therefore, it remains crucial to invest in technology research and development while also identifying unmet customer demands in real-time to understand the market, with the purpose of staying ahead of dynamics.

Lastly, collaboration with the government is essential for energy companies, as the energy sector is one of key sectors substantially impacting residents well-being, and the government invests a lot on renewable energy development and innovation. Cooperation with the government can attain financial support and tax incentives for projects, to improve profitability while also securing a strong market reputation and maintaining a leadership position in the market as exemplified by Origin's engagement in the Hydrogen Headstart Program.

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