University of Pretoria

RESEARCH REPORT

Innovation for Survivability, Resilience, and Competitive Advantage During a Crisis: The Case of Cross-Country Transport Ltd in a Covid-19 Pandemic.

by

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Abstract

Commercial road transport, both passenger and freight, has been hit hard by COVID-19 due to transport restrictions imposed to contain the pandemic and the general economic downturn. While COVID-19 has shown unfathomable challenges to organizations, the pandemic has enabled numerous organizations to unleash their ability to innovate in the middle of a crisis and cleared the way to become resilient further into the future. This research focused on the strategic innovation phenomena where innovation plays a critical role in helping organizations to be sustainable during times of crisis. The study explains this through analysis and insights from the Nigerian Road Transportation Sector, taking the case of Cross-Country Transport Ltd. The research explored the impact of the covid-19 crisis on the business operations of the case organization, the results and analysis showed that the pandemic had a significant economic impact on the company's business operations. In addition to the adoption of a cost-cutting strategy as a measure to avoid insolvency, the company's adherence to the lockdown and health measures as a response to the pandemic was viewed as a positive retort. Also, it was found that the case study company did not come up with any innovative strategies during the lockdown, however, post-lockdown saw a move towards online boarding instead of the traditional way of boarding. Based on the results, the company did not see an adjustment to its business model during the lockdown and post-lockdown, showing a lack of flexibility, and an innovative ecosystem within the organization. Although the 4IR digital technologies are evolving, they gave a competitive advantage to organizations that incorporated them during the lockdown. The objective was to test the preparedness strategy of the case study organization for the future adoption of these emerging technologies. The results showed that most staff had low knowledge of industry 4.0 technologies with disruption capacity in the sector of the company's operations. Although the company is looking into developing policies that will help support its preparedness strategy towards the adoption of Industry 4.0 technologies. This research also proposed a conceptual model that identifies the strategic innovation framework for crisis anticipation such as the recent COVID-19 pandemic. The model can support organizations to become resilient, competitive, and innovative during crisis response. Since the transportation industry is prone to crisis, the need to adopt a strategic response in anticipation of a crisis that impacts business organizations becomes imperative. Although there were limitations encountered during the study, recommendations for future studies were outlined.

Keywords: Innovation Strategy, COVID-19 Crisis, Road Transportation & Logistics, Competitive Advantage, Industry 4.0, Organizational Resilience

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Daniel Otuokwu, 2023

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List of Acronyms/Definitions/Abbreviations

TSI_f	The Freight Transportation Services Index
SARS	Severe Acute Respiratory Syndrome
GDP	Gross Domestic Product
IRU	International Road Transport Union
EU	European Union
NURTW	National Union of Road Transport Workers
4IR	Fourth Industrial Revolution
AVLS	Automated Vehicle Location System
GIS	Geographic Information Systems
WSN	Wireless Sensor Network
AGV	Automatic Guided Vehicle
ITS	Intelligent Transportation System
MoT	Ministry of Transport
NBS	Nigeria Bureau of Statistics
NYSC	National Youth Service Corp

1. Background to the Research Study

The 20th and 21st centuries of world commerce history were inundated by numerous crises and events that impelled innovations (Amankwah-Amoah, 2021), parts of which included the global economic recession of 2008/2009, which saw a hike in fares (Hausman and Johnston, 2014), the Middle East war and related security issues, the terrorist attacks of September 11, the SARS plague to mention but a few. Amid the first quarter of 2020, the coronavirus (COVID-19) pandemic entered borders, with tremendous social and economic effects on the developed and developing countries of the world (Amankwah-Amoah, 2021). The coronavirus pandemic effect can be explained by more than 173,286,047 cases and more than 3.7 million deaths, affecting all regions and countries around the world (Gisselquist and Vaccaro, 2021).

As a result of the pandemic, lockdown measures were initiated by governments around the world, which affected many sectors, especially the road transport sector of both passenger and logistics, bringing about a general economic meltdown (Wei et al., 2021). The International Road Transport Union (IRU), which has a membership base of over 3.5 million road transport companies spread across the various continents, estimates that many road transport companies are bearing severe financial losses, hence the situation threatens the future of these companies, and the economies they serve (IRU, 2020). While COVID-19 has shown "unfathomable challenges" to organizations, the pandemic has enabled numerous organizations to unleash their ability to innovate in the middle of a crisis and cleared the way to become resilient further into the future (Amankwah-Amoah, 2021). The current COVID-19 pandemic, coupled with innovative discoveries, has made an environment that's both favorable and difficult for companies to transform and innovate.

According to (Lee and Trimi, 2021) in the dynamic landscape of the digital era, the ongoing COVID-19 pandemic crisis underscores the absolute necessity of sustainable innovation for organizations not only to thrive but also to ensure their survival and success. (Nzioki, 2020) predicted that the external setting in which present-day technology companies compete has gotten to be more and more complex and chaotic in contemporary times, which has been largely due to globalization and the quick spread of new technologies, which includes the Web and digitalization. According to (Nzioki, 2020), navigating crises and managing evolving threats requires a combination of foresight and strategic management. Strategic Management alludes to the administration structures and forms that are fundamental for the planning, implementing, and evaluation of decisions pointed at securing an organization's comparative advantage and interests (Ackermann and Eden, 2011).

The purpose of these processes and structures is value creation; creating value systems that assist strategic decision-making and adaptability (Ritala et al., 2013).

Without strategic management, decision-making and proactive activities are not encouraged or advanced. As a result, important information isn't taken into consideration and decisions may not be made productively or on time. Organizations then become inactive and do not react to changes that occur in their operational setting (Rosemann and vom Brocke, 2014).

In contrast, Innovation Management is regarded as one of the foremost effective methodologies an organization can utilize to boost business productivity and streamline internal processes (Afuah, 2020). In a rapidly changing world where technology is evolving quickly and leaving behind older business models, organizations are constantly searching for new ways to streamline their innovative methods (Sorescu et al., 2011). Innovation does not come from ad hoc, isolated efforts competing for money, time, prestige, and attention. According to (Am et al., 2020) to genuinely improve, companies must strategically manage innovation and communicate straightforwardly with all partners. Although there are endless definitions of innovation, one of the most succinct was provided by (Porter, 1990), who said that innovation was doing things in a new way to ensure commercialization. (Porter, 1990) reference to doing things in a new way as intentionally broad because innovation is not confined to products and services but also includes processes and business model innovation.

Innovation strategy has a clearly defined plan of organized steps that an individual or group must take to realize an organization's growth and sustainability goals (Am et al., 2020). According to (Kahn, 2018) The aim of innovation is to create unique value, such as novel solutions to adjust to changing businesses or to solve looming health, social or economic challenges. And while strategy is a plan that describes exactly how you're going to accomplish your vision (Grant, 2021), it also acts as a heuristic that can be depended on when making difficult decisions, particularly in times of crisis (Am et al., 2020). In previous crises, companies that have capitalized on innovation have experienced improved growth and performance after the crisis. As shown in fig 1 below, organizations that kept their focus on innovation amid the 2008/2009 global economic crisis came out stronger, outpacing the marketplace by more than 30% and showing enhanced growth over the next three to five years (Am et al., 2020).

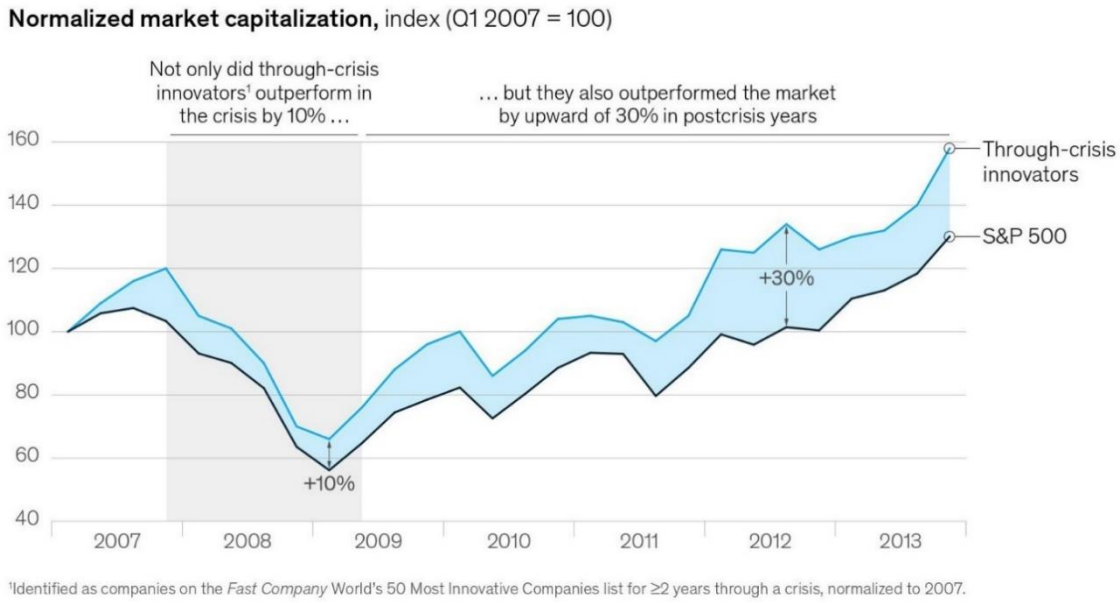

Fig 1.1. S&P 500 performance tracking during the 2009 crisis and post-crisis years (Am et al., 2020)

The covid-19 crisis is viewed to have more weighty dislocation to social (Bangun and Widana, 2021), and on the global economy (Drăgoi, 2020) the likes that the world has never experienced before. But crisis has also fuelled changes in business model leading to disruption. The 2009 economy crisis brought about the sharing economy, the SARS epidemic of 2002 influenced the adoption of e-commerce in Asia, which made China the major hub for innovation in the spheres of social commerce. Also with the climate change crisis as one of the global issues, the world is seeing significant adoption in the use of green technology innovation and eco-friendly initiatives (Am et al., 2020).

The research project focuses on the strategic innovation phenomena where innovation plays a critical role in helping organizations to be sustainable during time of crisis. The study explained through analysis and insights from the Nigerian Commercial Road Transportation Sector, taking the case of Cross-Country Transport Nig. Ltd. The COVID-19 pandemic has impelled organizations, even the most successful ones to investigate other ways to innovate (Heinonen and Strandvik, 2020). The pandemic inspired these innovations and are outlined not as it were to reply to it only, but also to advance organizational resilience, agility, and by and large showcase competitiveness during a crisis.

The study explored the impact of the covid-19 crisis on the business operations of the case organization, hence contributing to existing literature. Despite the constant flow of COVID-19, information about companies' innovation activities remains limited because of the crisis (Morawska et al., 2020), therefore this study seeks to contribute to existing literatures on understanding more about innovative strategies, that

organizations had to adopt to show case resilience and competitive advantage during the covid-19 public health crisis.

1.1. The Transportation Industry

The evolution of transportation has improved the way work is done, and how we live over the centuries (Ausubel and Marchetti, 2001). In the early days, people used horses, mules, and other animals to travel to different places and carry goods. Boats and man-made ships moved along coastal waters and oceans for exploration and trade. Most of the people settled in the coastal areas because the roads were difficult and often dangerous at that time. Water transport was still used in the 16th century to send agricultural products to various ports (Kavussanos and Marcoulis, 1997). For example, in the 19th century in the United States, railroads were built, which led to more areas of the country being developed and settled, and even more, goods being transported from across the country to these areas (Zhang et al., 2009). The transportation industry developed in the 1900s with the advent of automobiles and airplanes. The movement of people, animals, and goods from one place to another, by land, air, or sea is the responsibility of the transportation industry. This vast industry involves many types of organizations, such as airlines, railways and cruise lines, intercity transit companies, freight railroads, freight transporters, couriers, and express delivery services (Dempsey, 2002). As such it represents an important branch of any economy globally.

1.1.1. The State of the Road Transportation Sector in Nigeria

According to a World Bank report (2022), transport is essential to ensure economic growth, create jobs, and connect people to crucial services such as health care or education. However, in many developing countries, it is not profitable. One billion people still live more than 2 km from a weather road, where lack of access is inseparable from poverty. This goes to explain the key part that transportation plays in fostering economic growth, expanding access to essential services, and connecting people etc. The Nigerian Bureau of Statistics reported that since Nigeria's independence in 1960, the country's transport system has been plagued by poor roads; an insufficient fleet of buses or trucks; irregular, insufficient, and overcrowded trains and planes, and overcrowded ports. The aforementioned are common characteristics in developing countries, which includes physical challenges such as the lack of proper transport managers and planning, problems in capital restructuring, major problems with institutional reforms, and inefficient transport regulations. The report also stated that the share of transportation industry in Nigeria's gross domestic product [GDP] is about 3%. And Nigeria's Transportation statistics are grouped into four basic categories, namely rail, road, river, and air transport.

1.1.2. An Outlook of the Global Road Transportation Sector

The Road Transport is part of Transportation industry, and includes a few sub-sectors such as Road Freight and Passenger transport. According to a report from report linker (2022), Global traffic volume will increase from 7,312,500 million vehicle-km in 2021 to 7,540,100 million vehicle-km by 2026, with an average annual growth rate of 0.1%. Since 2016, global demand has decreased by 0.9% per year. The data further showed that with 4,750,000 million vehicle kilometres in 2021, the United States ranks first in terms of world traffic volume. Japan, Great Britain, and Australia were ranked 2nd, 3rd, and 4th respectively. This data is depicted in the figure below.

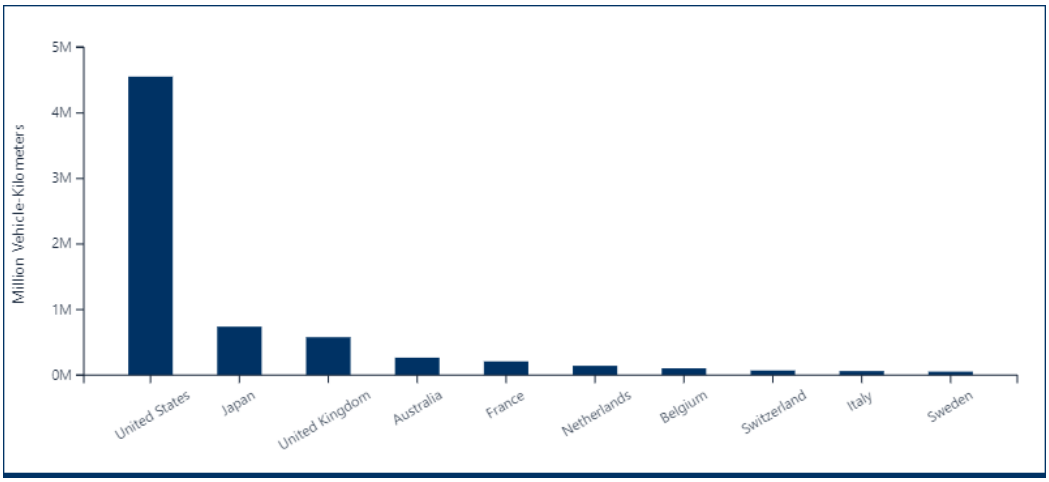

Fig. 1.2. Global Volume of road motor vehicle traffic by country in 2020 (Report Linker Research, 2022)

The research further reported that countries like Lithuania increased by 11.8%, while Malta decreased by 5.3% from 2016. The table below shows the top 10 countries in 2022, with major markets in the road transportation industry.

Table 1: Top 10 countries with major markets in the road transportation industry (Report Linker Research, 2022)

Position	Country
1	United States
2	Japan
3	United Kingdom
4	Australia
5	France
6	Netherlands

7	Belgium
8	Switzerland
9	Italy
10	Sweden

1.1.3. The Road Transport Sector in Nigeria

In Nigeria, road transportation is the most widely used mode of transport, accounting for more than 90% of its contribution to the Gross Domestic Product (GDP) of the subsector. The road transport sector is reliant on the structure of the human settlement (MARVELOUS). Road transport activity relates to mass or small transport of people, transport of animals, agricultural products, goods, and provision of mobile services (medical institutions, libraries, banks). Other than the uses mentioned above, recreational uses of automobiles also contribute significantly to the value of road transport in Nigeria (NBS).

Due to its share in GDP, road transport is the main contributor to the most economically efficient activity in Nigeria with a high percentage of non-river land. This observation is clearly confirmed by the fact that the most common reason for the increase in prices is the increase in transportation costs. Road transport statistics are very useful for planning at all levels. Hence, many households, research institutes, business organizations, and planning organizations at all levels of state administration are users of traffic statistics. According to the Nigeria Bureau of Statistics, Road transport statistics can be obtained through surveys, censuses, and systematic management. The main sources of obtaining road transportation data in Nigeria are from the Federal Ministry of Transport, the motor licensing authorities of state ministries, the National Bureau of Statistics, the Nigerian Union of Road Transport Workers, and the passenger transit operators union, including freight operations.

1.1.4. Cross Country Transport Nigeria Limited

Cross Country Transport Ltd stands as a premier road transport company in Nigeria, commencing its activities in 2002. It operates through four primary business segments: Passenger Transport, Logistics, Hospitality, and Courier Services. With a presence in multiple branches across Nigeria and several cities within the West African sub-region, the company has solidified its reputation as a leading road transport entity in Nigeria. Its consistent recognition through various accolades further reinforces its esteemed status. Bolstered by a team of proficient professionals, each excelling in their designated departments and divisions, the company continues to set industry standards.

The company's vision is to provide world-class mass transportation, logistics, and courier services that are reliable, safe, timely, and cost-effective service delivery and enhance customer satisfaction, thereby contributing to the transformation of the road transport sector in Nigeria. The company hopes to achieve this vision through innovation in its business units, internal processes, and external networks. The road transportation sector is a highly competitive sector in Nigeria, and players in this industry consistently develop strategies to capture a larger market share than their competitors. According to information obtained from the website, the company owns about 500 vehicles in its fleet, with an average life expectancy of 8 years, and is highly capable of providing efficient and productive services. Cross Country is a member of the Nigerian Association of Luxury Bus Owners (ALBON), and the Nigeria Association of Courier Operators (ANCO). The company is headquartered at 345, Muritala Mohammed Road, Yaba, Lagos, Nigeria, and entered the business of road transportation with a fleet of just 132 vehicles. What started as a small commercial transport company has grown into an internationally recognized company.

The status of Bus/Vehicle fleet of Cross-Country Transport Ltd as of October 2022 is presented in table 2.

Table 2: Cross Country number status (Company's report)

Bus Type	Notes
Long-haul Commuter Intercity	Passenger
Luxury Intercity bus	Passenger
Freight Truck	Goods
Mini Coach Bus	Passenger

The company has various terminals in major cities across Nigeria from where it carries out day-to-day movement to various destinations within Nigeria and the West Africa sub-region. However, the Head Office regulates the whole company's business operations and its office locations across Nigeria and beyond.

The list below shows few of the current destination for the company and its office locations.

- **Accra, Ghana**
  - Opposite Apollo Theatre, Ring Rd, Kwame Nkrumah Circle
- **Lome, Togo**
  - Lome – Togo – Drop off
- **Cotonou, Benin Republic**
  - Plot 162 Gbenonko Akpakpa, by Catholic Church/Dantokpa bridge
- **Abuja, Nigeria**
  - Utako – Dan Suleiman Crescent

- **Lagos, Nigeria**
  - 22 Ikotun Egbe Rd, Opp. SCOAN (Ikotun)
  - 345 Muritala Muhammed Way, Yaba
  - Maza Maza – Badagry Expressway by Festac Gate
  - 12 Ikorodu Rd, by Immac Group/Chicken Republic, Jibowu
  - Ajah 2, After Abraham Adesanya Roundabout, Lekki-Epe Expressway
- **Calabar, Nigeria**
  - Calabar – Opp. UJ Esuene Stadium
- **Owerri, Nigeria**
  - Owerri-Egbu Road – Bolanzca Park
- **Port Harcourt, Nigeria**
  - Waterlines Building, Waterline Junction, Port Harcourt

And a host of other location across Nigeria, where the company has its base.

The vision of Cross-Country Transport Ltd is: "*To transform the transport industry in Nigeria by providing world-class mass transportation, haulage, and courier services that are reliable in terms of safety, speed, and efficient service delivery that delights customers*." This vision statement accounts for the market disruption through its introduction into the road transport sector. The company has one of the largest transportation networks among road transportation companies in Nigeria, serving more than 30 destinations in Nigeria and some neighbouring countries. In addition, the company has won various accolades in recognition of its achievement in transportation and logistics. One of the awards was by the Chartered Institute of Transport, where the company was declared the Best Transporter in Nigeria. In addition, Cross Country has regularly won the National Bus Operator of the Year award, among other awards from prestigious bodies. The most recent of such award was the Voyage Awards in 2018, as Nigeria's Best Travel Portal.

1.2. Research problem statement and research objectives

1.2.1. Problem Statement

The transportation industry globally is facing unprecedented challenges, which require reinventing resilience to support the transportation industry of the future. According to a report by the International Road Transport Union, the road transport sector has suffered an estimated $1 trillion in economic losses, since the outbreak of the pandemic (IRU 2021). Because the road transport sector is the backbone of global supply chains, the IRU stated that road transport companies will require more financial support to avoid bankruptcy and ensure the stabilization of the transportation system due to the economic effect of the pandemic (IRU 2021). Before the pandemic, Nigeria's

transportation industry was valued at 2.6 trillion naira (US$6.9 billion) at current base prices in 2020, down from 3 trillion naira (US$8 billion) in 2019 according to the National Bureau of Statistics (NBS, 2021). This is reflected in its contribution to GDP in Q4-2020 falling to 1.8% compared to 2.1% in the same period last year, but still higher than the 0.8% recorded in Q3-2020. The road and highway infrastructure forms the mainstay of the country's transportation network. These highways hold 90% of passenger and logistics traffic, as designed in the country's National Integrated Infrastructure Master Plan (NIIMP). However, studies have shown that road transportation companies must continuously innovate to ensure their profitability and survival as the road transport industry faces sudden major crisis, overcapacity, rising costs, competition, rising fuel prices, poor road infrastructure, and worsening economic conditions. Many road transport companies depend on their capacity to design innovative business models in other to adjust to the ever-changing environment.

The following research questions are developed to be answered by the study.

1.1. How did Cross Country Transport Ltd respond to the global covid-19 pandemic?
1.2. What innovation strategies were adopted by Cross Country Transport Ltd for survival, and competitive advantage during and into the post-covid19 phase?
1.3. What adjustments, were made to the company's business model to remain operational in the covid-19 pandemic?
1.4. What is the preparedness strategy of Cross-Country Transport Ltd towards Industry 4.0?

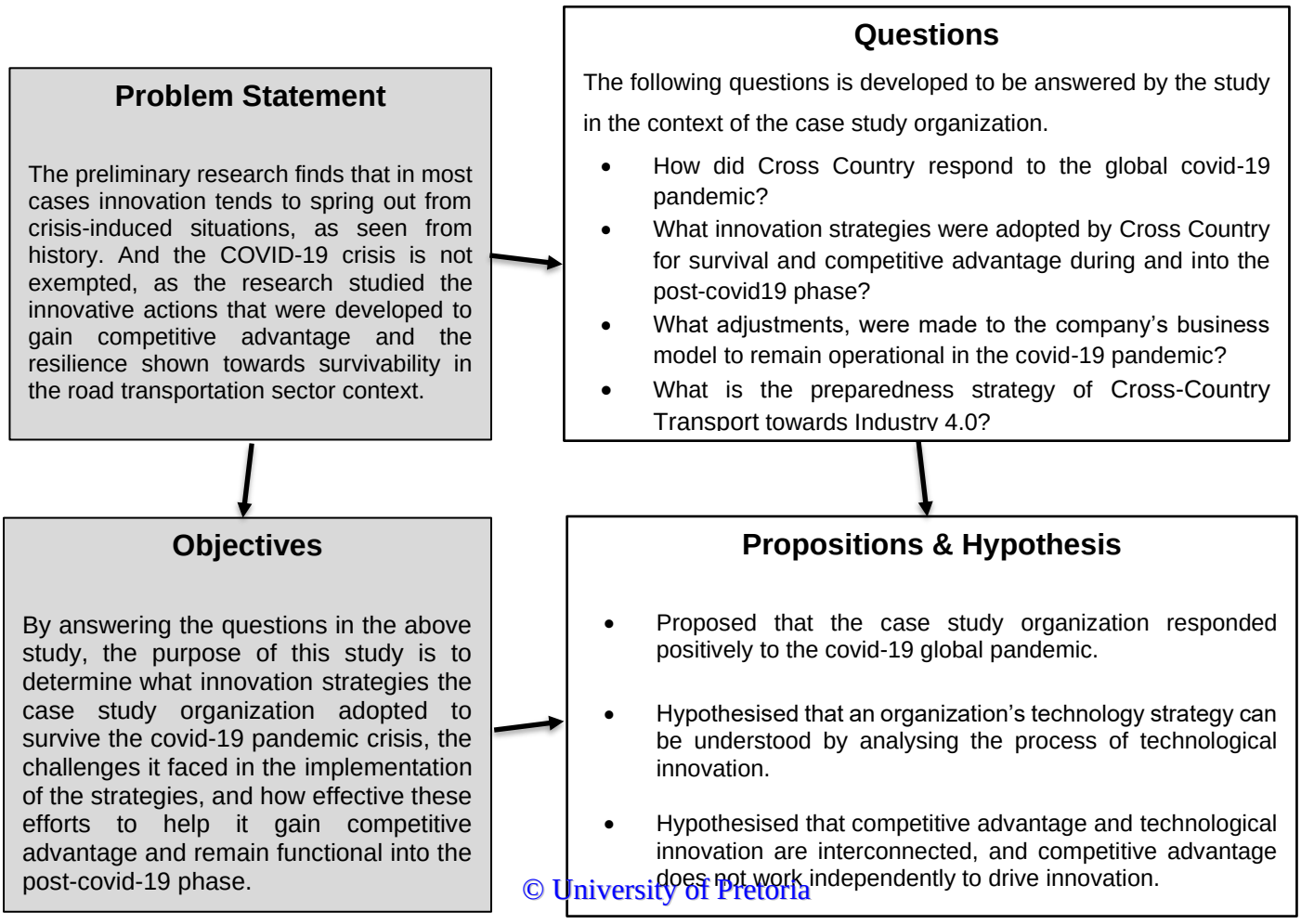

Fig.1.3. Summary of research problem statement and objectives

1.2.2. Research Objectives

To answer this problem, a research project is proposed with the following objectives:

1.1. Identify and analyse the innovation strategies used by Cross Country Transport Ltd during the COVID-19 pandemic as a major road transport company in the fiercely competitive road transportation sector.

1.2. Determine the challenges Cross Country Transport Ltd faced during the implementation of crisis-induced innovation strategies.

1.2.3. Rationale for the Research

Despite the rise and numerous developing research streams about the COVID-19 pandemic, past reports have provided limited information about innovative activities that was influenced by the crisis. This lack of research is astonishing since innovation can arise from crises, as we have seen from the historical crisis of similar magnitude. Taking an outlook from the road transportation sector which is one of the industries that was significantly impacted by the covid-19 pandemic, the research study aimed to discover how the case study organization handled the sudden impact of the global pandemic on its business operations, and what is the prospect for the organization in the post-covid era. Also, the study examined the preparedness strategy of the case study organization towards Industry 4.0, the emerging Fourth Industrial Revolution Technology in the transportation industry, which is set to revolutionize commercial transportation of the future.

1.2.4. Relevance of the research

The findings of this study will be useful in determining the effectiveness and long-term sustainability of the competitive strategies Cross Country Transport Ltd is currently using not only to compete in the industry but to also set the path for economic growth in the post covid-19 phase. The commercial road transport sector is characterized by fierce competition between various sector players, new entrants appear every day to often trying to outdo one another. Therefore, the study results will help to deepen the understanding of the innovative approaches that Cross Country Transport Ltd must take in other to thrive and remain competitive well into the future. Also, a continuous improvement on innovation strategy which helps organizations to sustain its competitive advantage is key to long-term business survivability. Finally, new entrants tend to spring up all the time to challenge established road transport companies and other new entrants. However, there is little research on why new entrants keep springing up, and while some have been able to survive the harsh competition, others

eventually went out of operations. This study provides a base for scholars in future research.

1.2.5. Limitations and assumptions of the study

The research will focus on the context of the Nigerian Road Transportation Sector, which will be focused on its passenger and logistics division taking a case study of Cross Country Ltd during the covid-19 pandemic and will not take into consideration any other African state or road transportation company. Also, since the covid-19 crisis is still ongoing, the researcher is aware that study materials on this subject is still evolving, and this is taken into consideration. The lack of study materials for the effects of the covid-19 pandemic in the field of study is also considered. Nevertheless, the study proceeds with referencing existing literatures on the subject, as it is the intent of this research to contribute to existing knowledge on the impact of the covid-19 crisis, and how organizations reacted to it. Furthermore, the interview respondents were just 5 staff members out of 8 population size drawn from the middle management level of the organization. Another limiting factor was that not all respondent participated in answering all research questions, rather the respondents participated on the research questions, they showed some elements of reluctance to participate, and companied about been busy, but preferred to answer research questions they found convenient.

1.2.6. Proposed Research Approach, Strategy & Schedule.

The research to be undertaken is a mixed-method approach using focused interviews and questionnaires as the primary data source, while the secondary data was gathered from transportation databases of the International Road Transport Union (IRU), The Nigerian Federal Ministry of Transport (FMT), The Nigerian National Bureau of Statistics, Journals/scholarly papers, and governmental agencies publications. Content analysis was used to analyse data from this study as it is intended to describe meaning and implications, while also drawing statistical conclusions from respondent information and documented data. Content analysis provides a deeper and more comprehensive explanation of the situation and does not limit the respondent's answers, and it is possible to generate more and very detailed information.

In a broad sense, research strategies consist of: (see Figure 1.4)

- Literature review is done to discover strategies, concept, and current practices that influence innovation during a crisis, what factors determines the survivability of organizations in a crisis induced situations and how this helps to gain competitive advantage. Knowledge gaps have been identified as the basis for this study.
- Propose a conceptual model to outline the factors affecting the adjustments companies make during a crisis, and to ensure it continuously thrive well into the future.

- Hypotheses and proposals should be made based on the literature reviews and conceptual model. Consequently, these hypotheses will form the starting point for the rest of the research process.

- Collection of data is generated by a structured interview questions and survey questionnaire respectively, which is targeted at the case study organization.

- The collected data is evaluated and analysed to test all propositions and hypothesis.

- The innovation for survivability, resilience, and competitive advantage during a crisis shall be established.

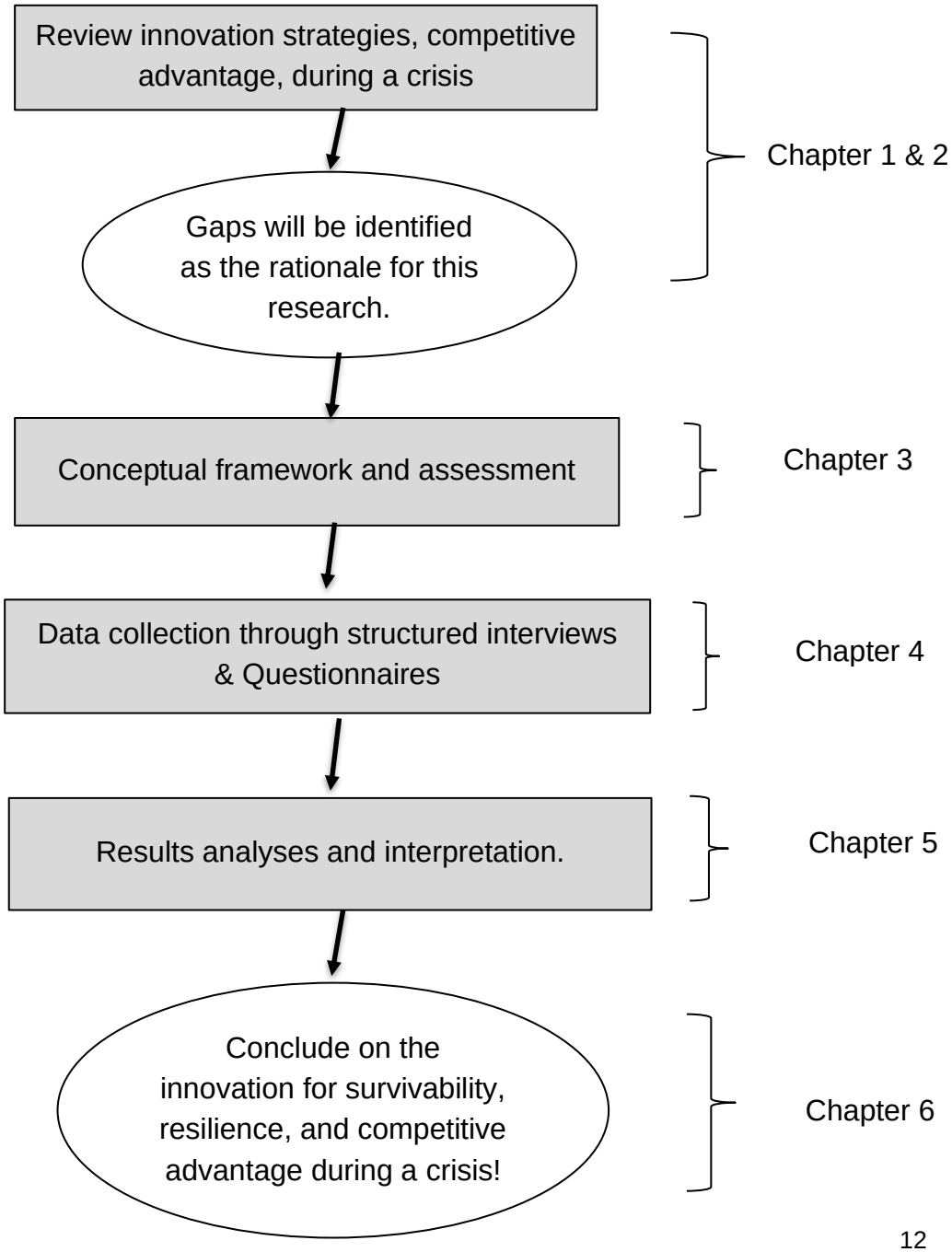

Figure 1.4: Research method and chapter outline

2. Literature Survey

2.1. Introduction

According to (Lendel and Varmus, 2011) innovation is the fundamental prerequisite for competitiveness. The covid-19 crisis has forced most organizations to downsize due to low business operations. Those companies that will come out strong from the economic downturn must implement an innovation strategy and will invest in research and development for innovation. In organization's where innovation is considered a core business process, tends to gain competitive advantage (Distanont and Khongmalai, 2020). A key prerequisite for creating and using innovation in the road transportation sector is a properly formulated and implemented innovation strategy.

2.2. Concept of Innovation Strategy

The definition of innovative strategy has been a debate among the professional public and how to allocate its areas of operation. (Kováč and Žigić, 2007) defines innovation as the approach used to determine the activities and resources needed to achieve long-term fundamental business-set goals and objectives. The signal for innovation is on timely response to changes when focused on orientation objectives. According to (Kováč and Žigić, 2007) the innovation strategy has to be based on the time factor, systematism, long term, variation, and the focus of activities and resources. The flexibility of the innovation strategy mentioned above is highlighted by (Lendel and Varmus, 2011). (Lendel and Varmus, 2011) iterated that Innovation strategy is often mentioned in many scientific literatures, which has seen its usage in research and development strategy, this attest to the fact that the term innovation strategy is broad.

(Pisano, 2015) defined Innovation strategies as just a set of consistent and complementary strategies or actions to achieve a specific viable goal. A great strategy aids in the coordination of various groups within an organization, the clarification of priorities and goals, and the focus of activities. Firms do define their general business strategy regularly, which includes its (positioning and scope) and establish how various functions like as finance, marketing, operations, and R&D will contribute to it (Lendel and Varmus, 2011). Innovative strategic sources such as knowledge, experience, innovation, opportunities, skills, and inventions available to businesses have been developed. The Innovation Source of Strategy consists of four main interrelated modules. Which are: Knowledge base, Bank of Inventions, Bank of innovation, Bank of innovative opportunities.

2.3. Current approaches to creating of innovation strategy.

The process involved in developing an innovation strategy is an intricate method. Several authors have offered many options for innovative strategies. (Lendel and Varmus, 2010) views innovation strategies as a vital component of the overall strategy that contributes to the achievement of innovation goals. (Šimková, 2006) indicates that

several factors must be considered. According to her, the goal of formulating an innovation strategy is to seek a balance stuck between innovation potential, entrepreneurship, and all-important elements of the internal environment. Four models of innovation strategy building are presented by different authors in table 3.

Table 3: Models for building innovation strategies and structures by various authors (Lendel and Varmus, 2011)

Author (s)	Structure of the innovation strategy model
Rudy (2004)	1. Clarifying innovative concepts. 2. Creating a vision for top executive. 3. Choosing an Effective Implementation Method
Kadár a Vida (2007)	1. Mapping and assessment of the impact of the surrounding operating system (technological, economic, legislative, social cultural, and political consequences). 2. Internal environment evaluation and analysis (product own resources, structure, and development). 3. Establishment of competitive strategy (profit maximization, customer satisfaction and quality, organizational growth, high productivity, market position improvement). 4. On-going program and project development. 5. Evaluating the effectiveness of innovation.
Šimková (2006)	1. External environment analysis (step-by-step analysis, industry economic characteristics, industry dynamics analysis, strategy map, competitor analysis, industry attractiveness analysis), 2. Stakeholder analysis (strengths, weaknesses, opportunities, and threats), 3. Internal environment analysis (existing strategy evaluation, result analysis by functional area, vulnerability analysis, spatial analysis, competition analysis, key success factor analysis),
Innovation Factory	1. Strategic intelligence, 2. Identify prospects for innovation, 3. Assessment of innovation opportunities, 4. Development of innovation strategies, 5. Definition of the want for organizational systems and processes, 6. Determining Required Organizational Competencies

Based on the analysis of this table, the internal environment seems to be key to achieving a sustainable innovation strategy. The differences of approach as stated in the table above alludes to the fact that innovation strategy as a framework, that cooperates with the innovation of organizations is evolving. It is conceivable to form a moderately universal model that will ensure the successful and subsequent implementation of an innovative strategy. In the creation of a model for an innovative strategy, the structural elements of the model need to be properly selected. It shows

the significance of innovation in the company. This is a follow-up assessment related to the definition of the company's vision and mission, the definition of its strategic objectives, a detailed analysis of the business environment (internal and external), and the formulation, implementation, and control of the strategy (Lendel and Varmus, 2011).

2.4. The relevance of strategy in the 21st century and in the 4IR

(Drucker, 2003) stated that for the twentieth century, the discipline of management was the greatest innovation. However, with the growth of technological innovation in an exponential rate, there are concerns that management itself has gotten to an existential phase in its record and if it is still suitable for its purpose. According to (Hamel, 2011), Management must now be reinvented due to unprecedented new challenges posed by rapidly changing technology. The change itself has changed since the 20th century. Change is happening at an accelerated, unstoppable, seditious, and exponential rate. However, nothing in the 20th century when these early management tools were created, has grown exponentially.

The modern market is driven by hyper-competition (D'Aveni, 1994), So innovation is the only form of protection (Hamel, 2011). But the benefits of knowledge wear out very quickly. New competition is all about how businesses generate new knowledge and how businesses can learn faster than their competitors. According to (Hamel, 2011), It is now important to create a company that can change as quickly as the change itself. Thus, companies that develop business models faster than their competitors will survive. Similar concerns were expressed after the 2007-2008 financial crisis. The global bank collapse and the subsequent recession underlined the limits of the traditional logic that underpins traditional fiscal and policy models.

2.5. Strategy Process in Chaotic and Complex Environments

The pioneers of corporate strategy shared a scientific worldview that dates to the 18th century enlightenment. The classical approach to strategy is also sometimes referred to as the classical scientific model and Newton-Cartesian figure (McMillan, 2008), Because it is believed that Newton laid the foundations of modern science. The classical scientific approach aims to reduce the uncertainty associated with strategic decisions. (Walton and Pyper, 2019) refers to it as technical rationality, and it is said to be the foundation of the traditional approach to strategy problem-solving and decision-making. In the 1950s and 1960s business strategy appeared as a discipline, and the core concepts and approaches used in the contemporary time were formed during the first two decades of its development.

(Chandler, 1962) viewed strategy and control systems as the primary project for top management and the execution approach as the duty of operations managers within the strategic units and departments of the enterprise. This viewpoint was buttressed by (Andrews, 1971), who held that the corporate strategic planning of an enterprise can and should be linear, rational, and analytical. Only two actions were advocated by him: strategy formulation and strategy implementation.

Complexity (Nicolis and Prigogine, 1989; Cramer, 1993) is a relatively new paradigm in strategy literature, bringing ideas from complicated science dating back to the 1960s into the complex systems used at the time of occurrence. Used as an interdisciplinary approach to understanding its essence, and application to strategic thinking and management issues.

Complexity refers to a systematic approach to the study of environmental and organizational epidemiology (Walton and Pyper, 2019). Systems are made from numerous related interdependent parts (Meadows, 2008). Newtonian science covers linear causality that causes changes in these types of systems. Complexity science, on the other hand, deals with nonlinear relations and the properties that make intricate systems flexible (Walton and Pyper, 2019).

Therefore, complexity can be viewed as the study of complex adaptive systems with non-linear dynamics of interactions between elements or agents. The system is adaptable due to the behaviour of each interacting agent changes depending on the various events and what happens during their interaction.

2.6. Strategy & Innovation Management

The external setting in which present-day technology companies compete has gotten to be more and more complex and chaotic in contemporary time, this has been largely due to globalization and the quick spread of new technologies, which includes the Web and digitalization (Nzioki, 2020).

Navigating crises and managing evolving threats requires a combination of foresight and strategic management. Strategic Management alludes to the administration structures and forms that are fundamental for the planning, implementing, and evaluation of decisions pointed at securing an organization's comparative advantage and interests (Nzioki, 2020).

The purpose of these processes and structures is value creation; by creating value systems that assist strategic decision-making and adaptability. Without strategic management, decision-making and proactive activities are not encouraged or advanced. As a result, important information isn't taken into consideration and

decisions may not be made productively or on time. Organizations then become inactive and do not react to changes that occur in their operational environment.

In contrast, Innovation Management is regarded as one of the foremost effective methodologies an organization can utilize to boost business productivity and streamline internal processes. In a rapidly changing world where technology is evolving quickly and leaving behind older business models, organizations are constantly searching for new ways to streamline their innovative methods. Innovation does not come from ad hoc, isolated efforts competing for money, time, prestige, and attention. To genuinely improve, companies must strategically manage innovation and communicate straightforwardly with all partners (Am et al., 2020).

Although there are endless definitions of innovation, one of the most succinct was provided by (Porter, 1990), who said that innovation was a new way to do things to ensure commercialization. (Porter, 1990) reference to a new way to do things as intentionally broad because innovation is not confined to products and services but also includes processes and business model innovation.

2.7. The Road Transportation Sector

Fig.2.1. Road transport sector overview (Source: The Economist Intelligence Unit)

Broadly speaking, the road transportation sector includes works related to the transportation of goods by road and the operation of vehicles such as buses for passenger transportation. The sector is important for social and economic development and ensures movement between countries (Confederation, 2020). Road freight services deliver essential goods, including food and medicines, and a variety of supplies that businesses and consumers depend on. The road transport sector makes an important contribution to economic growth, creates jobs, and prevents shortages of essential commodities. In many countries the sector is termed as an essential service.

2.8. Review of Past Crisis and impact on the road transportation sector

Studies from scholars (Rothengatter, 2011; Borca et al., 2021) (Chernogor et al., 2020; Hou et al., 2021) have shown that the road transportation sector, like other sectors, is

vulnerable to a multitude of disruptions. There have been several crises in recent decades, including the global financial crisis of 2008/2009, the energy crisis of the 1970s, several health crises, and crises related to civil unrest to mention but a few. These crises have often disrupted the transportation system leading to sharp shifts in transportation demand as people respond to these shifts based on the nature and level of perceived risks associated with the crisis. An example is the SARS epidemic which affected non-essential trips on public transport, Taipei subway halved at height of the SARS epidemic, taking four months for passenger numbers to return to pre-crisis levels (Agency, 2020).

2.8.1. Infectious diseases and pandemics and the road transport sector

Infectious diseases usually spread rapidly, affecting many people, and disrupting most people's daily activities. These diseases pose a public health crisis and are categorized as either pandemics or epidemics depending on their severity (Muley et al., 2020). The records of infectious illnesses affecting human lifestyles span centuries, a notable example is the Black Death of the 14th century. In 1918, the Spanish flu pandemic affected one in three people in the world (about 500 million) and caused the death of 10% of those infected (about 50 million) worldwide (Zhang et al., 2019). Troop movements during World War I caused the disease to spread from one continent to another later in the war (Fee et al., 2001). The figure below shows the chronology of major infectious disease health emergencies in the 21st century.

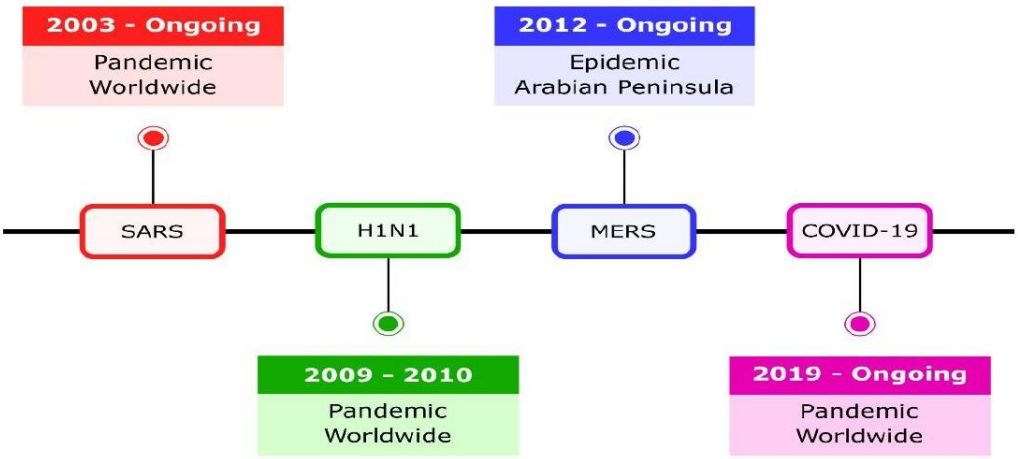

Fig 2.2. A timeline of the major health crises of the 21st century (Muley et al., 2020)

During the 20th century, it was thought that Infectious diseases has been curtailed, but then new diseases emerged in the course of time, such as the severe acute respiratory syndrome (SARS), the Middle East respiratory syndrome (MERS), and the most recent COVID-19 pandemic, which is termed to have surpassed previous diseases.

The road transportation sector, was one of the most affected of all sectors, followed by industry and manufacturing due to restrictions caused by COVID-19 (Muhammad et al., 2020). The varying degrees of restrictions put in place to fight the pandemic are changing the way people live and impacting their social relationships and economic situations. This directly affects their travel and extracurricular activities (Saadat et al., 2020).

2.8.1.1. SARS Epidemic Outbreak and impact on the road transport sector

It is reported that Between November 2002 and July 2003, about 8,100 people became infected with the severe acute respiratory syndrome (SARS), killing nearly 800 people. (World Health Organization (Organization and Zdrowia, 2004). Although more than 90% of these deaths and cases occur in the People's Republic of China and its south-eastern neighbours (Taiwan, Vietnam, Hong Kong and Macau), people around the world were also becoming infected with SARS, with cases recorded in Canada, South Africa, and Romania (Organization and Zdrowia, 2004). In the age of modern globalization, it was quickly recognized that SARS could easily spread to countries and regions via planes and other modes of transportation (Lam et al., 2003).

The SARS epidemic had a significant impact on the road transport sector, particularly in affected areas. Quarantine measures and travel restrictions led to a decrease in demand for public transportation, and many workers chose to stay at home to avoid exposure (Henderson, 2004). This resulted in a significant decline in ridership and revenue for public transport providers. Additionally, supply chain disruptions caused by factory shutdowns and border closures affected the movement of goods, leading to delays and increased transportation costs (Lee and McKibbin, 2004). However, the impact on the road transport sector was generally less severe than on the aviation industry, which was hit hard by travel restrictions and reduced demand for air travel (Siu and Wong, 2004).

2.8.1.1.1. Innovations Inspired by the SARS epidemic in the road transport sector.

During the SARS epidemic, several innovations (Tan et al., 2022; Au et al., 2005) were introduced in the road transport sector, including:

- Contactless payment systems and ticketing to reduce physical interactions between passengers and drivers.
- Increased ventilation and air filtration in public transport vehicles to reduce the risk of airborne transmission of viruses.
- Installation of hand sanitizing stations and disinfectant wipes in public transport vehicles and at transportation hubs.

- Use of UV-C light technology to disinfect surfaces in public transport vehicles and facilities.
- Development of real-time monitoring systems to track and manage passenger flows and prevent overcrowding.
- Introduction of temperature screening devices to detect potential cases of illness among passengers and staff.

These innovations have since become standard practice in the road transport sector, with many of them being further developed and refined to improve passenger safety and comfort.

2.8.1.2. The Covid-19 Crisis and its Impact on the road transport sector

The International Road Transport Union (IRU) reported that the covid-19 crisis has been labelled the most severe and prolonged pandemic in the history of the road transport sector, explaining that commercial passenger transport/logistics operations have been significantly impacted by COVID-19. However, months after the crisis, commercial road transport companies have maintained service as the best they can, but limitations in logistics, routing, and delivery often drive-up costs (IRU, 2020). The pandemic has had a major impact on public transport, especially travel patterns, as new regulations impact the number of riders using public transport (Confederation, 2020), Hence this resulted in a decline in the number of passengers using public transport, taxi sharing has been prohibited, and protective barriers have been required between drivers and passengers. The Covid-19 crisis created numerous challenges for road transport companies and their employees. As a result, these companies were unable to pay their drivers, service financial debts, and cover operating costs (Confederation, 2020).

According to the 2020 IRU Intelligence Report, many road transport companies have survived so far, but circumstantial evidence from its members is ringing alarm bells about their future. Therefore, the IRU evaluated two key sets of financial indicators that provided initial warning of the risk of business default (businesses unable to repay loans) and insolvency (businesses going bankrupt). These two financial indicators both point to an impending wave of bankruptcies in the road transport sector over the next few years.

A. Default Risk

Road transportation companies in all regions of the world face a high or very high risk of loan default in the coming year. This leads to a deterioration in their creditworthiness, thereby increasing their borrowing costs, especially for vehicles. As shown in Figure 2.3 below, across Europe (10) the risk is very high, mainly due to supply chain

disruptions during the peak of the pandemic. Other regions are also at very high risk due to macroeconomic conditions (IRU, 2020).

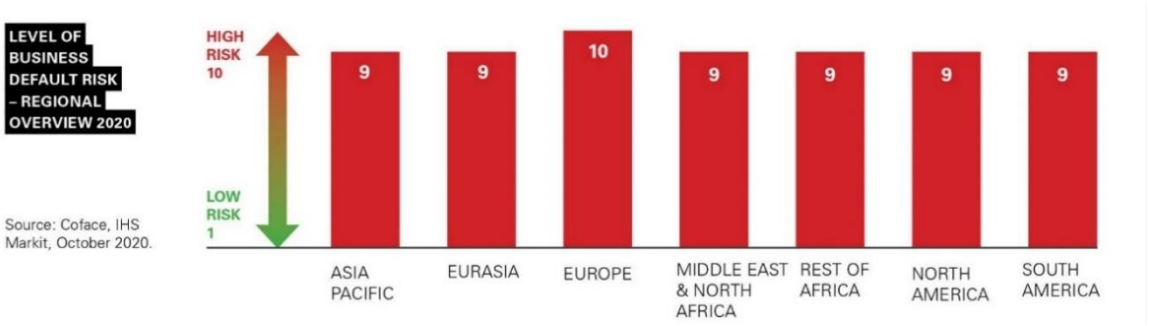

Fig 2.3. Level of business regional default risk (IRU, 2020)

B. Insolvency Risk

If a company is unable to repay its loans and cover its operating costs for a long period of time, it becomes insolvent, or otherwise bankrupt. The three key insolvency risk indicators combined will provide a comprehensive outlook for the year ahead: fixed asset turnover, free cash flow, and real revenue growth turning point. Reduced business activity and underloading lead to higher levels of empty running and the underutilization of commercial vehicles. Declining revenues make it impossible for businesses to pay ongoing bills and charges. Worse, some suppliers require cash on delivery, there is also the situation of customers who don't pay on time (IRU, 2020).

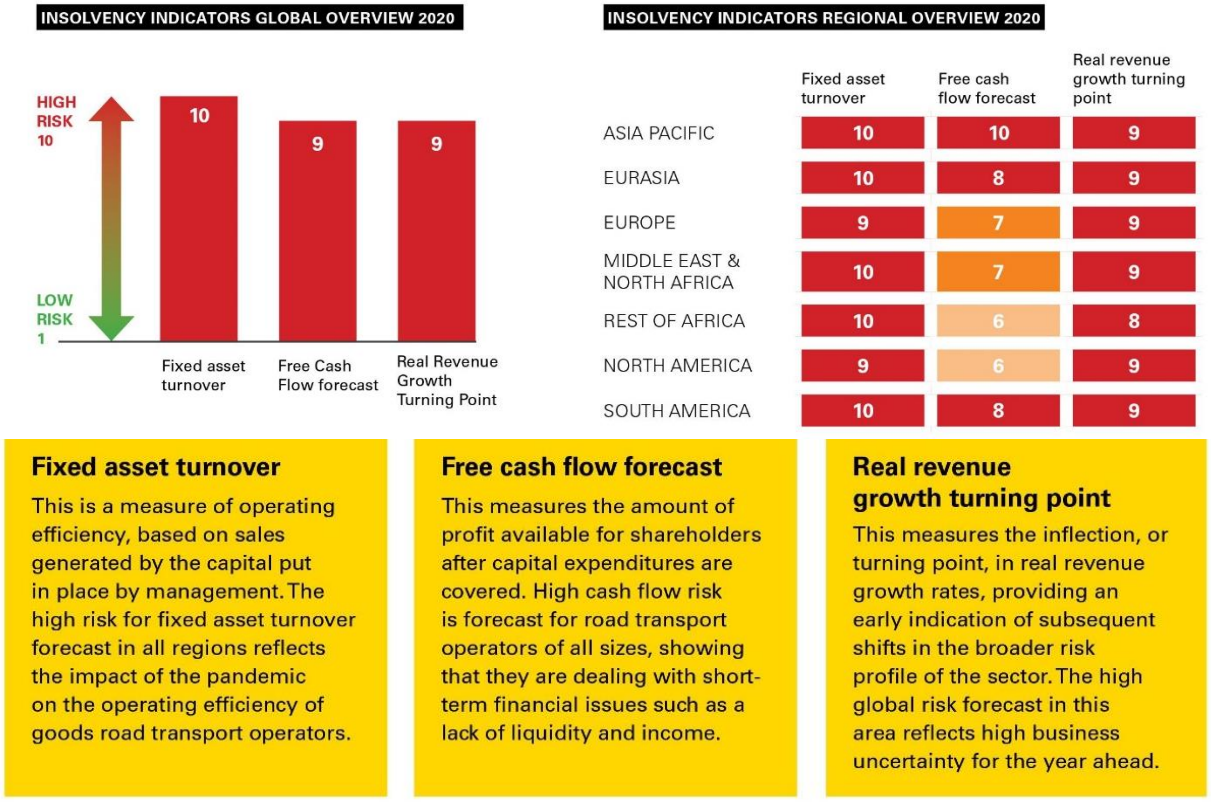

Fig.2.4 Insolvency Indicators both at the regional and global level (IRU, 2020)

(Karaman et al., 2020; Mitręga & Choi, 2021) buttress the fact that the sector is facing challenges because of the unexpected outbreak of the pandemic, it has experienced several setbacks affecting its operations, such as severe restrictions on imports and exports, reduced passenger demand, and changes in the transportation company's customer situation during the COVID-19 pandemic. (Ho et al., 2021) examined the impact of COVID-19 on freight transportation, with a particular focus on China. As the number of confirmed cases of COVID-19 rises, leading to emergency stockpiling and mismanagement of critical resources and facilities, as well as domestic demand and supply instability, COVID-19 is threatening road freight in China. It has been shown to have a negative impact on income, the market has changed consumer buying and spending patterns, Increased Fear, and Decreased Investment. (Richert et al., 2020) analysed plausible scenarios for how the COVID-19 pandemic could develop based on epidemiological and virology research and debate by dividing the pandemic fallout into three phases: Crisis Phase, Calibration Phase, and Conclusion Phase. (Richert et al., 2020) explored mobility behavioural demand, volatility, and modal choice. Some research also showed that the pandemic's impact on transportation varied by mode of transport. The decline in personal mobility is particularly evident for public transport (Automobil-Club; Aloi et al., 2020; Bucsky, 2020; De Haas et al., 2020; FOLLMER and LEPPLER, 2020; Klein et al., 2020).

And since the start of the pandemic, mobility demand dropped radically across Europe, (Richert et al., 2020) explained that the effects of the pandemic will have significant impacts on travel behaviour in the coming years. In Germany for instance, the national cell phone tracking data shows that between late February and late March 2020, the average distance travelled per day decreased by 47%, as shown in the figure below.

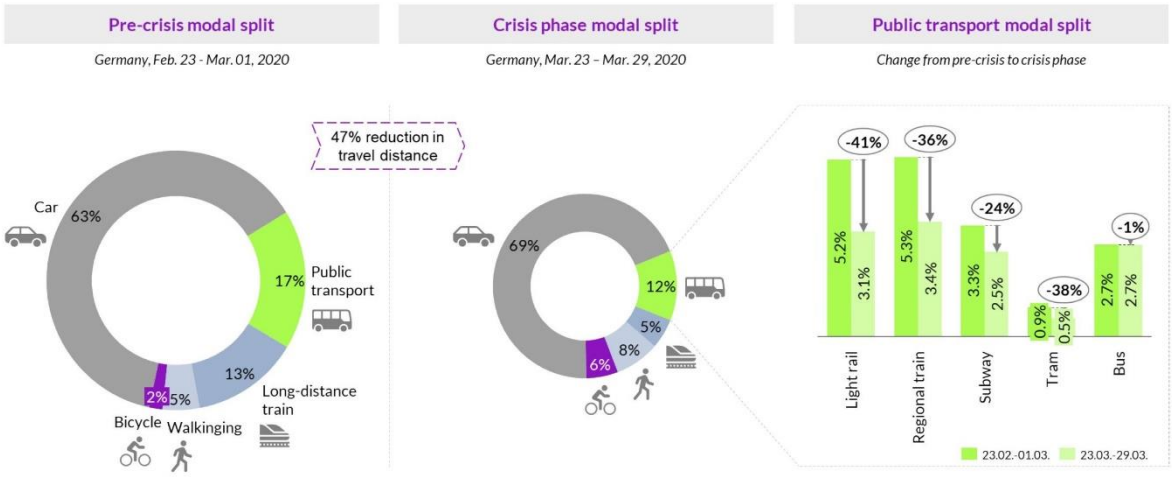

Fig 2.5. Growth of the modal split in Germany from the end of February to the end of March 2020 (Richert et al., 2020)

In addition, the data show a clear change in transport mode. Bicycles, with a modal share of more than three times, are emerging as a mode of transportation of the moment. The percentage of walking mode doubled, and the rate of car travel increased

also by about 10%. On the other hand, the proportion of public transport saw a decline to about one-third (Richert et al., 2020). Additional data shown in the figure below, confirms that demand for public transport in major German cities and some European capitals was down by around 75-95%.

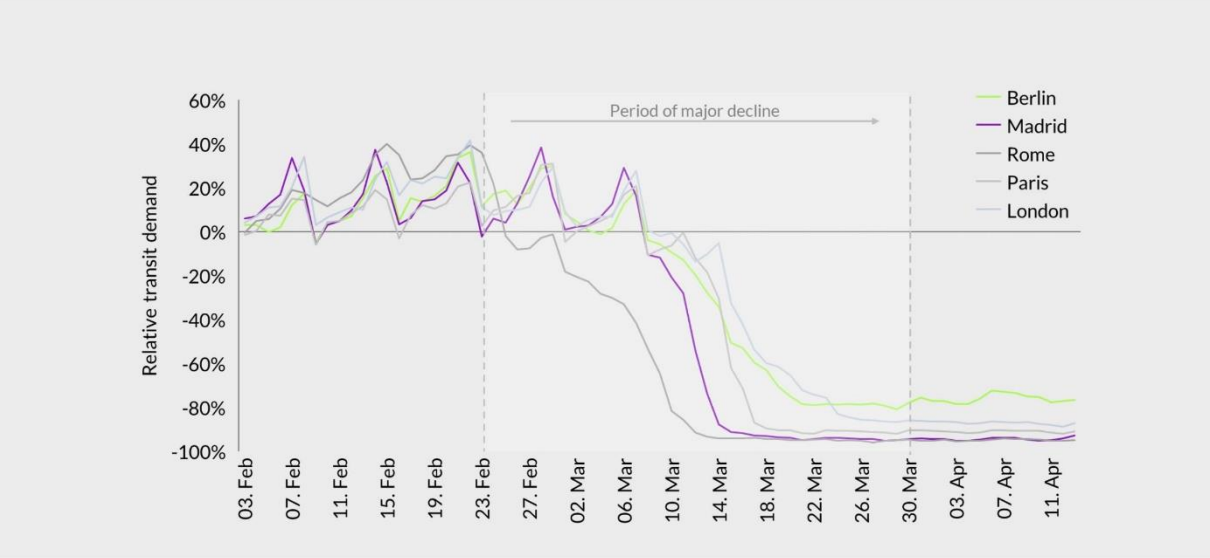

Fig. 2.6. Requests for Apple Maps driving directions per city as of January 13, 2020 (Richert et al., 2020)

In another study by (Eisenmann et al., 2020) focusing on Germany, a significant percentage of German survey respondents stated their intention to purchase a car due to the COVID-19 situation. This trend of wanting to purchase private car during the pandemic was also confirmed in another study that focused on Hungary, Spain, and China respectively (Bucsky, 2020; Aloi et al., 2020; Huang et al., 2020).

In Nigeria, the road transport systems are the most popular and widely used means of transportation (Nwafor and Onya, 2019). In his research, (Mogaji, 2020) discovered that public transport in Lagos, Nigeria became more expensive due to rising prices as passengers continued ignoring the strict lockdown measures put in place. This hike in fares has made it difficult for many commuters to afford public transportation.

2.8.2. Impact of energy crisis on the road transport sector.

The energy crisis of the 1970s began with the Yom Kippur War which broke out between Israel and various Middle Eastern countries on October 6, 1973. The Arab members of the Organization of the Petroleum Exporting Countries (OPEC) imposed an oil embargo on October 17, 1973, which initially targeted the United States, but quickly spread to Western Europe and Japan due to those countries' emotional support for Israel (Parish, 2009).

The embargo had an immediate effect. Oil companies were forced by OPEC to significantly increase their payments. Oil prices quadrupled in 1974 from US$3 per 42 gallons per cubic meter to nearly US$12 (US$75 per cubic meter) and from US$17 to US$61 per barrel in 2018 (Historian, 2013). The embargo triggered an oil crisis or "shock" that had many short and long-term implications for world politics and the global economy. Later it was called "the first oil shock", and the subsequent 1979 Oil Shock became known as the "Second Oil Shock". Figure 2.5 below explains the state of oil prices since 1861, and the effects oil shocks has had on oil prices.

The fall in oil prices created serious problems for oil exporters in northern European and Persian Gulf countries. Populous and developing countries that rely heavily on oil, such as Mexico, Nigeria, Algeria, and Libya, were unprepared for a market downturn, which left them in despairing conditions.

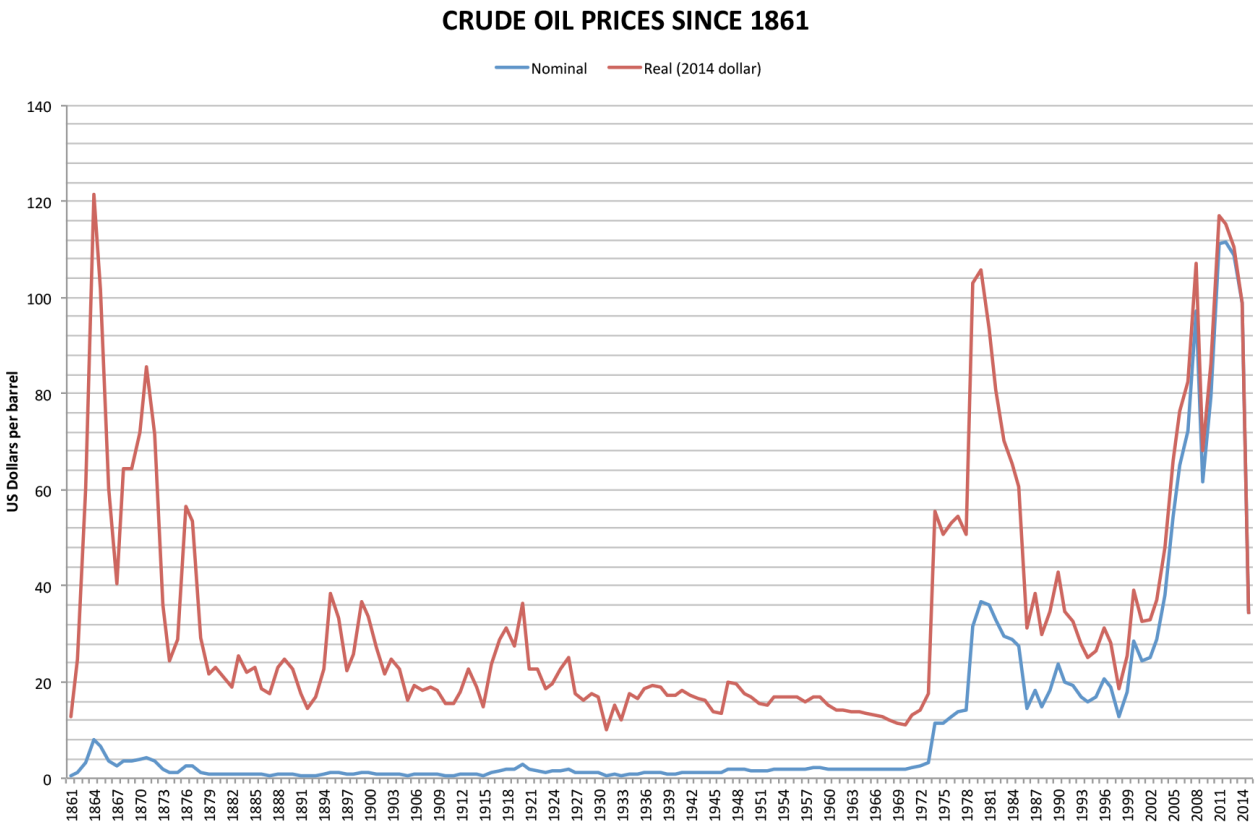

Fig. 2.7. Oil prices in US dollars, 1861-2015 (average US crude oil 1861-1944, Arabian Light 1945-1983, Brent 1984-2015). Red line is adjusted for inflation, blue line is unadjusted (Historian, 2013).

In retrospect, the energy crisis of 1973-1975 had little effect on long-term trends in car ownership and traffic. Analysing the data for this period (Parish, 2009) reveals four key points.

First, the monthly level of car traffic decreased by about 5% in 1974 compared with 1973. The first few months of the year were marked by fuel shortages and the effects

of Three-day week, but these ceased to be a factor in March. This is shown in the table below.

Table 4. The decrease in traffic in 1974 compared to 1973 (Parish, 2009).

Month	% Change in Traffic Levels (1974 on 1972)	% Change in Traffic Levels (1974 on 1973)
April	4.6	-4.4
May	2.3	-1.3
June	3.3	-6.5
July	-1.4	-6.9
August	3.2	-3.8
September	1.0	-5.3
October	2.0	-1.1
November	3.0	-1.4
December	0.6	13.3

According to the report by (Parish, 2009), These drops occur at a time when traffic levels typically increase by about 5 years. As a result, there is no doubt that traffic levels have declined due to the sharp increase in fuel prices (gasoline increased from 36p to 72p a gallon between mid-1973 and late 1974) and the economic recession of 1974. However, the decline was small suggesting a price elasticity of demand between 0.1 and 0.3.

Secondly, the decrease in traffic was due to the loss of transport trips, and not diversions to other modes. And the use of public transport had a slight change.

Thirdly, the drop in traffic was much greater on Sundays than on weekdays, Saturdays were slightly higher than weekdays which is shown in Table 5

Table 5. Change in traffic levels (Parish, 2009)

Month	% change in traffic levels (1974 on 1972)			
	Weekday	Saturday	Sunday	Overall
April	6.4	3.9	-3.7	4.6
May	3.1	1.4	-0.8	2.3
June	5.0	-0.1	-0.5	3.3
July	0.6	-1.4	-9.8	-1.4
August	4.5	1.2	-0.2	3.2
September	2.6	-0.5	-4.8	1.0
October	3.7	1.2	-4.6	2.0
November	4.0	-0.0	1.1	3.0
December	1.5	0.2	-4.1	0.6

	Journey Purpose		
Day of week	To and from work (%)	In course of work (%)	Other (%)
Weekday	30	22	48
Saturday	10	5	85
Sunday	5	3	92

These tables suggest that the primary impact is from leisure travel, and not during commuting or work. This is consistent with the lack of a modal shift to public transport. It seems that the main effect of the price increase is to convince people to give up leisure travel and instead utilized trains or buses for work trips (Parish, 2009).

Fourthly, the impact of the fuel price hikes was temporary, and growth resumed at its previous rate once the crisis passed. This was acknowledged by the Environment Department as a possible outcome when they released their latest traffic forecast in March 1975 (Parish, 2009).

2.8.2.1. Innovations inspired by the Energy Crisis

Great innovations can emerge as a direct result of a crisis (Durand and Sharma, 1982). The case of the OPEC oil crisis shows that this crisis can bring about entirely new industries based on state-led energy conservation and renewable energy. According to an Enel June 2022 report, the middle east energy crisis of the 1970's gave rise to the pursuit of technological innovation in advanced wind and solar energy research, with the first studies published online at the beginning of the following decade. In 1981, in Adrano, near Catania, Enel opened the 1 MW solar tower Eurelios, an innovative concentrator photovoltaic power plant. The experiment lasted for four years and provided important data for the subsequent development of solar cell technology. In the US, the Department of Energy was formed by an act of congress in 1977 in the aftermath of the 1973 oil crisis. It brought together most of the federal energy operations under one umbrella and provided the framework for a national energy plan that is comprehensive. A report by (Figueroa, 2013) stated that the oil crisis has major impact on economic development of developing countries. And this direct impact was mitigated by borrowing from petrodollar recycling, and the current account surpluses of exporting countries funded oil imports in developing countries. But in the recent decade, efficiency in energy, and renewable energy are columns of sustainable energy initiatives for all. Developing and emerging countries are seeing increased adoption of energy efficiency standards, objectives, and the implementation of national action plans (Figueroa, 2013).

(Solomon and Krishna, 2011) investigated sustainable energy transition that was spurred by the oil crisis, his research showed that few countries took significant innovative step on the aftermath of the oil crisis, and one of them was Brazil. When the oil crisis occurred, Brazil was importing about 80% of its oil. Another study by (Leite, 2009; Balat and Balat, 2009) showed that prior the OPEC oil crisis, Brazil was utilizing bio-ethanol as a transportation fuel since the 1920's. however as petroleum became inexpensive, Brazil switched from using Bio-ethanol to Petroleum, however as a response to the oil crisis, Brazil vigorously pursued ethanol production. According to the research, this decision was made based on economic and political factors, with multiple government goals aimed at reducing oil imports, supporting domestic sugar

producers, and boosting domestic auto production. Through this initiative, Brazil became the largest exporter of ethanol in the world, alongside the US, leading the world in ethanol technology (Hira and De Oliveira, 2009). Interestingly, the research by (Solomon and Krishna, 2011) showed that ethanol production provided over 700,000 jobs for Brazil in 2004, demonstrating higher employment intensity than other energy sources, as shown in fig 2.8

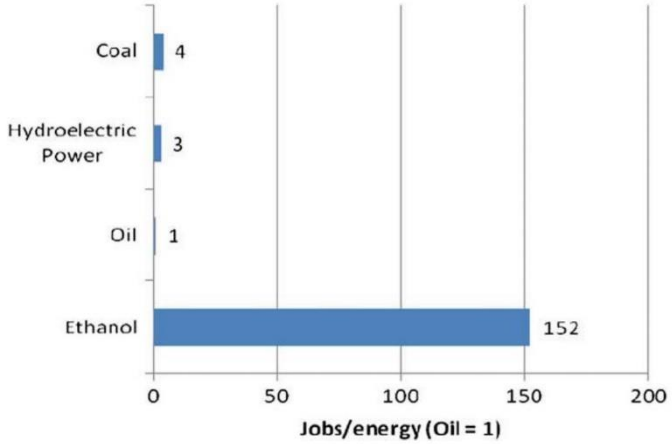

Fig. 2.8. Jobs are created by energy sources in Brazil (Solomon and Krishna, 2011)

Another case study country that was looked into by (Solomon and Krishna, 2011) was France. As of 1973, over 70% of France's total primary energy supply was oil. Almost all of the country's oil supplies are imported, with Middle Eastern countries contributing 71.6% of the total (Andriosopoulos and Silvestre, 2017). Struggling with the oil embargo, France turned to nuclear power to replace it as the main source of electricity. In the 30 years from 1971 to 2001, France built a total of 58 nuclear reactors, which increased the total nuclear energy supply from less than 5 million tonnes of oil equivalent (Mtoe) to over 100 Mtoe in 2008 as shown in fig 2.9 below.

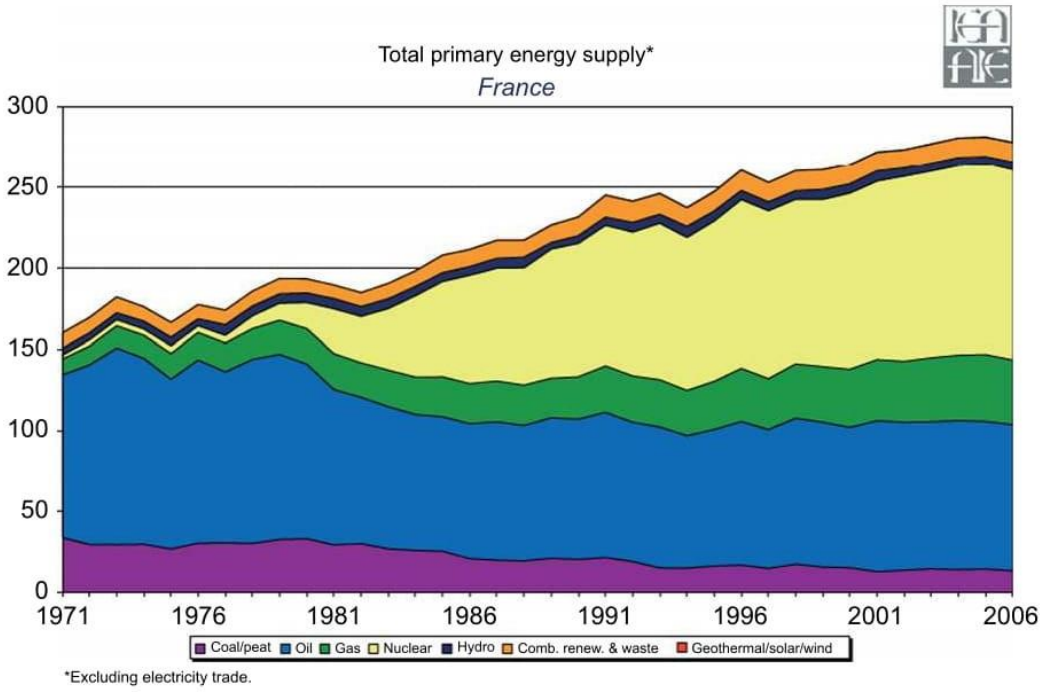

Fig. 2.9 total primary energy supply in France (Solomon and Krishna, 2011).

The literatures reveal that crisis can spur innovation in a way never before imagined. According to a study by (Furstenthal et al., 2021) crisis is the adrenaline of innovation, and leading innovators are seizing these conditions to reshape thinking and behavior, seizing opportunities to discover new solutions, and making bold bets that can stimulate growth.

2.8.3. The Impact of Civil Unrest on the Road Transportation Sector

According to a September 2022 world bank report, transportation is essential to support economic growth, create jobs, and connect people to essential services such as health care or education. Events of civil unrest can put the transportation industry at high risk, endangering employees, and slowing the movement of goods. In some cases, unrest tends to lead to hostilities and violence, blocking important transport routes. (Kollias and Tzeremes, 2022) his paper examined the relationship between civil unrest and economic growth, taking a range from 2000 to 2018, in 29 countries in the Middle East and Central Asia. The research showed that civil unrest and instability are harmful to the economy because they seriously disrupt the normal day-to-day running of economic activity.

According to Statistics South Africa, in the first quarter of 2021, the transport sector contributed R23.57 trillion to South Africa's GDP. The July 2021 civil unrest in South Africa is a recent case of how societal disorder impacts the transport sector. Rating agency Standard & Poor's estimates the cost of the riots to the national economy at R50 billion. Contextualizing economic impact, the road freight transport moves more than 70% of all manufactured goods in South Africa. Hence when the riots broke out on 9 July 2021, some national roads along the north coast of Durban and between Cedara and Harrismith were affected, resulting in More than 40 trucks been damaged at an estimated cost of R250-300 million, 26 of which were damaged at the Mooi River along highway N3 (Vhumbunu, 2021).

(Bonga, 2021) explained that over the last decades, South Africa has experienced a series of protests of varying magnitude and reasons for it. These series of protests as itemized in the table below, some of which has disrupted the road transport sector, operations of businesses, which makes it difficult for trade facilitation, and in turn negatively affects the economy.

Table 6. Some historical civil unrest in South Africa (Bonga, 2021)

Protest Name and/or Place	Year(s) of Event	Protest Name and/or Place	Year(s) of Event
Harrismith protest	2004	Siyahlala shack settlement	2012
Kennedy Road road blockade	2005	Marikana miner strike	2012
Khutsong protests	2006 & 2007	Grape farms in the Western Cape	2012 & 2013
N2 Gateway occupations	2007 & 2008	Sasolburg [municipal demarcation]	2013
Symphony Way road occupation	2008	Protea South, Soweto	2013
Balfour protest	2009	Bekkersdal, Roodepoort and Bronkhorstspruit	2014
Macassar Village Land Occupation	2009	FeesMustFall student protests	2015 & 2016
Durban proletarian shopping protest	2009	Zandspruit	2016
Abahlali baseMjondolo march	2010 & 2013	Westbury, Johannesburg	2018
Shaka's Kraal in KwaZulu-Natal	2011	Service delivery protests	2019
Samora Machel squatter camp	2011	Jacob Zuma Protests	2021

Data from the 2020 Global Peace Index, it shows that civil unrest has doubled worldwide over the past decade, with the number of violent and nonviolent protests increasing sharply. Civil unrest has increased 282% over the past decade, with 58% of countries experiencing violent protests in 2019 reflecting long-term trends. Civil unrest is becoming the top political risk for businesses, as evidenced by the results of a 2021 Allianz Risk Barometer, which shows that for the first time since 2018 "civil unrest returned back to the top 10 risks.

2.8.3.1. Innovations Inspired by Civil Unrest

According to the IRU, one of the best ways to improve operations in the road transportation sector is to innovate with new technologies. Because industries around the world are being revolutionized by technology, making processes faster and more cost-effective, while also providing new ways of solving problems.

A notable technological innovation that has the capability to provide rapid insight to transporters on road conditions, and how to navigate troubled areas is the Intelligent Transportation System (Mazur, 2020). According to the U.S. Department of Transportation, "Intelligent Transportation Systems (ITS) apply a variety of technologies to monitor, evaluate, and manage transportation systems to improve efficiency and safety."

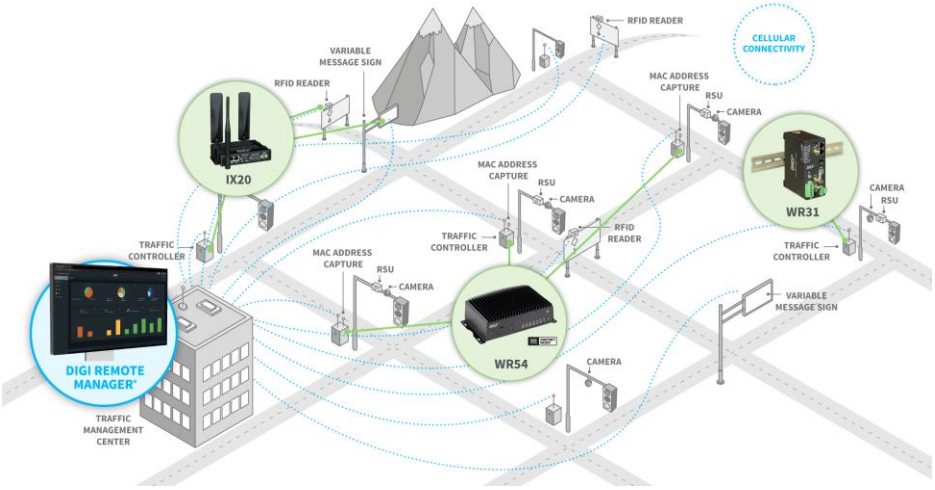

Fig. 2.10. The ITS road networking system (Mazur, 2020)

As shown in fig. 2.10 above, the system enables the city's traffic management center to communicate with other authorities and emergency responders by sending alerts about hot spots or city-wide issues that affect the city's road congestion, public safety, and emergency systems, to act, and to communicate with other agencies and emergency responders (Mazur, 2020). (Quessada et al., 2020) explained that the system has the capability to provide real-time data on the conditions of the road and

can suggest alternative routes to the driver to avoid the location where an event is occurring or allow the driver to act on information it received from a specific road.

2.8.4. The Impact of the 2008/2009 Global Financial Crisis on the Road Transport Sector

The transportation sector is closely linked to a country's economy and applies mostly to urban areas, which play an important economic role in a country's GDP (Moschovou and Tyrinopoulos, 2018). During the financial crisis of 2008/2009, the global economy shrank severely, and as a result economies around the world faced a 7.5% decline in real GDP even in the first quarter of 2008 (IMF, 2009). In the European Union, GDP fell by 4.6% in 2009, the peak of the crisis, and household consumption fell by 1.8% (Cascajo et al., 2018). According to (Cordera et al., 2015), variables based on the macro economy such as per capita income, fuel prices, and unemployment all had a significant influence on transportation demand during the crisis. Many scientific studies on the impact of the global economic crisis showed that certain changes in transportation behavior have occurred during periods of recession (Rothengatter, 2011; Sobrino and Monzon, 2014; Campos-Soria et al., 2015).

(Antoniadis) In his research explored the relationship between economic activity and the road freight transport sector. In a study done by the world bank which covered 33 countries at various stages of development and using 1989 data, shows that road freight transport closely follows the gross domestic product. Through the regression analysis approach, it was discovered that Gross Domestic Product (GDP), described 89% of the variation in tonne-km on the road. In the sample from the 17 developed countries, the elasticity of road ton-kilometers to GDP was 1.02.

The impact of the global economic crisis on trucking volumes was analysed by (Wrzesinska, 2011), which took into consideration the total volumes (tonnes/km) as derived from Eurostat. The findings revealed that there was a 10% decline between 2008 and 2009, with the conclusion that the global economic crisis reversed the growth in road freight transport seen six years earlier preceding 2009. In addition, she found that older member states of the EU had greater declines than newly admitted members. Road freight transport in Italy, Denmark, Austria, and France decreased by more than 40%, while the two new member states (Poland and Bulgaria) registered around 10% growth during the crisis.

The conclusion from (Antoniadis) research that explained the relationship between economic activity and the road freight transport showed that road freight transport is closely related to economic activity. This strong relationship is partially illustrated in Figure 2.6, the analysis showed that road freight transport and GDP followed the same trend until the economic crisis hit Europe in 2008-2009.

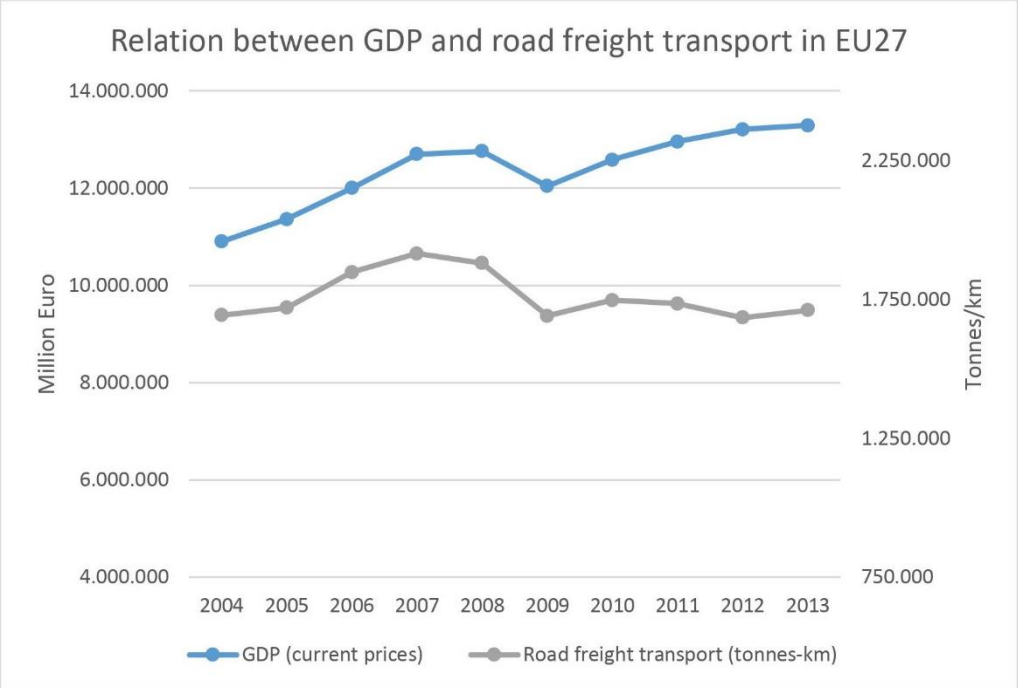

Fig. 2.11. GDP and road freight transport ratio in EU 27 (Antoniadis)

A high proportion of economic activity takes place in metropolitan areas and capital cities, often seen as targets of employment opportunities and logistics distribution centres (Moschovou and Tyrinopoulos, 2018). According to data from the EU, 85% of the EU GDP is produced in urban regions. The growth of GDP per capita between the year 2008 and 2014 compared to the EU-28 average registered a decline in several EU regions (Eurostat, 2016). The economic crisis affected freight movement in many countries, but the hardest hit within the European Union was Spain, Italy, and Portugal. The report also showed that road traffic since 2005 in Italy has been on a downward trend. In Portugal, road freight was hit hardest. Between 2005 and 2012, both tonnes and tonne-kilometers have clearly declined. The change in domestic tonnage was -58%, while international tonnage was -30% (Portugal, 2010).

The EU facts and figures showed that the demand for passenger transport in passenger kilometers (p-km) in EU-28 countries had a fairly steady rate of increase until 2009, as shown in fig 2.6 below. It declined slightly in 2010 (around 1.5%), rose again between 2011 and 2009, and stabilized in 2012. Freight demand in t-km shows a different trend. After a large rise through 2008, and in 2009 experienced an equally large decline (Moschovou, 2017)**.** And after three years of trying to grow, it declined again in 2012. The GDP of the 28 member states of the EU fell sharply in 2009, but passenger transport demand increased slightly in the same year, suggesting passenger activity is less affected by changes in GDP as opposed to freight activity, which has not kept pace with GDP growth. The EU's freight traffic performance tracks closely with changes in GDP, even outpacing economic growth in 2004 (Agency, 2013).

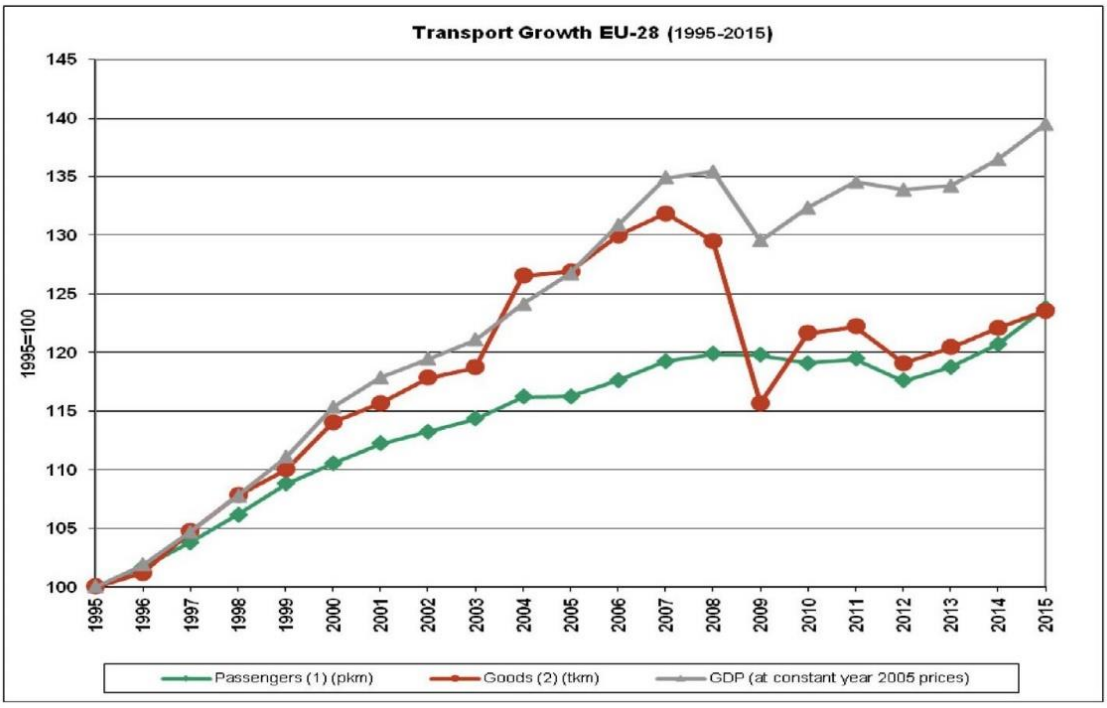

Fig. 2.12. Growth of passenger and freight transport relative to EU 28 GDP from 1995 to 2015 (Moschovou and Tyrinopoulos, 2018)

The International Road Transport Union (IRU, 2009), in its report stated that during the economic crisis, demand for important freight transport services significantly slowed down, further accelerating the rate of decline. The report further stated that data obtained from Road Freight Organizations and government sources for the fourth quarter of 2008 showed:

- A reduction in road freight activity of up to 50%.
- Doubled bankruptcy.
- The unemployment rate increased significantly which includes both permanent or temporary layoffs, reaching 140,000 job losses in the EU, in CIS countries about 120,000 and 200,000 job losses in North America.

The 2009 transport forecasts were very disturbing. In the first quarter of 2009, Freight transport rates generally fell. The same alarming situation is reflected in the passenger transport market, according to the tourism market. The report also stated that the taxi business section saw a 20% decrease in airport transportation services. In the US, the Bureau of Statistics measured the long-term growth of the freight transportation service within the period of 1976 to 2016. According to the report, during the economic crisis freight transport services declined by 13.2% between (December 2007 to June 2009). Fig. 2.13 shows the detrended and smoothed TSI_f from January 1979 to December 2016.

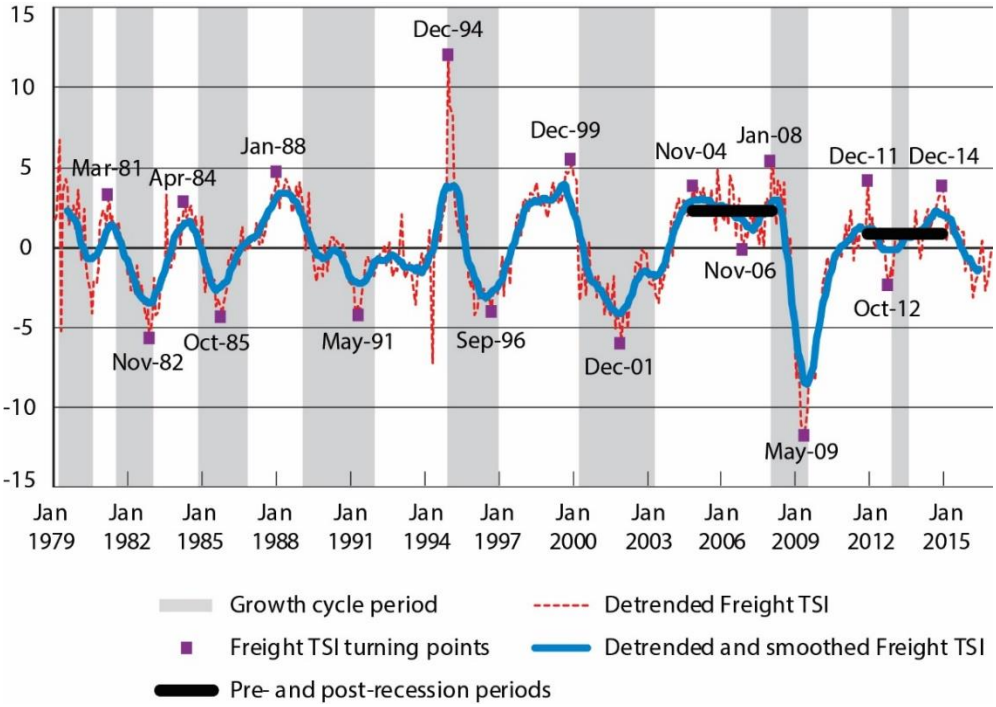

Fig. 2.13. Detrended and Smoothed Freight TSI_f (Jan 1979 to Dec 2016) https://www.bts.gov/topics/transportation-and-economy/long-term-growth-freight-transportation-services-0

The detrended and smoothed Freight Transportation Services Index TSI_f started rising rapidly after reversing in May 2009 (a month before the economy accelerated due to the recession) but also slowed. Growth in the few years after the recession is also lower than that before the recession, as shown by the detrended and smoothed TSI_f values. Detrended and smoothed values have only risen marginally above zero since the recession. The detrended and smoothed mean from December 2011 to December 2014 which is (0.85) is lower than the peak-to-peak mean of (2.28) from November 2004 to January 2008 before the recession, indicating a slowdown in freight transport growth following the recession. (US Bureau of Statistics, 2022).

2.8.4.1. Innovations Inspired by the 2008/2009 global economy crisis.

The surge in start-ups played a pivotal role in fostering economic growth post the 2008 recession, encompassing even those fledgling enterprises that eventually gained widespread recognition. Amidst the most challenging phases of the financial crisis, start-up endeavors experienced a notable uptick. The year 2009 witnessed the birth of over 500,000 new enterprises, coinciding with a rise in the National Entrepreneurship Index. Noteworthy names such as Dropbox (2008), Uber (2009), Venmo (2009), WhatsApp (2009), among others, introduced highly significant and disruptive technologies that brought about a profound transformation in the competitive landscape. The proliferation of these new solutions has forced established businesses to try to catch up even beyond the post-recovery phase of the crisis (Dullea, 2020).

Studies have shown that organizations that ignore innovation during economic crises tend to fail. This is always true, especially in times of recession or depression. Notably, Apple is a company known for innovation, (ROTHAERMEL) in his research explained that Innovation has been one capability that has kept Apple at the forefront, from its inception to survival, success, and ultimately profitability and the envy of the industry. Apple released the iPod in 2001, during the dot-com boom, and the iPhone in 2007, as shown in fig 2.14. The two products recorded huge successes, which helped Apple grow into the trillion-dollar company it is today. Apple was termed by the media as the "recession resistant company".

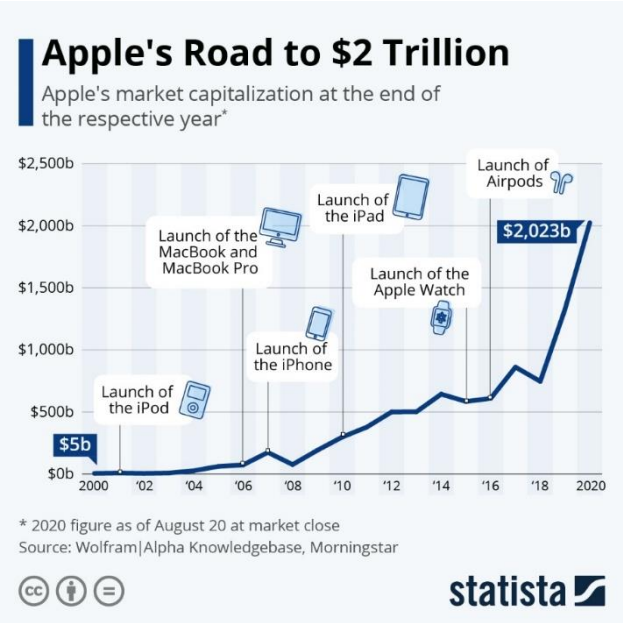

Fig. 2.14. Apple's market capitalization at the end of the respective year (StudyCorgi, 2022)

However, after a slow pace as shown in fig 2.15, apple began climbing the ladder in 2005 and took 70% of the market share in the portable music player industry. And while the recession of 2008-2009 reduced sales, the company recovered quickly. iPod sales skyrocketed during the post-recession holiday season, which was a special gift and a perfect fit for the affordable premium slot. The growth of apple continued, despite the recession, and was among the very few companies that weren't caught up in troubled waters. All innovations, including the iPhone and MacBook versions, continued to contribute to its growth.

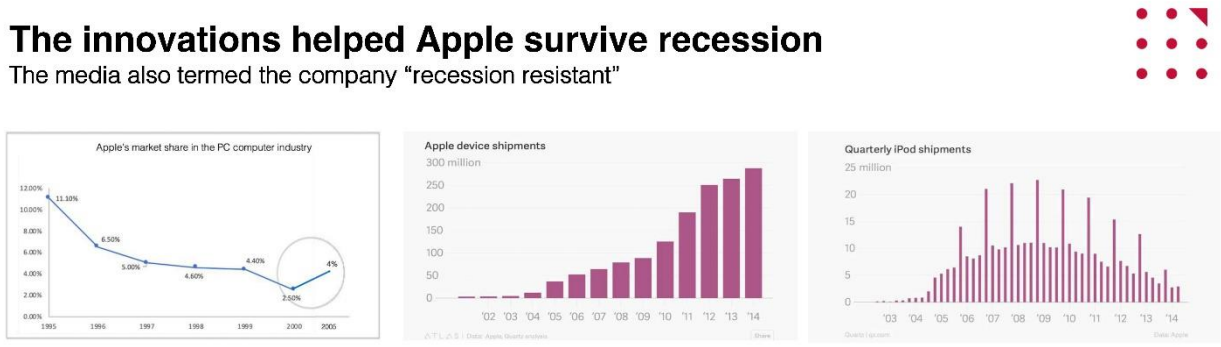

Fig. 2.15. Growth of apple products during and post-recession (StudyCorgi, 2022)

2.9. Management of Technology

2.9.1. Developing a formal definition

(Thamhain, 2005) stated that Technology management connects the scientific, engineering and management disciplines to develop, plan, and implement technology capabilities to shape and achieve an organization's operational and strategic goals. The dimension of the above explanation is illustrated in the figure below.

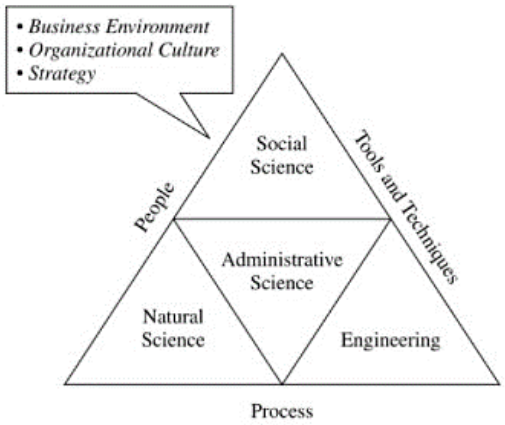

Fig. 2.16. Dimensions of technology management (Thamhain, 2005)

Technology management is an interdisciplinary field that involves two aspects of knowledge. Science and engineering with broad disciplines in (1) organization and management, and (2) other disciplines that support technology or management, such as information technology, social sciences, and industrial engineering.

2.9.2. Technology Management in Organizations

In the mid-1960s, Joan Woodward illustrated the link between technology and organization. Based on her research on production technology, she was the first to see organizational structure from a technical point of view. In the 1950s, considering the technical complexity of the production process, Woodward built a measure to distinguish companies. Therefore, high technical complexity simply implies that most of the work carried out is done by machines, then low technical complexity refers to the inclusion of nearly all specialist in the execution of the work. (Ahmad, 2014).

Technology is a dynamic force, and on this premise, the sphere of technology management has developed to address how companies ought to approach the utilization of technology in operations and business strategies. Technology is innately challenging to manage since it is always evolving regularly in unpredictable ways. Technology management refers to the set of practices and policies that leverage technologies to develop, maintain and enhance a firm's competitive advantage based on patented information and know-how (Shane, 2009)

All organizations use different forms of technology to run their businesses, which do have a significant and decisive effect on the nature, operation, design, and organizational structure. In an organization, divisions and departments develop around equipment used for information, production, communication, or control. From as simple as the procurement of a personal computer with a word processor to investing in the latest automated manufacturing equipment (explaining the impact of technology), the range of technologies that companies can implement or use is enormous. (Ahmad, 2014).

In addition to the rapid increase in complexity of this technology, the rate of change is also skyrocketing. Developing Modern-day computer systems are the most intricate human activity an organization has ever done. Its application is also very difficult and beneficial for all kinds of enterprises. (Dasgupta et al., 2011) affirmed that technology is changing rapidly, and it still makes a significant contribution to a volatile and highly competitive market.

Since the 1990s, much expertise has arose connecting technology management with broader business operations and strategies. According to (Thamhain, 2005) Technology is widely recognized as a resource to do business more efficiently and support economic growth in all corporate functions, from concept to distribution. Technology has also become a strategic weapon for the unique positioning of products and services in the marketplace, and technology management has become the domain of professional managers.

Today's businesses must operate in an environment of increasing global competition, rapid technological change, time pressures and maximum efficiency. Almost every company has the goal of making things cheaper, better, and faster (Thamhain, 2005). Success is largely determined by the organization's ability to effectively integrate the use of technology (Thamhain, 2005). Technology management is acknowledged as a core competency that is essential for the growth and survival of nearly every business. This involves the development of some new technologies, but most often for developing and improving products and services for More efficient, faster, more flexible, and more socially responsible operations. Focuses on the application of technologies to improve business processes (Thamhain, 2005).

2.10. Organizational Change Management

To meet a variety of challenges, businesses must continually evolve and adapt from technological changes and the emergence of new competitors, legal or regulatory changes, or potential economic trends or directions, of which failure to do so may result in stalling or worse, loss of operations. (By, 2005)

About 50% of all organizational change activities fall flat, which shows the importance of understanding how to plan, facilitate, and implement change which is a vital skill for business leaders and managers (By, 2005)

Organizational changes are the actions that a company takes to change or adjust important parts of the company's structure. This can include internal processes, company hierarchies, underlying technologies and infrastructure, company culture, or other important aspects. (By, 2005)

Organizational change can be transformative or adaptive. (By, 2005)

- Adaptive changes are minor, incremental, iterative changes that organizations often make to advance their policies, workflow, products, and processes over time. Employing new team members to meet growing demand or implementing new telecommunications policies to pull in more qualified job seekers are all instances of adaptive change.

- Transformative changes are more critical in scope and scale, which often means a dramatic and, in some cases, an abrupt departure from the current situation. The launch of a business division or new product, or choosing to increase globally, are instances of a transformational change.

2.11. Organizational Resilience

(Vogus and Sutcliffe, 2007) Organizational resilience is defined as sustaining positive change under difficult conditions so that the organization becomes stronger and smarter. By "difficult conditions" meaning silent mistakes, scandals, crisis, and shocks, as well as disruptions of routine and continuous risks (e.g., competition), stress and tension. Also include both conditions (exogenous shock and constant stress). Studies have shown that the build-up of small outages can compromise system security as easily as larger events. Resilience helps organizations move from one form of strategic flexibility to another and respond effectively to changing conditions. According to (LengnickHall and Beck, 2009), organizational resilience is a multidimensional organizational attribute that enables an organization to absorb, respond effectively, and be able to benefit from unexpected surprises.

(Lengnick-Hall and Beck, 2009) also added that the potential of organizational resilience offers a basis for flexibility, hardiness and insight into creating new ways for businesses to recover and often thrive when faced with adversity and uncertainty caused by intermittent pressures in the ecosystem. (Gittell et al., 2006) asserts that organizations survive crises better when they maintain strong financial reserves and

relationships and have a business model that fits the requirements of the current competitive environment.

2.11.1. Achieving Resilience Capacity

Organizational resilience results from interactions between specific contextual, cognitive, and behavioural factors. (Lengnick-Hall and Beck, 2005) A mental process and conceptual orientation known as cognitive resilience enables organizations to identify, translate, evaluate, and prepare responses to evolving situations to which they are unfamiliar. Cognitive resilience contributes to the creation and selection of behavioural alternatives and the decision to initiate action by businesses. While Behavioural resilience is the honed and practiced behaviours that become part of a firm's innate response to sudden crisis, stimulate the development of routines, resource structures, and interaction patterns that embody the firm's response (Lengnick-Hall and Beck, 2016).

These behaviours are intended to generate and leverage enterprise flexibility. Contextual resilience represents a system of communications and resources that provide the background for a company's response to disruptive situations. Contextual resilience merges social relationships to support a framework for swift response to new situations and a network of prospective resource contributors that expand the scope of feasible resource choices and combinations that businesses can consider in disruptive environments. The above dimensions (cognitive resilience, behavioural resilience, and contextual resilience) explained above, all acts in different capacities, yet they complement each other in producing an organization’s reaction to disruption.

2.11.2. The role of positive relationships for individuals, communities, and organizations.

Numerous studies have revealed that positive relationships do enhance better results for individuals, communities, and organizations (Cameron et al., 2003; Dutton and Ragins, 2017). Greater physical and psychological well-being is a positive social attitude towards people (Ryff & Singer, 2001) Reduced stress and increased energy that positive relationships create reduces the risk of death (Seeman, 1996). A positive relationship affects the body's endocrine, immune, and cardiovascular systems, and improves health and well-being as well as the relationship itself (Heaphy and Dutton, 2008). The density and structure of a community's social bonds predict its economic viability. The presence of social capital and positive social networks contributes to community-level achievements such as education, financial well-being, and crime reduction (Baker, 2000). Social capital promotes knowledge transfer in an organization (Nahapiet and Ghoshal, 1998) and achieve consistent behaviour (Faraj and Sproull, 2000) among members of the organization.

2.11.2.1. Sources of Resilience

2.11.2.1.1. Relationships as a source of sustainability

The position of relationships is mainly vital while thinking about how people and groups reply to crises. Most organizational principle has centred at the terrible effects of disaster consisting of tipping points, vicious cycles, threat-rigidity and downwards spiral (Weick, 2003), however, some organizations have shown a tendency to grow and prosper significantly during times of crisis. These organizations show resilience.

Colloquially, resilience refers to the ability to "absorb stress and maintain consistency" (Oxford English Dictionary). In organizational science, (a) means maintaining positive coordination in difficult environments. (Kanov et al., 2004), (b) Ability to recover from unfortunate situations (Vogus and Sutcliffe, 2007), and (c) Ability to achieve desired functions and results Maintain stress along the way (Bunderson and Sutcliffe, 2002). According to (Wildavsky, 1988) Resilience is the dynamic ability of an organization's flexibility to evolve and change over time. This is not a static property that may or may not exist within the organization. Rather, it is the result of a process that enables organizations to keep their resources flexible, agile, convertible, and sustainable, avoiding undesirable trends and responding positively to unpredictable situations (Vogus and Sutcliffe, 2007).

These procedures help maintain the resilience and positive social relationships of people in the workplace (Anderson et al., 2006). However, a growing body of empirical evidence supports the notion that active workplace relationships or relationship retention is a prerequisite for organizational resilience.

These results stem from the type of relationships between the organization’s members. The nature of mutual emotional, moral, and social mutual aid is a major factor in the resilience of an organization's (Carver et al., 1989).

In a study in which subjects experienced similar levels of stress, (Aiello and Kolb, 1995) found that close group members experienced the least stress. Similar data show that collective employee support reduces the negative impact of work stress on performance.(Moyle and Parkes, 1999) (Schaubroeck and Fink, 1998) when faced with work stress, positive relationships serve as a key survival resource, which enables both the individuals and organizations to develop the needed resilience.

Personal caregivers, other talented adults, and children with close relationships with their peers, and children living in close communities did better (Masten and Reed, 2002).

2.11.2.1.2. Financial reserves and business models as a source of sustainability

(Wukich, 2013) along with social support, he argues that maintaining financial reserves in a form that is resilience enough to deal with unforeseen events is an important mechanism for building resilience. Likewise, the study of hospital response to Doctor's unexpected strikes, (Meyer, 1982) observed that untapped resources act as "systematic shock absorbers" that cushion the effects of environmental shocks. in the study one of the hospitals that showed resilience was able to adapt to a crisis without laying off staff by accumulating a lot of money during quiet hours. In other hospitals, a strong organizational ideology that emphasizes the well-being of its employees has had a profound impact on the organization's responsiveness towards external shocks. The hospital suffered a short-term loss of profits for not laying off staff, but this strategy helped them maintain their commitment to their staff and adapt right after the crisis. Based on the question of appropriate resources, it is hypothesized also that in today's competitive environment, business models are another important source of crisis resilience. Financial buffers help organizations weather the storm by providing loss protection, but with business models which meet the requirement of today's competitive environment, organizations are expected to will minimize those losses and recover faster. Amid the current crisis, a viable business model can be especially important in addition to reserves.

2.11.3. Resilience in Crisis

Whereas individual resilience alludes to the mental capacity to elude negative emotional experiences and adjust flexibly to the changing requirements of the environment, organizational strength – following (Blanco, 2018) defined resilience from an organizational point of view as the capacity of a firm to successfully develop specific responses, absorb, and eventually participate in transformational actions to take advantage of potential surprises that may undermine the existence of the organization. Hence, the concept of organizational resilience includes adaptability, resistance, and adaptation as key characteristics, and relates to the capacity to absorb shocks, reorganize, and learn, and adaptation as a key competency.

(Kayes and Yoon, 2016) argued and developed their primary theory around organizational resilience: Organizational failure stems from a rift in learning, even if by chance, the breakdown method itself could be a learning mode, the latter being the primary source of recovery from events. Thus, learning by experience, especially, is a valuable intervention for maintaining resilience in the event of an accident, natural disaster, or crisis. By learning, people can better understand the incident and create actionable responses in the future.

As a central source of resilience, learning is a key driver of survival: learning, particularly experiential learning, describes how organizations stay resilient within the face of crisis, breakdown, and disaster. Organizations are vulnerable when learning from experience is handled lightly. Consequently, failure to learn contributes to and is the cause of several organizational failures.

2.12. Competitive Advantage

(Porter, 1985) defined competitive advantage as the position a company occupies over its competitors. It defines an organization's "uniqueness" in its relationships with its competitors. This suggests a distinct, and ideal long-term advantage over the competition. Competitive advantage is the premise of a good strategy, and a good strategy makes a competitive advantage (Analoui and Karami, 2003). It is more than an idea of a competitive strategy that may or may not be unique (Johnson et al, 2005). (Rothaermel, 2016) asserts that gaining and sustaining competitive advantage is the defining question of strategy.

(Porter, 1985) emphasized that competitive advantage is developed and sustained when a business performs its most important function, which is cheaper or better than its competitors. He goes on to say that sustainable competitive advantage needs efficient control over cost factors, and economies of scale, connectivity, learning, interconnection, and timing offer key opportunities to create benefits. (Porter, 1985) It shows how companies in the industry can achieve broad profits or focus on one or several specific areas. He claims that he can use cost advantage, differentiation, and focus to gain an advantage.

(Thompson et al., 2013) Large companies generally assume that they are gaining a competitive advantage from multiple sources. Porter (1985) argues that speed and rapid response to opportunities and threats can deliver benefits primarily through cost reduction and differentiation. The most successful companies innovate to fill the competition gap, constantly looking for new forms of benefits, and then staying ahead. There are few sources of individual benefits that can be sustained over the long term. Achieving a competitive advantage requires the organization's specific skills, assets, and capabilities.

The success of a competitive position means that the client's view of the quality or relative value of a product or service relative to the price of a competitor’s product or service is consistent with the price of the product or service. competitive service. (Segal-Horn, 2015) It provides an alternative, but clearly relevant view of competitive advantage, focusing on three C’s customers, competitors, and companies. The customer ultimately decides whether the transaction will be successful by purchasing the product or service. Businesses are organized based on specific characteristics, and their structure and management methods determine the cost of a product or

service, but competitors also differentiate their products, and services, resulting in costs.

2.12.1. The generic building blocks of competitive advantage

(Hill et al., 2014) These are common blocks of competitive advantage that can be customized by any company, irrespective of industry, product, or service. They are closely related and include efficiency, quality, innovation, and customer distance. Efficiency gives companies a cost-effective competitive advantage through employee productivity, as measured by productivity per employee. Quality products are products and services that you can trust in the sense that they are doing their job well. High quality has two impacts on competitive advantage. (Munizu, 2013). First, it raises the value of the product from the consumer's point of view, and second, it increases productivity and reduces the unit price. Innovations include product types, organizational structures, production process, management systems, and advances in corporate-developed strategies. Competition is seen as an innovation-driven process for providing businesses with something unique that can either charge a much higher price for a product or offer a much lower unit price than its competitors.

Achieving excellence and innovation is essential to achieving customer responsiveness because customers will value your products more and create competitive advantage based on differentiation. (Dirisu et al., 2013) He emphasized that customer response time is an aspect of customer response and can be a major source of customer satisfaction or dissatisfaction. The unique requirements of each customer group, beautiful design, good service, and after-sales, as well as the need to adapt products and services to serve and support also enable customers to build loyalty with the brand. performance, all of which contribute to responsiveness.

2.12.2. Basis of competitive advantage

(Porter, 1980) Characteristic general strategic models at the enterprise level are usually acknowledged as a major model in the marketing literature and strategic management. According to Porter, good performance can only be achieved by the company's dedication to at least one common strategy (focus, low cost, differentiation). Over the years, a great deal of empirical literature has been devoted to the question of whether a company can successfully pursue a combination of these strategies. Its best component refers to corporations competing at home, while best a small component is worried with corporations competing in overseas markets (Salavou and Halikias, 2009). It has been discovered that the ability for knowledge transfer from one department to another, in both manufacturing and service sectors promotes organizational performance of firms (Argote and Ingram, 2000). Although knowledge transfer benefits have been recognized in many contexts. However, it varies widely between organizations.

2.13. Competitive advantage in economic crisis

An important aspect is gaining insights into why a few companies tend to gain a lasting competitive advantage and others don't. One reason for this; is the focus on internal capabilities and resources as a basis for gaining sustainable competitive advantage for the company (Alrhaimi, 2015). During economic crises, the sources of competitive advantage can be knowledge, relations, structure, and cost (Alrhaimi, 2015). A key approach to a possible source of competitive advantage is to focus on a company's strategic capabilities and competencies.

2.14. Industry 4.0 in Road Transportation Sector

Industry 4.0 involves the integration and development of innovative ICT in the industry (Barreto et al., 2017). The primary goal is to foster the integration of intelligent products and processes across the entire value chain. This integration empowers the organization to enhance its efficiency in producing goods and services, thereby elevating the quality of its offerings. Simultaneously, it leads to increased customer profitability by introducing novel products and services. These interconnected shifts within the industrial sector are recognized as components of a broader framework known as Industry 4.0, often referred to as the Fourth Industrial Revolution. (Barreto et al., 2017).

(Asadollahi-Yazdi et al., 2020) explained that nine technologies form the foundation of Industry 4.0, as shown in Figure 2.17. And many of these technologies are already used in manufacturing. However, with Industry 4.0 they will be transformed into an optimized single-cell manufacturing process that comes together into an integrated workflow with full automation and optimization.

Fig 2.17. Nine key pillars of Industry 4.0 (Asadollahi-Yazdi et al., 2020)

(Asadollahi-Yazdi et al., 2020) explained that the 9 pillars of the 4IR provides numerous benefits to the industrial world, which ranges from enhanced productivity, agility, innovation, better customer service experience, revenue to mention but a few.

2.14.1. Emerging 4IR Technologies Transforming Public Transport

As the world stands on the brink of the 4.0 revolution that is set to transform most industries, the road transportation sector is also being impacted by these changes. The influence of the latest technology in the industry rapidly transforms all transport processes into 4IR (Komarov, 2018). According to (Mbowa et al., 2021) The implementation of 4IR in the transportation industry will create an intelligent transportation system “ITS”; including the intelligent public transport system (IPTS) as a subsystem. IPTS main goal is to monitor the network of public transport to ensure efficiency and give users up-to-date information on routes and operating conditions of the network (Elkosantini and Darmoul, 2013).

To achieve its desired goals, IPTS relies on the latest technologies that must be used in various areas of the public transport system. As the transport industry cannot be excluded from 4IR, broader 4IR tools will be used for the growth and operational efficiency of public transport. These tools include IoT, AI, Big Data, Cloud Computing, CAV’s, and Blockchain to mention but a few. Among these tools are embedded technologies that can be used to transform the public transit system by changing the ways passengers interact with the transportation services while increasing the operational efficiency of public transport companies. These technologies fall into the following categories: travellers information systems, operations and fleet management, smart vehicle initiatives, electronic payment systems, smart vehicle initiatives, and security (Mbowa et al., 2021). These technologies are explained below.

A. Automated Vehicle Location Systems (AVLS)

AVL is a computerized vehicle tracking system used to track vehicle location details. It provides real-time information about vehicle location to help inform other stakeholders. Basically, GPS is the primary technology used to locate vehicles using Wi-Fi and satellites, receiving data transmitted in the form of signals from antennas mounted on buses and to GPS to locate the vehicle (Bashingi, 2016). According to (Bajčetić et al., 2018), AVLs have improved the public transport system as it provides users with real-time vehicle status information, including vehicle monitoring, management, and control. In the event of a breakdown, the Public Transport Control Room (PTCR) can track the location using Wi-Fi. After all bus-related information is retrieved, it is sent to the cloud and made available to the user or passenger through the public transit website. This technology is best suited to public transport as it improves bus schedules, compliance, and improves service delivery (Mbowa et al., 2021).

B. Geographic Information Systems (GIS)

GIS is a transport technology that collects, manipulates, analyses, manages, and provides geographic data of all kinds for example route design (Elkosantini and Darmoul, 2013). The first thing GIS does is encode data collected by tracking systems such as GPS. The connection between GPS and GIS helps map and track the progress of vehicles on routes and identify disruptions in transportation networks. GIS helps analyze traffic flows to evaluate and classify transport network and vehicle service designs (Mbowa et al., 2021).

C. Maintenance Monitoring Systems

Vehicle Breakdowns and road accidents due to poor maintenance of vehicles in public transportation are major problems for passengers and an issue in public transportation. To avoid these kinds of uncertainties, public transportation companies must integrate with emerging maintenance transportation technologies (Ali and Alwan, 2017). The technology is used to collect and report vehicle maintenance information automatically. Collected information is uploaded wirelessly at the end of the trip or during the trip (Šarić et al., 2012). The maintenance monitoring system can be achieved by integrating IoT gateways such as vehicle sensors that connect to the entire vehicle infrastructure. All maintenance-related systems are effectively monitored, and information is stored in one place. This emerging technology is efficient and effective as it allows companies to keep their vehicles in good condition and eliminates the risk of breakdowns that cause inconvenience to passengers (Mbowa et al., 2021).

D. Real Time Information Sharing

According to (Mbowa et al., 2021), One of the major problems in public transport services is poor communication between passengers, and this is attributed to poor and inadequate provision of real-time information to customers. Information on traffic conditions, bus departure and arrival times, delays, traffic jams, and more. This is an important reason why public transportation companies need to make great efforts to implement user-friendly, easily accessible, and powerful information tools. (Bruglieri et al., 2015) suggested that the application of real-time systems is the most appropriate technology for improving passenger communication in public transportation. Real-Time Information is an AVL-based tool that provides passengers with real-time information about the operation and status of vehicle networks. (Elkosantini and Darmoul, 2013) stated that there are two generations of real-time information. The first is a variable message sign (VMS) that provides important vehicle information such as waiting times, presence of situations etc. The second is Advanced Traveler Information Systems (ATIS), which is used to connect different devices to create a unified view of traffic demand management and disruption management. International research has identified real-time information as a tool for improving public transport performance and customer satisfaction (Venter et al., 2020). Another study reveals that RTIS reduces

user anxiety and increases confidence in the transport system, leading to increased use of public transport (Ferris et al., 2010).

E. Intelligent Vehicles

According to (Ainsalu et al., 2018), Smart vehicle technology is used in public transport for many reasons, but the focus of public transport adoption is safety. Public transport has limited resources, so safety is a top priority. Collision Warning System (CWS) is one of the most important new technologies in the era of Industry 4.0, which is set to transform the transportation industry by reducing traffic accidents. A major problem in public transportation is the increasing number of traffic accidents in which passengers lose their lives. Rising accident rates necessitate immediate collision avoidance measures, of which CWS is seen as a breakthrough. CWS is an in-vehicle sensor used to monitor the vehicle's surroundings to warn the driver of conditions that could lead to a collision (Xie et al., 2015). The technology is enabled by GPS, GIS, and vehicle-to-vehicle communication to give live updates on traffic conditions and signal interpretation (Mbowa et al., 2021).

2.14.2. Emerging 41R Technologies Transforming Logistics (Logistics 4.0)

(Bukova et al., 2018) stated that Industry 4.0 will not only change the logistics landscape, but it will also create new demands on supply chains and delivery services, with various overlapping applications and technologies. Logistics and supply chains are generally one of the most important aspects of business for any organization, especially the transportation industry (Amr et al., 2019). Logistics 4.0 has emerged in recent years because of the 4th Industrial Revolution and the technological advances of the 21st century (Radivojević and Milosavljević, 2019). In parallel with the industrial revolution, the technological, social, demographic, and market conditions in which logistics went through stages from Logistics 1.0 to today's Logistics 4.0 (Radivojević and Milosavljević, 2019). Figure 2.18. depicts the evolution of logistics from the first industrial revolution to today.

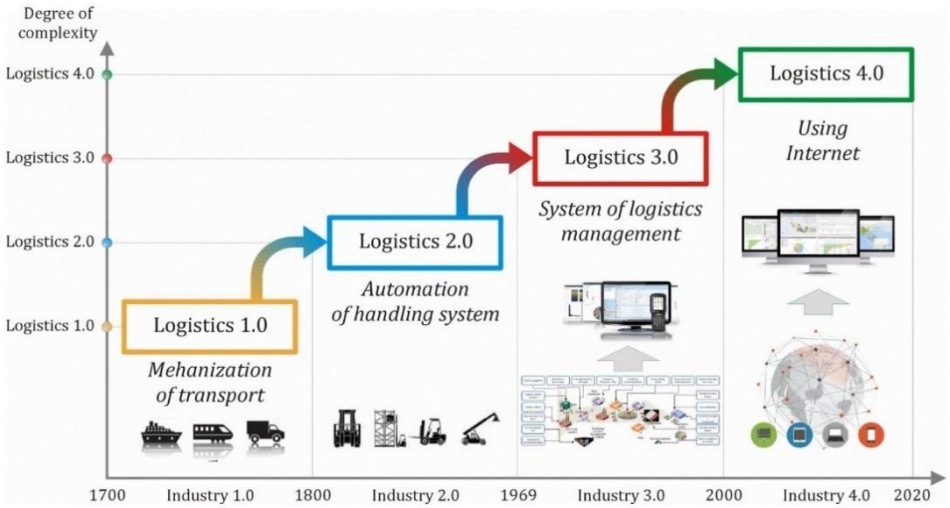

Fig. 2.18. The evolution of logistics (Radivojević and Milosavljević, 2019)

According to (Radivojević and Milosavljević, 2019) the term Logistics 4.0 first appeared in 2011 as an answer and support for Industry 4.0. This situation has had a repel effect producing terms like, Warehousing 4.0, distribution 4.0, Marketing 4.0, Inventory Management 4.0, Procurement 4.0 etc. This represents the logistics section's answer to Industry 4.0 developments and requirements. (Szymańska et al., 2017) stated that despite similar assumptions, Logistics 4.0 is a narrower term than Industry 4.0.

(Oleśków-Szłapka and Stachowiak, 2019) emphasized that Logistics 4.0 is based on state-of-the-art information and communication technologies, software systems, and the Internet, all of which provide:

- Logistic management,
- realization of the flow of goods, and
- Realization of information flow

The above mentioned points were explained by (Oleśków-Szłapka and Stachowiak, 2019), stating that logistics management includes planning, executing, and controlling all processes. the realization of the flow of goods is a set of all allowable operations movement of the flow of goods from the source of raw materials to the delivery of the product to the end user.

While realization of information flow is needed to support the implementation of freight flows and logistics management. Logistics 4.0 was termed smart logistics by (Radivojević and Milosavljević, 2019) because its components enable intelligent process management. According to (Wang, 2016) The components that are associated with Logistics 4.0 are data processing and analysis, real-time positioning, connectivity, and integration, automatic data collection, business services, etc.

(Radivojević and Milosavljević, 2019) analysed these components explaining that the automatic identification of all objects and participants in the logistics process, and the ability to locate them and collect data in real time enables quality management, planning, and optimization. Data processing and analysis creates new knowledge, intelligent management prerequisites, and new business services. Although there are many technologies that depicts these technologies, Figure 2.19 shows the most important.

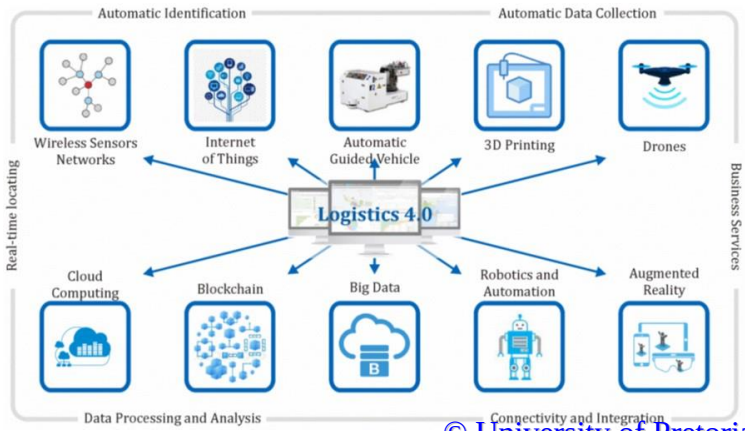

Fig. 2.19. Logistics 4.0 components and technologies (Radivojević and Milosavljević, 2019)

These technologies are briefly explained.

a. Blockchain Technology

Blockchain stands as a groundbreaking, state-of-the-art technology that holds immense potential in providing robust traceability, transparency, and auditability. It ensures data and transactions are stored and transmitted in a secure, decentralized fashion, free from the need for intermediaries. This results in an unalterable record, fostering a high level of trust (Yarosh, 2020). Blockchain technology applied to logistics and supply chains provides enhanced information security and safeguarding meticulous tracking, transparent data sharing among all stakeholders and users, cost-effective advantages via smart contracts, the fostering of novel business paradigms, and numerous additional benefits (Radivojević and Milosavljević, 2019).

b. Big Data

According to (Rodríguez-Mazahua et al., 2016) Big data is used primarily to describe large, heterogeneous, and often unstructured digital assets that are difficult to handle with traditional data management tools and techniques. He described Big Data using the 5V model which is shown in Fig. 2.20

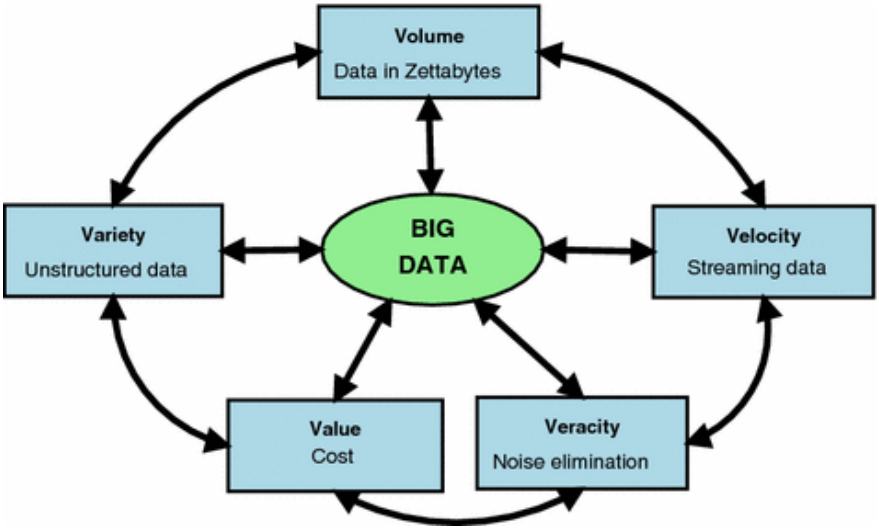

Fig. 2.20. The 5V model that is currently defining Big Data (Rodríguez-Mazahua et al., 2016)

Application of big data analytics in logistics provide cost reduction methods, optimal pricing strategies, and strategies for optimizing logistics processes, greatly expediting decision-making (Moldagulova et al., 2020). Logistics 4.0 means a huge increase in the quantity, variety and speed of data processing. By applying big data analytics and data mining (DM) techniques, companies can create added value and adopt new business models. By utilizing Data Mining, it is possible to predict market trends and

user behavior, as well as investigate the cause of problems, etc (Radivojević and Milosavljević, 2019).

C. Internet of Things

In the global information industry, the Internet of Things (IoT) is considered the technological and economic wave after the internet. IoT is an intelligent network that connects everything to the Internet to exchange information and communicate through information-gathering devices according to agreed-upon protocols (Chen et al., 2014). The realization of IoT has created a virtual model of virtual reality where business models can control processes and activities in real-time based on information about the current state of objects. Various models of connectivity over the Internet exist in logistics systems, representing the first IoT solution leading to the global connectivity of all stakeholders and objects (Radivojević and Milosavljević, 2019).

D. Wireless Sensor Network

A wireless sensor network (WSN) is an independent and self-configuring arrangement that observes various physical or environmental factors, including temperature, sound, vibration, pressure, motion, or pollutants. This network collaboratively transmits the gathered data over a communication network. It can be defined as a wireless network with no infrastructure, a main site or sink where data can be observed and analyzed (Matin and Islam, 2012). An illustration of Wireless Sensor Networks (WSN) application in logistics includes the utilization of WSN and 3D cameras for measuring vehicle loads, ensuring the quality of goods through sensor data analysis, placing sensors in transportation and handling equipment as well as logistics infrastructure and facilities. Moreover, the integration of sensors into workwear enhances worker safety and well-being, among other applications (Radivojević and Milosavljević, 2019).

E. Cloud Computing

Cloud computing represents a paradigm shift in computing that abstracts the underlying IT infrastructure for the user. With some degree of abstraction, users don't have to worry about the hardware and software they use. Instead, both hardware and software are virtualized and can be purchased from the appropriate service provider as needed (Schuldt et al., 2010). Cloud computing offers many advantages for logistics companies as it enables fast, efficient, and open access to IT services and innovative solutions in the supply chain. Logistics companies no longer need to invest in the purchase of software applications and hardware infrastructure, develop their own IT principles, or coordinate integrations with commercial partners (Radivojević and Milosavljević, 2019).

F. Robotics & Automation

This technology involves employing automated systems, robots, and specialized computer programs to move materials, carry out various tasks, and enhance and automate warehouse operations. By utilizing this technology, the occurrence of injuries and potential risks can be significantly reduced. It can manage breakdowns, handling repetitive tasks, and tackling more valuable assignments. Additionally, the system guarantees enhanced efficiency and precision in order fulfillment.

G. Augmented Reality

Augmented Reality which is an Industry 4.0 technology is currently attracting a lot of interest in the industry. This involves adding virtual information to a real "discovered" environment with the use of appropriate devices that help users with everyday tasks like assembling parts to create products (Plakas et al., 2020). Some possibilities for AR applications in logistics are: Application of smart goggles in warehouses for collection, sorting, and packing operations; Intelligent use of forklifts and vehicles; Using smart glasses to smartly deliver products to end consumers etc (Radivojević and Milosavljević, 2019).

H. Drones

This technology is seeing its usage in some developed countries, although still in its infant stages. The technology is seen as a game changer in many aspects of business operations. Already companies like Amazon, DHL, UPS, and Walmart to mention but a few, have begun utilizing this technology to serve their customers. The largest use of drones is expected to be in internal processes, monitoring logistics operations, and deliveries to end users. Logistics operations can be simplified by using drones for transportation between production units, urgent delivery of spare parts, and movement of goods from warehouses to retail areas within the same facility. Drones can be used to check the status of facilities and equipment, manage inventory, and inspect incoming vehicles at entrance/exit gates (Radivojević and Milosavljević, 2019).

I. 3D Printing

3D printing, also known as additive manufacturing, has been around for many years but has recently become more and more popular. Originally used for prototyping for the aerospace and automotive industries, today it is used in almost all fields (Wieczorek, 2017). 3D printing will have a major impact on logistics processes and services, regional logistics networks are becoming more complex, and new supply chain strategies are being developed. Companies can offer new logistics services in the field of spare parts supply, Logistics providers can define a global 3D platform using a digital model base, Personalization of products and services according to the user's

requirements is achieved by 3D printing at the nearest distribution center (Radivojević and Milosavljević, 2019).

J. Automatic Guided Vehicle

An Automated Guided Vehicle (AGV) is a type of mobility vehicle primarily intended to move goods from one place to another. AGVs are used commonly in, warehouses, distribution centers, manufacturing plants, and terminals (Jaiganesh et al., 2014). According to (Radivojević and Milosavljević, 2019) AGV vehicles used in logistic process includes: tractors for towing trailers, vehicles for general cargo, pallet trucks, trucks with forks, light trucks, vehicles for assembly lines, special vehicles, etc. Using AGVs in logistics processes reduces costs and labor, increases work reliability, productivity, safety, and quality, and reduces the risk of human error and injury.

3. Conceptual Model

3.1. Introduction

In an era where innovation is almost an essential survival strategy, understanding how to successfully manage innovation is critical (“innovate or die” (Drucker, 1999)). At the same time, innovation is very risky, because it can lead to the death of the company (Ortt and van der Duin, 2008). Therefore, it is not surprising that much research in the field of innovation management is prescriptive in nature and focuses on how to successfully implement innovations. According to (Afuah, 2020) Most successful companies have used their new knowledge at some point or have been able to use the innovations of other companies to provide new products or services that their customers need.

This chapter proposes a conceptual framework based on the research discussed in the literature to identify innovation management strategies and their impact on organizational survivability during a crisis, and to investigate its linkage to achieving competitive advantage while taking into consideration the potential role emerging technologies of the future will play in enhancing an organizations competitiveness.

This framework has been developed to answer key components of the research questions. The frameworks that will be discussed are the innovation strategies framework, business model innovation framework, competitive advantage framework and the industry 4.0 framework.

3.2. Innovation Strategy Framework

The Innovation Framework allows organizations to efficiently validate concepts, assess the strengths and weaknesses of every idea, to make informed judgments. A solid structure allows ideas to be focused on a central issue, making it easier for business leaders to consider options. With a powerful framework, ideas focus on central issues and provide leaders with a lens to consider options more easily.

According to Samina Karin of North-eastern University Business School, Professor of entrepreneurship and innovation, he argued there are many frameworks for dealing with different types of problems in different situations, and together they contribute to innovation. The development of these frameworks was done by academicians, consultants, and business leaders respectively, also these was based on real-world experience at work. Frameworks like Six Sigma are so prevalent that most companies are already using them in their businesses.

(Palmer and Kaplan) recognizes that the Strategic Innovation Framework brings together seven dimensions to create a portfolio of growth-driving outcomes. These dimensions are illustrated below:

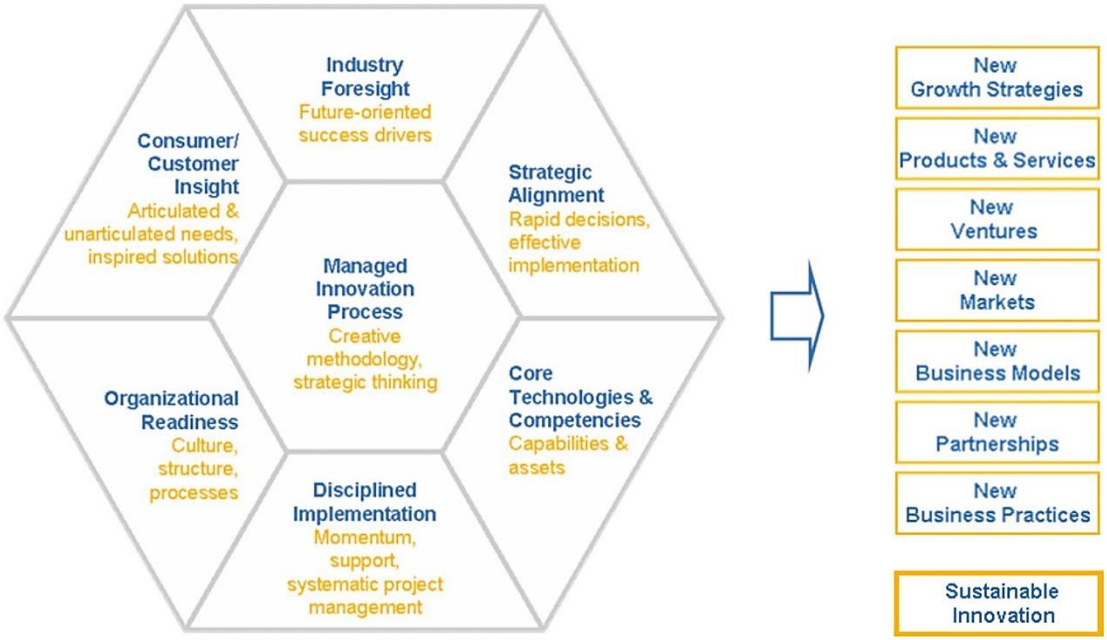

Fig. 3.1. Strategic innovation framework (Palmer and Kaplan)

3.2.1. Innovation in Crisis

Joseph Schumpeter notably claimed that the “creative destruction” although painful, promotes innovation and progress by letting go of the old and the familiar in favour of the new and better. From this perspective, recessions can be a source of opportunity for innovators and innovative systems (OECD, 2012). And as discussed previously, innovation can also arise from crisis induced situations, and many studies has confirmed this.

In the road transportation sector tremendous growth over the decades has been witnessed, the sector appears to be the most utilized form of transportation based on the continuous increase in passengers numbers (Sun et al., 2021). However, the sector has also experienced its share of various crisis at various times. The occurrence of crisis do come with a cannonade of urgent, unpleasant and unexpected events, which leaves little room to plan or organize the needed responses (Nathan, 2000). Exceptional crises, such as the COVID19 pandemic, probably mean that not only do we have little time to organize and plan our response, but our traditional response strategy is inadequate (Wenzel et al., 2020). The covid-19 pandemic is a reminder to road transportation professionals on the fragility of success, and the need to anticipate and plan towards possible similar disruptions that may occur in the future.

(Drucker, 1985) hypothesized that innovation will be driven by unexpected events, inconsistencies, technological needs, and changes in industries and markets. Therefore, it may be the perfect time to take a look at how organizational leaders can

create a culture of innovation to help them survive and thrive during this difficult time of the Covid-19 crisis.

The International Road Transport Union in its report published in July 2020, highlighted how some of its member in the road transport sector responded to the coronavirus crisis. These responses include.

Providing lifesaving support: - Despite the financial adversity inflicted by the crisis on both freight & passenger transport, drivers were still committed to ensure medical supplies, food, and passengers gets to their destination safely. A notable company that took up this support is UPS. In response to the pandemic, the company's subsidiary, UPS Healthcare doubled its clinical trial equipment storage and delivery facility in Germany, to ensure the timely delivery of medical supplies around the globe, including PPE's, ventilators, test kits etc.

Adapting to community needs: - Passenger transport was mostly affected by the lockdown measures. Revenue fell by 80% for conventional inter-city services and by up to 100% for cross-border passenger and passenger car services. Passenger transport employees and companies responded with innovation and efficiency. For instance, in Spain, the government responded to high COVID-19 mortality rates by turning hotels into medical facilities for patient recovery. However, there was a serious shortage of logistical capacity to transport patients. ALSA, one of the main passenger transport companies in Spain, helped to solve this challenge by providing buses for emergency military units and adapting their vehicles to the needs of patients. The company was also involved in moving Covid-19 patients to medical facilities across Spain.

Exchange tourist for students: - Commercial Road transportation also played a positive role during the recovery period as communities adapted to the "new normal" of social distancing. A passenger transportation company called Sales-Lentz in Luxembourg adapted its fleet of buses to offer an innovative way to comply with health regulations during the covid-19 pandemic. Some students were unable to attend school due to social distancing rules in Luxembourg. Sales-Lentz helped transform one of his tour buses into a classroom for 10 students and their teachers. Buses were equipped with a small desk, a plexiglass partition, and a student chair. The vulnerable in society, particularly the elderly, were isolated from families during the public health crisis. At the end of the quarantine period, some nursing homes were not equipped to welcome visitors in compliance with health measures. Sales-Lentz installed a plexiglass partition on one of its buses to create a space for unrestricted family visits.

Fig. 3.2. One of Sales-Lentz coach bus innovatively converted to suit students (IRU, 2020)

Based on the above, the following hypotheses were established:

Hypothesis 1:

H_0: Cross Country could not respond positively to the global covid-19 pandemic.
H_1: Cross Country responded positively to the global covid-19 pandemic.

Hypothesis 2:

H_0: Cross Country did not adopt any innovative strategies.
H_1: Cross Country adopted innovative strategies.

3.3. Business Model Innovation Framework

(Mahadevan, 2004) stated that for an organization to be successful, it must continuously be involved in creating value for its customers and shareholders respectively. Innovation is seen as one possible force for value creation as no one business model can sustain a company throughout its lifespan, because organizations will always be met with challenges that tends to disrupt business operations, therefore its business model must be flexible to accommodate such disruptions. Previous research has shown also that new Business Models has the capability to solve market potential in technological innovation while driving a firm's competitive advantage growth and profitability (Florén and Agostini, 2015).

(Mahadevan, 2004) Indicated that a successful BMI entails three vital elements which are as follows; recognition of the need to move the business model to the ensuing cycle as value decline happens. Taking advantage of new value opportunities which is created for designing the next business model while adequately sustaining the innovation to develop leading value ahead of the competition by applying judicious

selection of the business model components. (Mahadevan, 2004) Proposed the following BMI framework model as a basic structure of BMI, it explains that the process is monotonous because diffusion of innovation occurs over time.

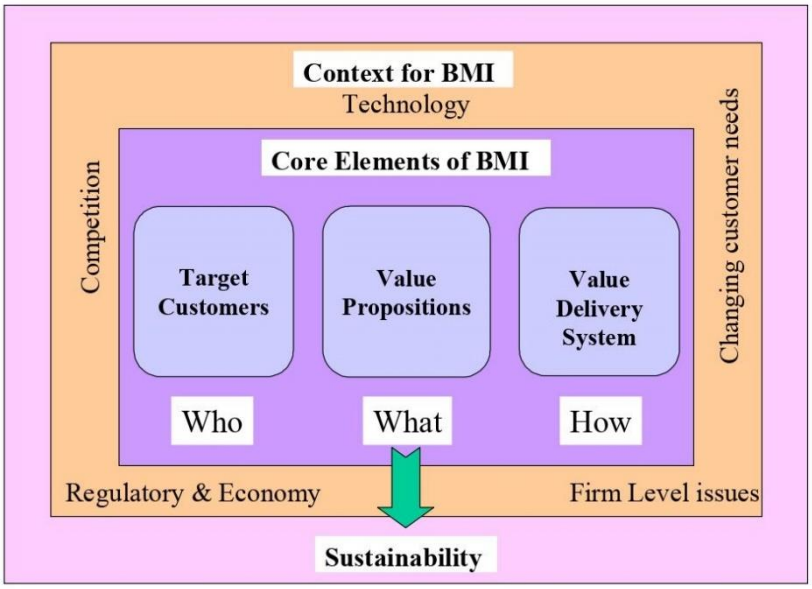

Fig. 3.3. Framework for Business Model Innovation (Mahadevan, 2004)

As mentioned in the literature review, the Road Transport Sector is susceptible to crisis induced disruptions, and as such road transportation companies must make room for innovation to thrive within the context of its business model.

The value proposition of the road transportation sector is to move people and goods from one place to another, depending on the customer segment that provides the service. The most important factors that influence customer decisions are schedule and price. In general, the road transportation most important business model is based on an efficient service delivery or low-cost strategy (Karwowski, 2015).

Low-cost business models are described as creating value by attracting customers through the offering of low costs services, while also having a differentiator strategy. Companies that adopt the low-cost strategy usually focuses on attracting more customers, thereby competing for a large market share. The adoption of this model is part of Porter's emphasis on cost leadership strategies. Companies which have adopted this model in Nigeria includes Cross-Country Transport, Libra Motors, GUO Motors, Peace Mass Transit, etc.

Based on the above, we make the following hypothesis:
Hypothesis 3:

- H_0: Cross Country did not make any adjustments to its business model.
- H_1: Cross Country adjusted its business model.

3.4. Competitive Advantage Framework

(Gikonyo, 2018) referred to competitive advantage, when organizations implement value creation strategies that cannot be replicated and are not currently used by competitors. (Teece et al., 1997) postulated that companies gain and maintain competitive advantage through their ability to innovate, integrate and extend existing technologies and continuously develop new capabilities. According to (Banerjee, 2003) Core competencies are an organization's ability to function effectively and respond to problems in the business environment. (Hamel and Prahalad, 1990) To move quickly into the future, he explained, CEOs must see opportunities through proactive and consistent ability, and create something that no other company can match. Therefore, core competencies have an important role of consolidating resources or turning it into a sustainable competitive advantage for businesses.

The goal of a company is to achieve excellence. To achieve this, companies in the industry must have a competitive advantage that others in the industry cannot replicate. Companies looking for a sustainable competitive advantage need to grow strategies that help their competitors combine resources in ways that cannot be replicated (Kabue and Kilika, 2016). Companies do not exist in isolation but operate in an environment of other companies in the same or different industries. There are also regulatory bodies, organizations, and codes of conduct with which a business must operate. Also, certain cultural practices, such as traditional, legal, and historical factors all combine to influence and shape the firm. Thus, the above review of the literature on relevant theories and key components reveals that there is a possible link between a firm's resources and competitive advantage. To explain the relationship between corporate resources and competitive advantage, (Kabue and Kilika, 2016) proposed the following theoretical model.

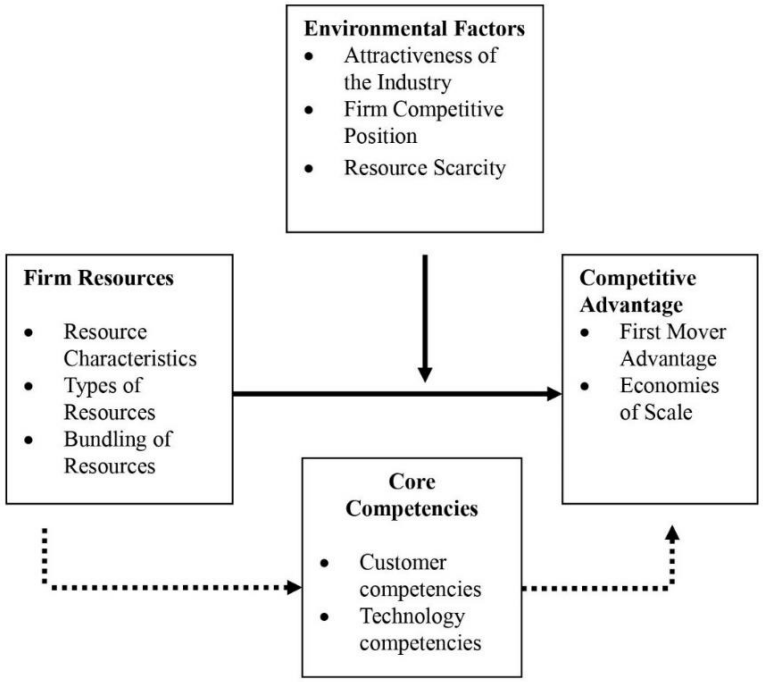

Fig. 3.4. A theoretical model for linking corporate resources, core competencies, and competitive advantage (Kabue and Kilika, 2016).

3.5. Industry 4.0 Framework

A comprehensive comprehension of worldwide transformations becomes achievable through the delineation of overarching global megatrends that possess extensive ramifications across numerous industries. Among these significant megatrends lies Industry 4.0, situated within the realm of intricate emerging technologies. The main goal of Industry 4.0 is the radical transformation of conventional processes into intelligent processes (Paprocki, 2017). Industry 4.0 describes the digitalization of industrial production, bringing profound changes to the areas of transportation and logistics. Over the years, the field of transportation and logistics has witnessed significant transformations. With technology persistently reshaping the global landscape, its influence on logistics is poised to grow even further. This marks a fundamental change in the way businesses ensure swift and effective delivery of their products to customers (Richnák, 2022).

The current pandemic has revealed some serious problems with the current transportation system and needs to take advantage of that momentum to drive innovation, and this has revealed that emerging technologies are indispensable in the actualization of technological innovation. (Valdés et al., 2018) Industry 4.0 technologies (automation, Internet of Things, artificial intelligence, cognitive computing, big data analysis, digitalization, etc.) will change the paradigm of the road transportation sector, increasing efficiency as well as creating new mechanisms. It has also declared that it is more efficient to make it more secure.

Here are a few applications of Industry 4.0 to the road transportation sector:

1. Predictive Maintenance: Using data from vehicles, sensors, and other sources, predictive maintenance algorithms can predict when maintenance is needed and schedule it in advance, reducing downtime and improving efficiency.
2. Intelligent Transportation Systems (ITS): ITS technology can be used to optimize traffic flow, reduce congestion, and improve safety on roads. This can be done by using real-time data from vehicles and other sources to optimize traffic management and route planning.
3. Autonomous Vehicles: Autonomous vehicles have the potential to revolutionize the road transportation sector by improving safety, efficiency, and reducing labor costs. These vehicles can be connected to the internet and other vehicles, allowing for the creation of smart transportation networks.
4. Supply Chain Optimization: Industry 4.0 technologies can be used to optimize the supply chain in the road transportation sector. This can include using data to optimize routing, reduce transportation costs, and improve delivery times.
5. Connected Logistics: By connecting vehicles, warehouses, and other elements of the supply chain, Industry 4.0 technologies can improve the coordination of

logistics activities and improve the overall efficiency of the road transportation sector.

Overall, Industry 4.0 has the potential to revolutionize the road transportation sector by improving efficiency, safety, and sustainability.

Based on the above, the following hypothesis is formulated:

Hypothesis 4:

H_0: There was no preparedness strategy towards Industry 4.0

H_1: There is a preparedness strategy towards Industry 4.0

3.6. Conclusion

The chapter concludes with the conceptual framework that will be implored for the study. First, we need to establish the strategic innovation framework and explore its usefulness during a crisis which threatens an organization's existence. And how an organization can turn such situations around, to gain competitive advantage.

Through the screening of the literatures and current trends in innovation strategies, several influencing factors and linkages were observed to make the conceptual model shown in fig 3.5. which can be applied in the road transportation industry for innovation strategy preparedness in a crisis.

And while Industry 4.0 is an emerging paradigm shift that will impact the industry in a way never imagined, yet some of such technologies are already in use indicating the need for road transport companies to show preparedness towards its adoption to ensure its survivability and advantage in the industry.

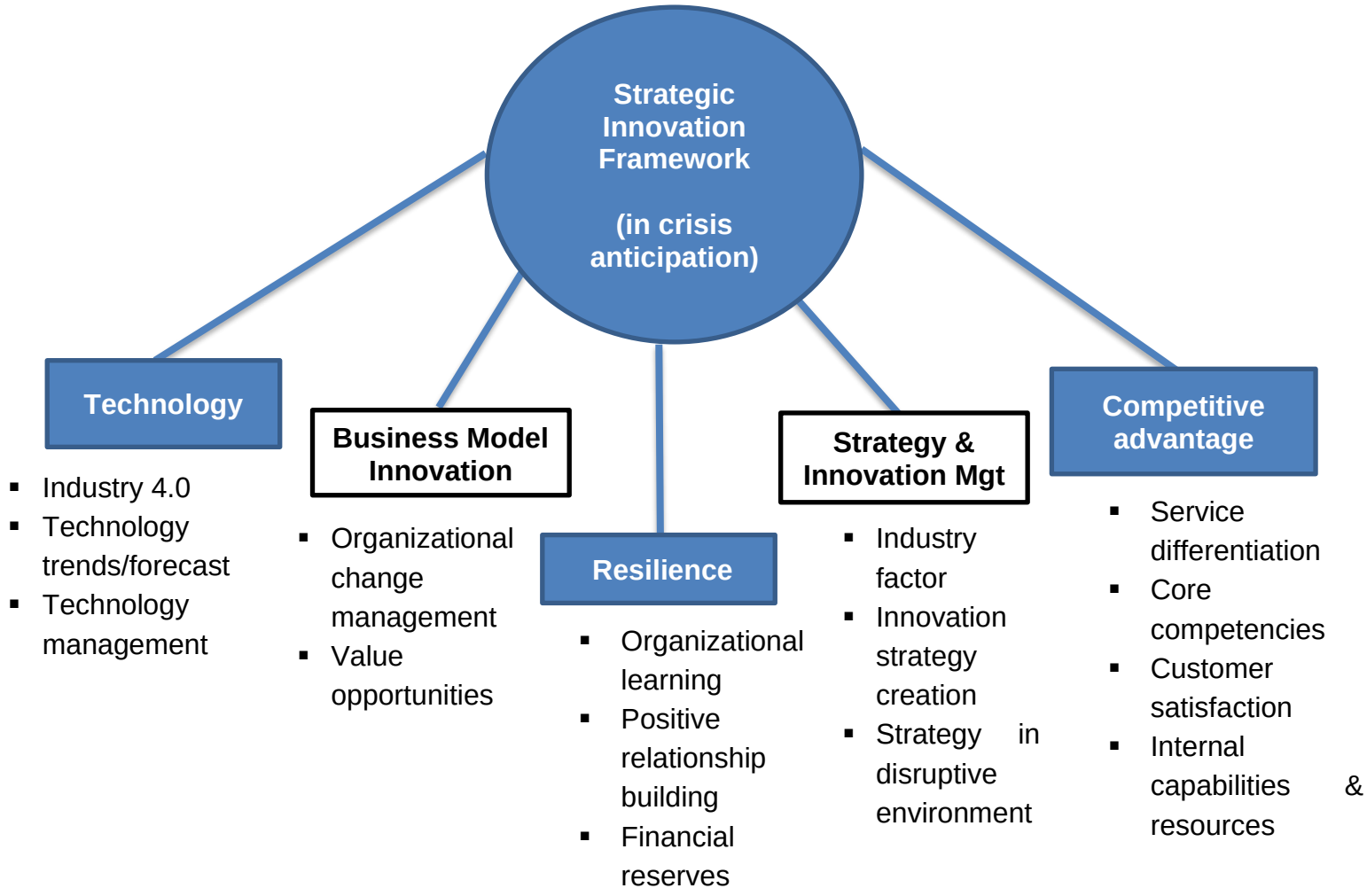

Fig. 3.5 Proposed Conceptual Model (Author's model)

4. Research Design and Methodology

4.1. Introduction

The chapter will discuss on the industry and case study company investigated, the study design, the research approach, proposed data collection instruments that will be used. It is also the intent of this chapter to discuss on the validity and reliability of the study.

4.2. Research Design

The research is to be conducted using a case study approach, to have an in-depth understanding of how Cross Country Transport Ltd one of Nigeria's top road transportation companies has been able to manage and sustain a competitive advantage during the covid-19 crisis. (Harling, 2012) describes a case study as a holistic study which seeks to investigate a modern-day phenomenon within its environmental framework. Case studies provide a systematic way to review events, collect data, analyse that data, and report results. so the researcher can better understand why the case happened the way it did and what might become important for further investigation in future research (WANG et al., 2017).

It is expected that this case study provides valuable data on various innovative strategies which Cross Country Transport Ltd is applying to show resilience, survivability and gain competitive advantage during ongoing pandemic that adversely affected the road transportation sector. The focus of the study is centred on innovation and strategy; therefore, the targeted respondents were drawn from majorly middle management and Lower management team(s) of the company who have across the board understanding on the nature of operations in their department and contribute to major policy and operational decisions of the organization. The departments that were targeted includes Operations, Human Resources, Information Technology, Logistics, Courier, Finance, Sales, and Marketing department of the company. There are similar studies (De Graaf and Huberts, 2008; Bennett, 2004; Oliver et al., 2015) which have adopted this research design.

4.3. Research Method

The research that was undertaken is a mixed-method approach using focused interviews and questionnaires as the primary data source, while the secondary data were gathered from transportation databases of the International Road Transport Union (IRU), The Nigerian Federal Ministry of Transport (FMT), The Nigerian National Bureau of Statistics, and Journals/scholarly papers. Content analysis was used to analyse data from this study as it is intended to describe meaning and implications, while also drawing statistical conclusions from respondent information and documented data. Content analysis provides a deeper and more comprehensive

explanation of the situation and does not limit the respondent's answers, and it is possible to generate more and very detailed information. The research approach is depicted below.

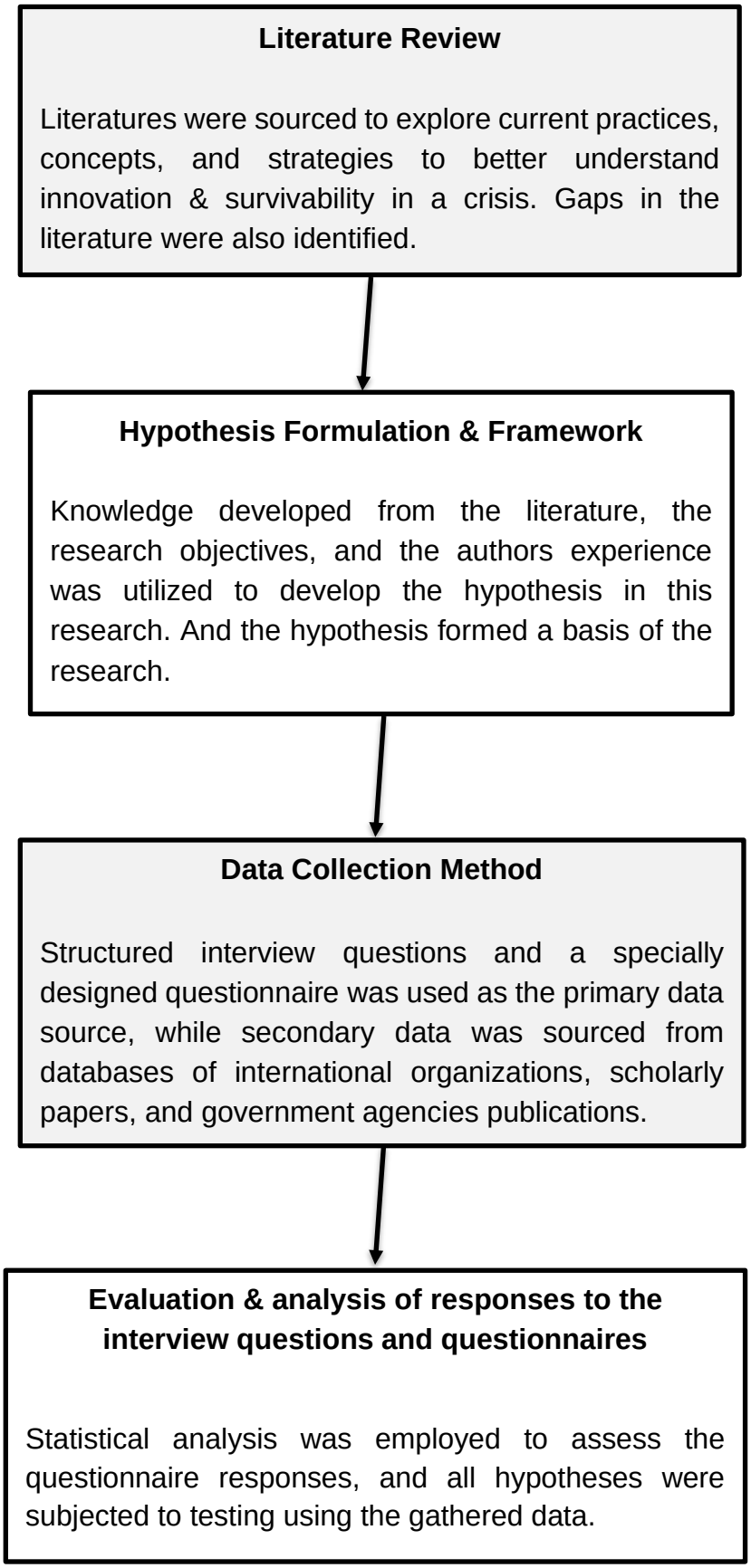

Fig. 4.1. Research Methodology

4.4. Research Instruments

4.4.1. Structured Interviews

Interviews are one of the most well-known qualitative data collection strategies. A variety of commonly used qualitative interview strategies have emerged from different academic perspectives, resulting in different interview approaches (DiCicco-Bloom and Crabtree, 2006). Ethnographic pioneers have developed the use of unstructured interviews with key local informants. That is, data is collected through field note observations and to include themselves as well with the study participants. An unstructured interview is more like a conversation than an interview and is always considered a "controlled conversation" for the benefit of the interviewer.

In contrast, a structured interview is an evaluation method designed for obtaining and comparing answers from all interviews. Interviewees are asked about their past experiences and/or the status of the proposed assumptions. This procedure is standard for all respondents (Queirós et al., 2017).

Structured interviews usually provide a strong response rate, and interviewers are on ground to clarify the questions to prevent misunderstandings by the respondents. Moreover, planning for a structured interview can also take some time. So based on this research, structured interview format was employed as part of qualitative data collection strategies.

4.4.2. Questionnaires

The use of questionnaires has become a regular part of data collection in scientific research in many disciplines (Valli, 2017). Questionnaires are research tools used for conducting surveys and comprises of questions defined in such a way to assemble data from respondents to be used in statistical analysis. The research problem helps to formulate the research questions, and it is organized to collect the relevant data needed to answer the question.

The use of hypotheses is also contained in this research type and are utilized to test the anticipated outcomes. The data collection methods are specified once the research question has been identified and hypotheses formulated (Ponce and Pagán-Maldonado, 2015).

(Patten, 2016) summed up the advantages and disadvantages of using questionnaires as follows:

- **Advantages of questionnaires:**

  - It provides an efficient way to collect data by providing answers that are easy to tabulate or evaluate, and the resulting data can be analysed easily, especially if the questionnaire contains choices that most need to be checked.

  - It helps to collect information about sensitive issues, and because it can be responded to anonymously, therefore respondents tend to be honest with their feedback.

  - Questionnaire research comes at low-cost, and the only major costs are duplication and shipping if the questionnaire is sent to the respondents.

- **Disadvantages of questionnaires:**

  - Sometimes the response rate can be low, which is often the case if the questionnaire is mailed to the potential respondent, who does know the researcher closely.

  - Questionnaires can only provide snapshots of the question and can work best when they provide an objectively evaluable questions, such as multiple-choice questions and short-answer questions that require a very limited number of responses.

  - Respondents may give answers that are socially desirable, even if those responses are not accurate.

4.4.3. Existing Database Sources

The use of existing databases is a source of data collection in secondary research. The advance in technology has enabled large amount of dataset to be stored, complied and this can be retrieved for research purpose (Johnston, 2017). This has resulted in the use of existing data to become more prevalent in the use of conducting research, which is known as secondary data. And while secondary data is adaptable and can be utilized in a few ways, it is like collecting and evaluating primary data. Thus, it can be a systematic method and an empirical way with both procedural and evaluation step. Existing scholarly papers, government publications, and publications from international organizations was consulted to aid the secondary research method.

4.4.4. Descriptive Statistics & Analysis

Descriptive statistics is a statistical method for summarizing data in a substantial and meaningful way (Mishra et al., 2019). Dataset may be a collection of reactions or perceptions from a test or whole populace. In collection of data in quantitative research, requires that statistical analysis is implored to explain the types of responses, like the relation between two variables, or the average of one.

There are three descriptive statistic types which are:

- Distribution: The distribution is related to the frequency of each value, its evaluated and illustrated in graph. This method is employed in the results section.
- Central tendency: The Central tendency is related to the average of values (mean, median & mode).
- Dispersion: Variance refers to how spread out the dataset is.

The table below gives an overview of the most used descriptive statistics as explained by (McHugh and Hudson-Barr, 2003).

Table 7. Commonly used descriptive statistics measures

Different Types of Descriptive Statistic Measures			
Shape, Form, or Normality Statistics	**Central Tendency** (also called Location Statistics)	**Measures of Dispersion or Variation**	**Quartile and Percentile Measures**
Skew (symmetry of the distribution)	Mode	Range	Percentile
Kurtosis ("peakiness" or "flatness" of the distribution)	Median	Variance	Interquartile range
	Mean	Standard Deviation	

Source: (McHugh and Hudson-Barr, 2003)

4.5. Hypothesis Testing

When conducting research, the problem statement is first established. Objectives, hypothesis, and the research questions give a specific reconstructions and explanations of the research question/problem statement (Mourougan and Sethuraman, 2017). Hypothesis is a tentative clarification that accounts for some facts and can be tested for further research. The hypothesis must be a statement that describes the relationship between two or more quantifiable variables. Must have a clear meaning for validation of established relationships.

Types of hypotheses

According to (Mourougan and Sethuraman, 2017) Hypotheses are classified into two, based on the test for statistical significance:

- **Null hypotheses**

The null hypotheses give the explanation that there's no real relationship between variables. (H_O or H_N). The null hypothesis might sound like this: "There is no difference between...". H_O is the opposite of what the experimenter expected or predicted. The researcher conclusion is to either hold the null hypothesis or support the alternative hypothesis and reject the null hypothesis. The fact that H_O is not rejected, doesn't indicate that H_O is true. Rather, there might not be sufficient evidence against H_O. The construct of the hypotheses is easy once the null hypothesis is established.

- **Alternative Hypotheses**

The alternative hypothesis is a report that describes the possible outcomes a researcher can anticipate. (H_1 or H_A). This happens when the null hypotheses are refused. In many cases, the alternative hypotheses are the desired conclusion for the researcher. There are two types of alternative hypotheses, which are directional and non-directional hypothesis.

Testing of Hypotheses

The testing of Hypothesis is a statistical method that is implored in varied situations. This testing includes:

- If the hypothesis is correct, the result should be observable.
- Select an investigation method that allows for the observations, experiments, or other steps required to indicate if these occur.
- Applying this strategy and gathering the data that can be analysed to show whether the hypotheses is backed or not.

There are two probabilities.

Nothing Happened - Null Hypothesis H_O
Something Happened - Alternative Hypothesis H_1

Although the technical details vary by context, but all hypothesis tests utilize the same basic set of terms and concepts.

4.6. Sample size for the Research

According to (Kibuacha, 2021) The term "sample size" pertains to the complete count of participants who have been included in a survey. As this count is frequently divided into smaller groups according to demographic attributes like age, gender, and location, the cumulative outcomes of the entire sample accurately depict the whole population. An important statistical analysis factor is by determining the right sample size. An insufficient sample size will yield invalid outcomes and fail to accurately mirror the characteristics of the studied population. Conversely, a larger sample size reduces errors and enhances representativeness, but excessively large samples can escalate both the cost and duration of the study significantly.

A sample size formulae was published in the research bulletin by the National Education Association, which is used to determine the sample size needed to represent a targeted population (Krejcie and Morgan, 1970). This formula is shown below:

Table 8. A table to determine sample size from a given population.

N	S	N	S	N	S
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	1000000	384

4.7. Conclusion

This chapter describes the rationale for this study, the design and methods used. It also described the qualitative study design used in this study to understand how innovation can help organizations survive and remain resilient in times of crisis. The criteria for choosing the study instruments were discussed, with also the data collection procedure and instruments.

5.0. Introduction

The objectives of this case study were to establish the Survivability, Resilience, and Competitive Advantage arising from Innovative Strategies Cross Country Transport Ltd has adopted as a major road transport company in Nigeria and some parts of West Africa regions to survive the economic onslaught influenced by the covid-19 pandemic on the road transportation sector and to compete successfully in the face of competition in the turbulent road transportation sector and determine the challenges it faced in the implementation of crisis-induced innovation strategies. The interview was guided in line with the research questions and objectives and was done via zoom, also the questions were answered satisfactorily. Content analysis was used to analyse data from this study as it is intended to describe meaning and implications, while also drawing statistical conclusions from respondent information and documented data. Content analysis provides a deeper and more comprehensive explanation of the situation and does not limit the respondent's answers, and it is possible to generate more and very detailed information. Furthermore, a hypothesis was tested using both the null and alternative hypothesis methods to validate the research questions.

5.1. Sampling

The population targeted for the questionnaire is 80, and our sample size is 66 persons who are situated mainly in the corporate head office of the organization. Out of this total population of 80, we had 68 respondents to the questionnaire, which represented 88% of the total targeted population size. The interview respondents' sample size is 5, which represents 70% of the target population of 8, drawn from middle management level, because they have a broader understanding of operations within the organization, and are also involved in policy-making and operational decisions of the company.

5.2. Questionnaire Response Rate

The questionnaire was designed to be completed by members of staff of Cross-Country Transport Ltd only. The researcher was aware that some members of staff aren't degree holders, this is true specifically for those whose role in the company is driving, maintenance, cleaning, and security to mention but a few. Hence the questionnaire was done in a way that is easy to understand and can accommodate anyone who can read, write, and understands the operations of the company. However, to gather reliable data, it was recommended that these non-degree holders in the company be skipped, as they aren't knowledgeable about the inside working of the organization. The questionnaire was created using a google form, and a link to the questionnaire was sent to the Admin Manager of the company who assisted with sharing the links with members of staff (see the appendix page for the questionnaire).

The survey questionnaire brought in a total of 68 respondents in total, the respondents were mostly gotten from workers stationed at the company's head office, while a few were from other locations of the company neighbouring the head office.

5.3. Individual Profiles

It was necessary to break down the profiles of individuals who responded to the questionnaire, to understand their current level of management in the company, and years of experience. Their profiles provide us with their level of working knowledge, and experience to report on the operations of the organization during the covid-19 crisis. The respondent's distribution regarding these two terms is discussed below.

5.3.1. Current management distribution level

As previously stated, this research seeks to understand and explore information from staff members of the organization who experienced the situation of the covid-19 impact on the company's operations. Hence accurate information about the company's response to the effects of the covid-19 pandemic will be gathered. The chart below shows that all level of the management team was well represented. However, the statistics show that 80.9% of respondents combined were from middle and lower management levels, which meant that accurate information was gathered because these levels of management teams are charged with the day-to-day operations of the company.

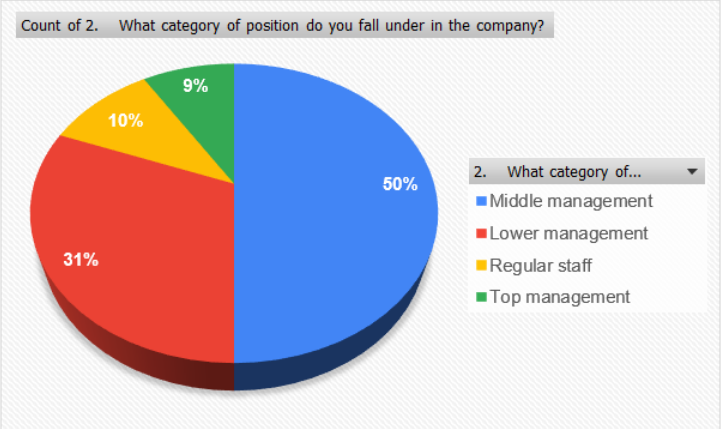

Fig. 5.1. Level of Management Distribution

5.3.2. Industry working experience.

According to (Waldeck, 2014), people become familiar with the practices and principles that guide their work, and then by regularly working long hours in specific positions, they develop superior approaches to high performance. Figure 5.2. shows that 38% of respondents had between 5 - 10 years of experience gained through working in the transportation industry. This indicates that respondents had significant experience with

the operations of the company and understand the nature of the industry of operations. About 37% of respondents had over 10 years+ of experience, while 25% of respondents had less than 5 years of experience.

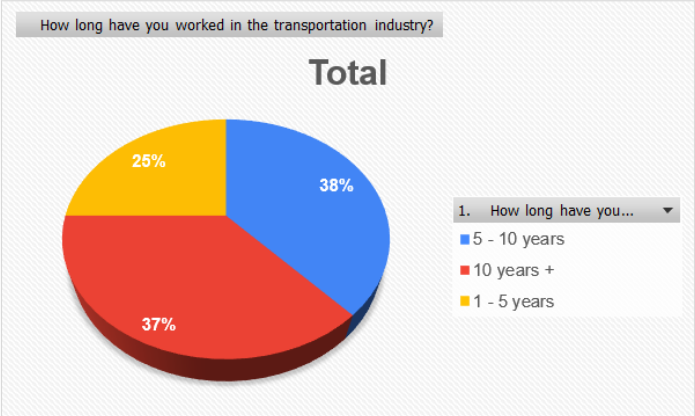

Fig. 5.2. Industry working experience distribution.

Respondents' responses generally provided useful and reliable information. Most of the respondents worked in the day-to-day operations of the company and had extensive experience in these positions. Therefore, it was expected that these respondents had good knowledge of how the company responded to the effect of the pandemic on its business operations, hence they were more likely to give an accurate picture of the impact the crisis had on the company.

5.4. Descriptive Analysis

This section provides an overview of the responses gotten from the interview to answer each research question, In addition to the responses from the questionnaires.

5.4.1. Research Question 1: How did Cross Country Transport Ltd respond to the Covid-19 pandemic?

- **Summary of Interview Responses**

Research Q1	
Participants	**Responses**
P1	▪ Temporarily shut down of operations. ▪ Putting up public enlightenment & hygiene promotions. ▪ Application of cost-cutting strategy. ▪ Laying off employees. ▪ Adherence to Covid-19 safety protocols.

From the table: The participant postulated that the company had to comply with the lockdown directives of the government as part of measures to curb the spread of the pandemic, hence this resulted in the temporary shutdown of operations that affected income for the company. Another aspect was the use of posters for enlightenment and hygiene promotions. The rudimentary strategy that senior management of companies relied on during the covid-19 crisis is a cost-cutting strategy (Bailey and Breslin, 2021). Organizations chose to cut labor costs (e.g., hiring and wage freezes, training budget cuts, layoffs, shortened contract hours, etc.) rather than making long-term investments in their workforce to weather this crisis. From the data collected, it was observed that Cross Country adopted a reactive approach (Deren and Skonieczny, 2021) by cutting down the business cost to combat the economic impact of the covid-19 crisis on its business operations, to enable the company's survival. This was a classical upside-down cost reduction method whereby senior management determines by how much cost reduction should be done, accessing the major cost categories, and instructing middle management to effect certain reductions to achieve the appropriate amount of savings. This approach of cost reduction also means that many staff must be laid off, especially those roles termed redundant. This further increases the workload on those retained, which impacts the mental wellness and work productivity of those employees (D'Souza et al., 2006; Sun et al., 2022). In addition, the company adhered to the covid-19 safety protocols which included the provision of face masks to staff members, customers, and others. These protocols also included ensuring physical distancing and the promotion of hygiene.

- **Summary of questionnaire responses**

The response from the questionnaire regarding research question 1 in total.

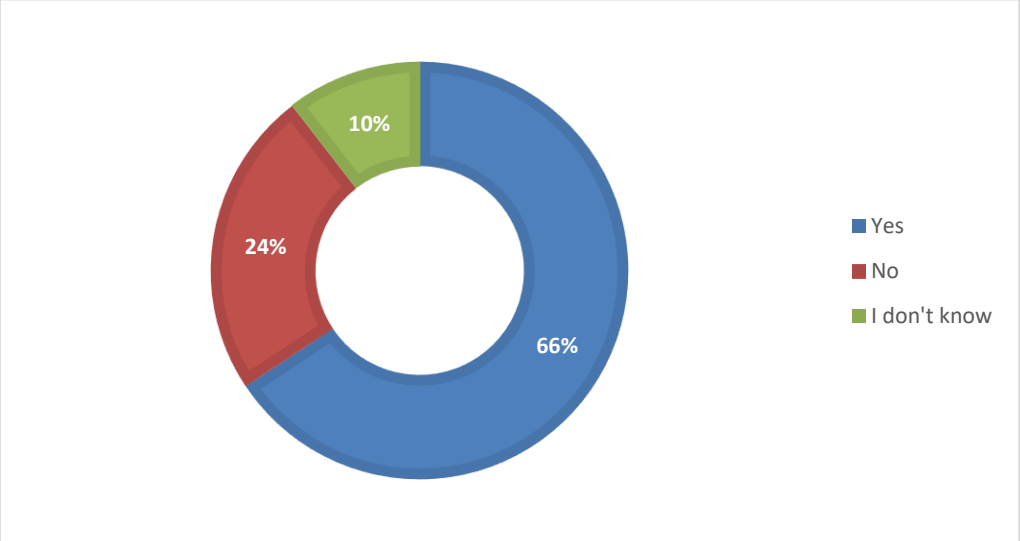

Fig. 5.3. Responses to if the company responded effectively to the sudden impact of the pandemic on its business operations.

From the distribution data in fig 5.3, 24% believe the company did not respond effectively to the sudden impact of the pandemic on its business operations, while 66% believe the company responded effectively, and 10% had no idea.

Total responses = Interview responses + Questionnaire responses

Interview = $^{1}/_{5} \times 100 = 20\%$

Questionnaires = 66%

Total responses = 86%

86% of the respondents says the company responded positively to the effect of the pandemic.

5.4.2. Research Question 2: What innovation strategies were adopted by Cross Country Transport Ltd for survival and competitive advantage during and into the post-covid-19 phase?

- **Summary of Interview Responses**

Research Q2	
Participants	**Responses**
P1	▪ Move to online boarding post-lockdown. ▪ The use of video calls to monitor driver and passenger compliance. ▪ Exclusive offerings to NYSC Corp members post lockdown. ▪ Provision of freebies incentives to customers.
P2	▪ No innovative strategies formulated during lockdown. ▪ No operations due to lockdown measures. ▪ Move to online boarding post-lockdown. ▪ Challenges faced was financial losses.

From the table: The first participant highlighted that the strategies of the organization changed, with its position and direction also affected. This change was instituted post-covid-19 lockdown period. According to the respondeonline andthe covid pandemic,

passengers were expected to come to the office location to board, but now prospective passengers can be gotten online, and can indicate their interest in joining the transit. This move shows that the aftermath of a crisis can create an opportunity for an organization to come up with innovative strategies (Filippetti and Archibugi, 2011; Ulmer et al., 2022) Furthermore, the use of video call to monitor drivers and passengers' compliance with government's guidelines, also as part of strategy, the company provides an exclusive package offers to prospective NYSC Corp Members, by conveying them directly to their respective orientation campground within the country post-lockdown. Other strategic methods to gain competitive advantage the company introduced includes the provision of freebies. Strategy development supports sustainable competitive advantage in organizations (Tapera, 2014).

Responses from Participant 2 shows that no innovative strategies were formulated by the company to remain somewhat operational during the lockdown, and because of no operations, the company suffered severe financially losses, which also resulted in mass retrenchment of staff. This is generic in regards the approaches and impact the pandemic had on business organizations (Subramanya and Kermanshachi, 2021), as a result of the lockdown, the company had no operations, until the government began easing the restrictions. The second respondent also confirmed that the company adopted online boarding post-lockdown as a measure to maintaining social distancing, however, this is an innovative approach resulting from the influence of the pandemic that was implemented by the company. In summary financial losses because of the lockdown, and post lockdown measures i.e., reduce passenger capacity mandated by the government was the main impact on the company's operations.

- **Responses from Questionnaires**

The response from the questionnaire regarding research question 2 in total

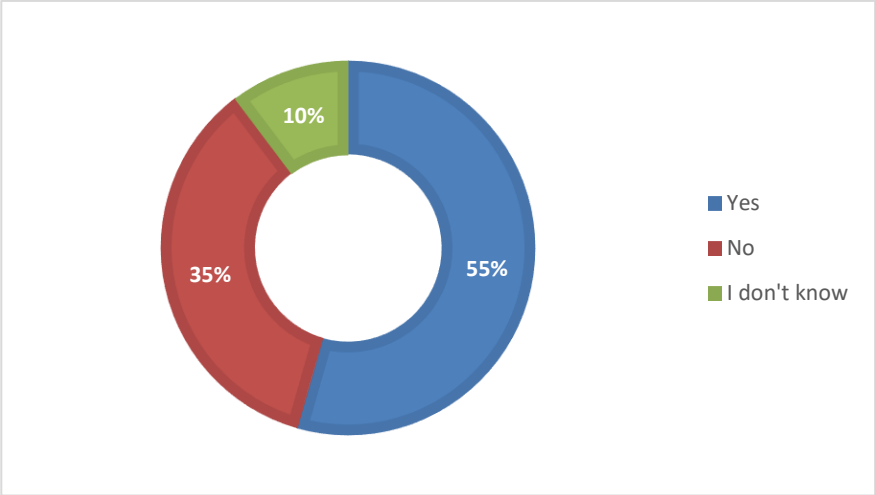

Fig. 5.4. Statistics of staff who responded if the innovation strategies implored by the company to tackle the covid-19 crisis; think it helped/will help Cross Country Transport Ltd gain competitive advantage during the crisis and into the future?

55% believe that the innovation strategies implored by the company to tackle the covid-19 crisis; helped/will help Cross Country Transport Ltd gain competitive advantage during the crisis and into the future, while 35% believe that the innovation strategies implored by the company will not enable competitive advantage, and 10% had no idea.

Total responses = Interview responses + Questionnaire responses

Interview = $^{2}/_{5} \times 100 = 40\%$

Questionnaires = 55%

Total responses = 95%

95% of the respondents believe that the innovation strategies implored by the company to tackle the covid-19 crisis; helped/will help Cross Country Transport Ltd gain competitive advantage during the crisis and into the future.

5.4.3. Research Question 3: What adjustments were made to the company's business model to remain operational in the covid-19 pandemic?

- **Summary of Interview Responses**

Research Q3	
Participants	**Response**
P1	▪ Shut down of some branches. ▪ No change in business model. ▪ No value creation. ▪ No contingency plan in place. ▪ Provision of PPE for customers.

From the table: The responses from the participant showed that the pandemic caused a shutdown of company's operations, which was the general situation for most economic activities around the globe (Fernandes, 2020; Haleem et al., 2020; Łącka and Suproń, 2021). Business operations were moving smoothly before the pandemic struck; hence the lockdown was enforced by the government to curb the effect of the infection transmission especially in Lagos State where the company's head office is situated (Mogaji, 2020). Due to the lockdown measures, operations for the company were stalled. It was also discovered that the company did not innovate its existing

business model when the pandemic struck, hence no value was created during this time, which resulted in significant revenue losses for the company, although this was the case for most road transportation companies globally (Gonzalez et al., 2022), few companies identified were able to take advantage of the crisis to innovate it existing business model (IRU, 2020), putting up a quick strategic contingency plan that demonstrate a culture of innovation. However, after the lockdown was slightly lifted, the company was able to begin gradual operations and applying the Covid-19 strict health measures. The participant suggested in wake of the disruption caused by the pandemic, the company needs to adopt some strategies like embarking on strategic marketing, and the purchase of new passenger buses/freight vehicles, which would enable the company to effectively manage its operations to improve its performance.

- **Responses from Questionnaires**

The response from the questionnaire regarding research question 3 in total

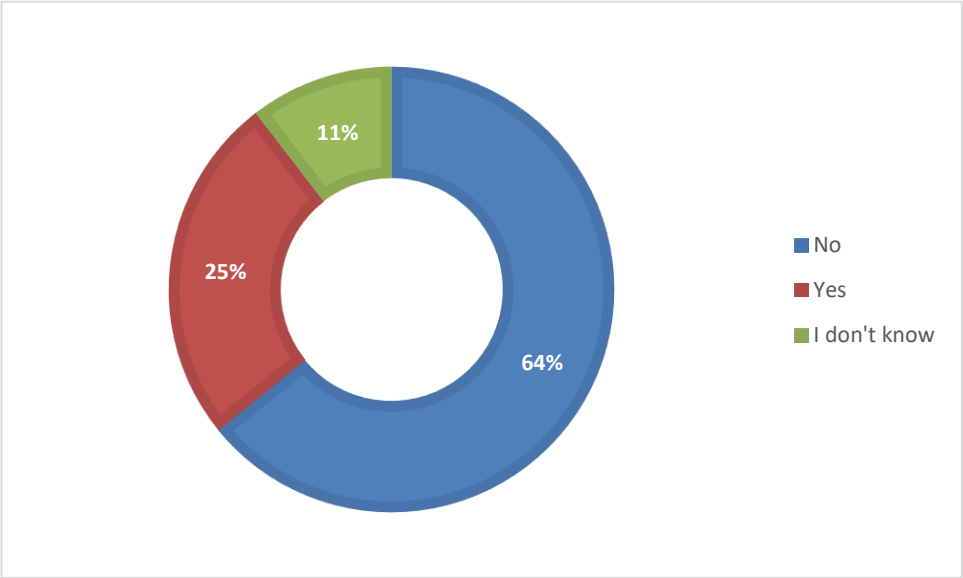

Fig 5.5. Statistics of staff who responded about the company's business model situation during the pandemic.

64% say that the covid-19 pandemic did not oblige the company to innovate its existing business model, while 25% believe the pandemic did oblige the company to innovate its business model, and 11% had no idea.

Total responses = Interview responses + Questionnaire responses

Interview = $^{1}/_{5} \times 100 = 20\%$

Questionnaires = 64%

Total responses = 84%

84% of the respondents says that the covid-19 pandemic did not oblige the company to innovate its existing business model.

5.4.4. Research Question 4: What is the preparedness strategy of Cross-Country Transport Ltd towards Industry 4.0?

- **Summary of Interview Responses**

Research Q4	
Participants	**Responses**
P1	▪ Employ more tech savvy employees. ▪ Hopes to transition to automated payment systems. ▪ Planned installation of tracking devices in vehicles. ▪ Planning to leverage technology for operations. ▪ Introduction of ERP to the organization's operations. ▪ Move to E-ticketing. ▪ 50% of company's locations has been computerized. ▪ Automation of processes from the point of payment to destination. ▪ Upskilling of older staff in IT usage ▪ Inclusion of technology policy

From: the table: The response from the participant reveals few IT policy the company is currently reviewing to implement as a way to upgrade its operations, and meet up with the competition (Kumar and Pansari, 2016). Although the company boasts of experienced driving personnels, its IT competencies still lags behind when compared to share rivals, hence this is inhibiting the full capacity of the organization to leverage on the emerging technologies of the Fourth Industrial Revolution (4IR) for the road transport sector (Mbowa et al., 2021). However, the company has succeeded in implementing an Enterprise Resource Planning System to help integrate the various business divisions and departments, with a view of optimizing internal work processes (Addo-Tenkorang and Helo, 2011). The company is keen on leveraging technological tools to help gain a competitive advantage, it has succeeded in achieving 50% computerization of its branch locations. Furthermore, it has made the step of moving to E-ticketing replacing the manual ticketing methods. The company has implemented a policy to upskill older staff, employ young IT-savvy talents, and gradually retire and replace older staff with young employees (Hana, 2013).

- **Responses from Questionnaires**

The response from the questionnaire regarding research question 4 in total.

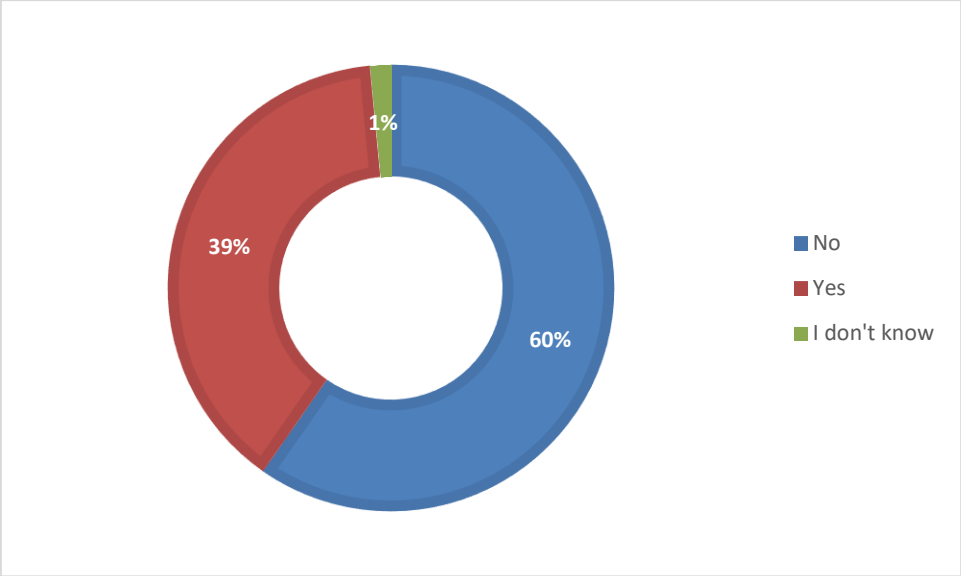

Fig 5.6. Statistics of staff with knowledge of Industry 4.0 in the company

The data above (60%) indicates that a greater part of the staff has no knowledge of Industry 4.0, while just 39% says they have knowledge about Industry 4.0, while 1% cannot tell.

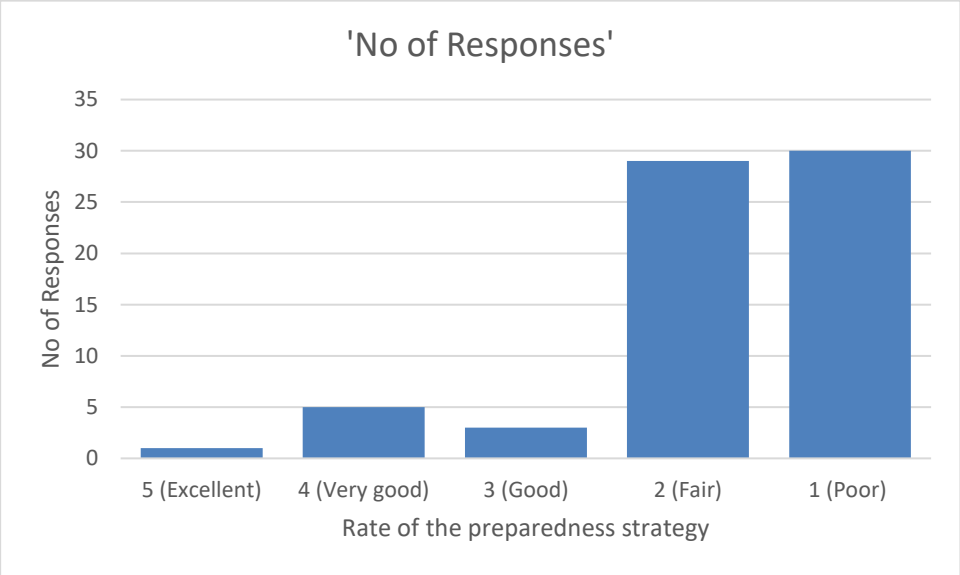

Fig. 5.7. Responses depicting the rate of preparedness strategy of the company towards Industry 4.0

Responses from 30% of the participants believe the company has a poor strategy preparedness towards Industry 4.0, 29% believes its strategy is fair, 3% believe it's got

a good strategy, 5% percent believes the company has a very good strategy, while less than 2% believes the company has an excellent preparedness strategy.

Total responses = Interview responses + Questionnaire responses

Interview = $^{1}/_{5} \times 100 = 20\%$

Questionnaires = 30%

Total responses = 50%

50% of the respondents says that the company has a poor preparedness strategy towards industry 4.0.

5.5. Hypotheses Testing

Hypothesis 1:
H_0: Cross Country could not respond positively to the global covid-19 pandemic.
H_1: Cross Country responded positively to the global covid-19 pandemic.

According to Guerrieri, Lorenzoni, Straub, and Werning in 2020, the COVID-19 pandemic has had severe effects on enterprises, hurting both the supply and demand sides of the economy. Lockdowns and quarantine measures adopted by governments throughout the world in response to the crisis led to the closure of non-essential enterprises, a break in supply chains, and a halt to production activity. This caused serious financial hardship and the possibility of bankruptcy for several small and medium-sized businesses. The pandemic overall resulted in a significant supply shock that adversely affected business performance. The pandemic similarly caused a drop in demand. As customers worried about the disease spreading, service sectors including airlines, restaurants, and tourism saw a decline in customer traffic. Increased unemployment and income loss significantly reduced consumer spending, especially in sectors that were negatively impacted. Even those who weren't affected felt the effects of uncertainty and gloom. According to Guerrieri et al. (2020), there is a chance that demand may overreact to the supply shock, which might result in a recession with insufficient demand. As a result, it is anticipated that company performance would suffer during the epidemic.

Cross Country has responded effectively to the worldwide COVID-19 outbreak. This was achieved through compliance with the lockdown directives, implementing Covid-19 safety protocols, environmental sanitation, promotion of hygiene, face mask-wearing, and physical distancing. Although these responses did not come without their negative effects. It almost brought the company into bankruptcy due to the lockdown

directives which hindered operations and financial flow for the company. In response to the COVID-19 pandemic and the government's orders to stop the virus's transmission, Cross Country Transport Ltd. as other companies and industries implemented lockdown compliance and shutdown strategies. These procedures were taken to limit physical contact and unnecessary mobility in order to stop the virus' transmission and safeguard public health.

Many countries throughout the world used varying degrees of lockdown measures during the COVID-19 epidemic to stop the virus's spread. During lockdowns, people had to move more slowly, non-essential companies had to close, and social distance rules had to be followed. These actions could have had a considerable impact on the operations of road transport firms like Cross Country Transport Ltd. Lockdown compliance required the business to follow government instructions, which may have included stopping services, temporarily shutting offices and terminals, and restricting activities to just those that were necessary.

When used in this context, the term "shutdown" describes the temporary suspension of company activities or the severe reduction in services during the epidemic. Cross Country Transport Ltd could have been forced to temporarily cease operations or scale back its services as part of lockdown compliance, in reaction to decreased travel demand and government limitations, and in response to these factors. Shutdowns can have happened for several reasons, such as a decline in the demand for passengers or goods, travel restrictions, and worries about the safety of both consumers and personnel.

The company's financial performance, staff well-being, and overall business continuity would have suffered significantly because of lockdown compliance and shutdown. The suspension or curtailment of activities would have resulted in a decrease in revenue as well as probable financial losses. Furthermore, cutting off or furloughing staff during this period may have stretched morale and productivity even further. The company's capacity to endure the financial burden and alter its operations during the closure would have been critical to its long-term survival and resiliency.

Cross Country Transport Ltd, like many other organizations, employed a cost-cutting approach during the COVID-19 pandemic to overcome the economic hurdles brought on by the crisis. The impact of the pandemic, including lockdown measures and lower travel demand, is likely to have had a negative influence on the company's sales and overall financial performance. In response to these conditions, the company implemented several cost-cutting initiatives to maintain financial resources. This cost-cutting plan might have included measures like workforce cutbacks through layoffs or furloughs, hiring freezes, and wage decreases. Furthermore, the company may have prioritized simplifying operations, optimizing supply chain procedures, and negotiating better terms with suppliers.

Non-essential business travel and entertainment costs should have been limited and attempts to optimize technology investments may have taken precedence. While these cost-cutting methods were important for short-term survival, the firm may have encountered difficulties in sustaining staff morale and assuring the capacity to rapidly return when conditions changed. As a result, maintaining vital services and staff support while cutting costs became critical for Cross Country Transport Ltd throughout the epidemic. The effectiveness and ramifications of these cost-cutting initiatives would be better appreciated if the data from the case study, including interview responses and questionnaire findings, were thoroughly examined.

According to the interview replies, Cross Country Transport Ltd. responded reactively to the COVID-19 crisis's financial impact on its company operations by implementing a cost-cutting plan. The inclusion of measures like mass layoffs and bankruptcy acceleration suggests that the corporation had substantial difficulties during the pandemic. The questionnaire replies, on the other hand, revealed that 66% of respondents considered the company's response as effective for the survival of the business operations, However, 24% of respondents stated that the company's response wasn't effective. While 10% were doubtful or had no clue. Given this knowledge, it is critical to evaluate the results with caution and to examine potential variables that may have impacted respondents' impressions. While some participants may feel Cross Country responded successfully to the pandemic, others may have different opinions based on their own experiences and viewpoints. To get more firm conclusions on Cross Country Transport Ltd's response to the global COVID-19 epidemic, the facts must be extensively examined, including the specifics of the company's activities and their results throughout the crisis. Furthermore, considering the backdrop of the pandemic's influence on the road transport industry as well as the obstacles encountered by businesses at this period will aid in providing a more thorough view of the company's entire reaction to the crisis.

Based on the data and analysis, the alternate hypothesis (H1) is accepted that Cross Country Transport responded positively to the pandemic.

Hypothesis 2:
H0: Cross Country did not adopt any innovative strategies.
H1: Cross Country adopted innovative strategies.

Companies continuously strive to remain ahead by implementing creative methods as the business environment is constantly changing. The purpose of this study is to determine if Cross Country, a well-known organization, used new techniques in its business practices. The alternative hypothesis (H1) contends that Cross Country did, in fact, use new techniques, contrary to the null hypothesis (H0), which holds that the company did not do so.

During the post lockdown phase of the pandemic, Cross Country Transport Ltd. showed its proactivity and adaptability by implementing a method for survival and competitive advantage. The firm altered its boarding procedure in reaction to the pandemic situation, switching from the conventional boarding that took place in physical offices to online boarding. This facilitated adapting to shifting consumer preferences and utilizing technology to improve the customer experience. Potential passengers may now declare their interest in using the transport online. Furthermore, the use of video call to monitor drivers and passengers' compliance with government's health guidelines, demonstrates the company's commitment to safety standard.

Cross Country also provided special package deals to potential NYSC Corp Members, strengthening client loyalty and satisfaction. The business competed by offering incentives and freebies to clients, displaying its dedication to luring and keeping customers in difficult pandemic-related circumstances. The findings of the case study show that Cross Country Transport Ltd aggressively pursued new solutions post lockdown phase to overcome the uncertainties and obstacles of the COVID-19 pandemic. The company's capacity to adapt and execute new ideas not only aided its survival, but also helped it achieve a competitive edge in the road transport industry, putting it in a good position for success after the crisis.

Based on the data and analysis, the alternate hypothesis (H1) is accepted that Cross Country Transport Ltd adopted innovation strategies.

Hypothesis 3:
H0: Cross Country did not make any adjustments to its business model.
H1: Cross Country adjusted its business model.

Making major changes to how a firm generates, delivers, and extracts value from its products or services is what business model innovation entails. Businesses must frequently reassess their approach during times of crisis, like as the COVID-19 epidemic, to be robust and sustainable.

The absence of innovation in the business model implies that Cross Country did not seek new methods to produce value or pivot its operations to accommodate changing market circumstances. This might have resulted in missed chances to ensure continual cash flow, increase efficiency, or improve client experiences. Failure to innovate the business model during a crisis like the pandemic may have resulted in large revenue losses for the company, as it may not have been well prepared to deal with the challenges given by abrupt and drastic changes in customer behavior and market dynamics.

While some businesses may have failed to innovate during the pandemic, others may have been successful in discovering and executing new strategies or business models that allowed them to adapt and prosper despite the adversity.

These assumptions are based on the replies and data supplied, which show that most respondents (64%) say that the company did not innovate its current business model throughout the pandemic. The alternative hypothesis (H1) argues that changes were made to the business model, which contradicts the null hypothesis (H0), which states that no changes were done.

According to the facts supplied, Cross Country, the firm under consideration, had considerable obstacles during the COVID-19 epidemic. To deal with the economic consequences of the crisis, frequent solutions included abrupt stoppage of operations, personnel reduction, and branch closures. Most respondents (64%) stated that the company did not alter its existing business model during this period, showing a lack of aggressive changes to handle the pandemic's issues. It is worth mentioning, however, that 25% of respondents perceived some amount of modification to the business model, while 11% were unclear, allowing room for doubt.

Given the evidence, the alternative theory, that Cross Country modified its economic strategy during the pandemic, is ruled out. However, more study and exploration would be required to properly confirm the depth of the modifications made and their influence on the company's performance during this difficult era.

Hypothesis 4:
H0: There was no preparedness strategy toward Industry 4.0
H1: There is a preparedness strategy toward Industry 4.0

The hypothesis analysis for Cross-Country Transport Ltd's Industry 4.0 readiness plan offers a mixed picture. The null hypothesis (H0), that there was no Industry 4.0 readiness strategy, is not totally supported, as the company has made some steps to adapt to emerging technology. These initiatives include the implementation of an Enterprise Resource Planning (ERP) system and the introduction of E-ticketing. Furthermore, initiatives to hire tech-savvy people, upskill older employees, and adopt a technology strategy indicate the company's appreciation for technical expertise. The alternative hypothesis (H1), on the other hand, is not fully supported, given the questionnaire results reveal considerable gaps in readiness. A significant section of the workforce is unfamiliar with Industry 4.0, and the public view of the readiness approach is largely unfavorable. To fully realize the promise of Industry 4.0, Cross-Country Transport Ltd must solve these difficulties, improve IT capabilities, and build a comprehensive plan to effectively embrace the technologies of the Fourth Industrial Revolution.

5.6. Secondary Data Analysis & Results

The qualitative data section of the research involved collecting pertinent information through the utilization of various search engines. This information was subsequently compiled by meticulously reviewing scholarly articles as well as reports released by governmental and professional bodies, all of which presented original contributions within the realm of road transportation. The approach for selecting data involved thoroughly perusing these sources to identify and reference the pertinent details.

5.6.1. Approach to the research findings

A catchphrase search was undertaken involving covid-19 effects in the road transportation sector, and what innovative strategies were adopted by companies within the sector to demonstrate resilience, survivability, and competitive advantage during the public health crisis. The provided search term was employed to guarantee the identification of a comprehensive collection of papers. A thorough assessment was conducted on the most referenced published materials to establish a comprehensive understanding of the current scientific knowledge related to the subject matter. This procedure encompasses four primary phases.

1. Keyword search including the impact of the covid-19 pandemic on the road transportation sector. 2. The effects the pandemic had on the road transportation sector in Nigeria. 3. Innovations inspired by Covid-19 in the road transport sector. The main search engine used for this finding is Google Scholar, IEEE Xplore, and Science Direct, others include databases of the International Road Transport Union (IRU), The Nigerian Federal Ministry of Transport (FMT), and The Nigerian National Bureau of Statistics.

Table 13 below summarizes the list of sources for this qualitative study.

Sources
International Road Transport Union
Science Direct
Google Scholar
Ministry of Transportation Nigeria
National Bureau of Statistics
IEEE Xplore
Other publications

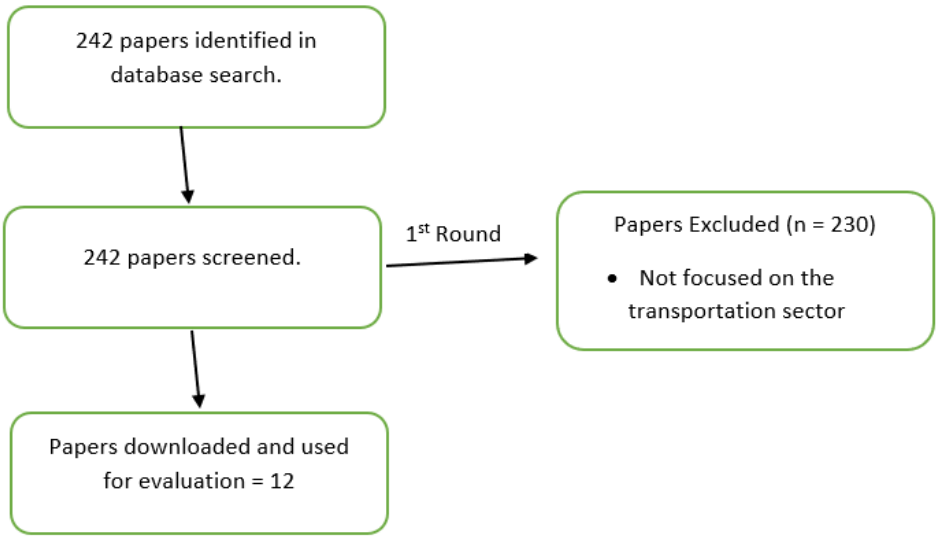

Fig. 5.8. The framework in the figure above provides the flowchart for decision-making (Sourced: Science Direct)

5.7. The Impact of the Covid-19 Pandemic on the Global Road Transportation Sector.

5.7.1 International Road Transport Union Report (IRU)

The International Road Transport Union is the world road transport organization that represents the entire road transport sections which include buses, coaches, trucks, and taxis to promote the sustainable movement of people and goods around the world. Representing the voice of over 3.5 million companies globally that operate mobility and logistics services in more than 100 countries, IRU delivers solutions that make the world better.

IRU's vision is to become a global leader by connecting societies with safe, efficient, and environmentally friendly mobility and logistics. IRU forms global mobility, develops knowledge, builds networks, represents interests, and provides services. It achieves this by bringing together various stakeholders, industry suppliers, associations, and operators from over 100 countries.

IRU is the trusted voice in mobility and logistics, it facilitates and strengthens the dialogue between intergovernmental agencies, international organizations, and all stakeholders involved in the road transport industry. The IRU contributes to policy and regulatory initiatives that create an effective and sustainable economic management framework around the world. Additionally, the IRU empowers the private sector to proactively raise standards, demonstrate professional excellence, and assess competence.

5.7.2. IRU's assessment of the impact of the pandemic on the road transportation sector

An executive summary in June 2021, detailed IRU's intelligence report assessing the impact of the pandemic on both passenger and logistics transport, as well as restrictions and relief measures. The report combines in-depth research of IRU members with macroeconomics research and analysis. The COVID-19 pandemic has significantly battered the road transport sector, emerging as one of the hardest-hit industries. The International Road Transport Union (IRU) reports that commercial road transport enterprises continue to grapple with substantial COVID-19 impacts on their mobility and logistical operations. These challenges primarily stem from the widespread adoption of governmental measures such as social, health, and mobility restrictions, all aimed at curbing the pandemic. Additionally, the resultant economic downturn in certain sectors has compounded the difficulties faced by the road transport industry.

According to IRU's Intelligence report, passenger and freight transport is expected to see a decline in revenue globally in 2021. While freight transport losses are projected to be half of the year 2020 levels, passenger transport losses remain higher. IRU's June 2021 report focused on three main action calls, which are explored below.

a. Distress Call

One year into the pandemic, supply chains, and global mobility remained disrupted. IRU reported that road transport companies played a key role in responding to the crisis in parts of the world, but many road transport companies are now facing genuine financial hardships and are struggling to survive. The Purchasing Managers Index (PMI) measures the expectations of future orders expected by purchasing managers in 21 industries.

The figure below showed that in comparison to all other sectors, transportation service buyers have negative expectations of future orders and expect volumes to decline on average.

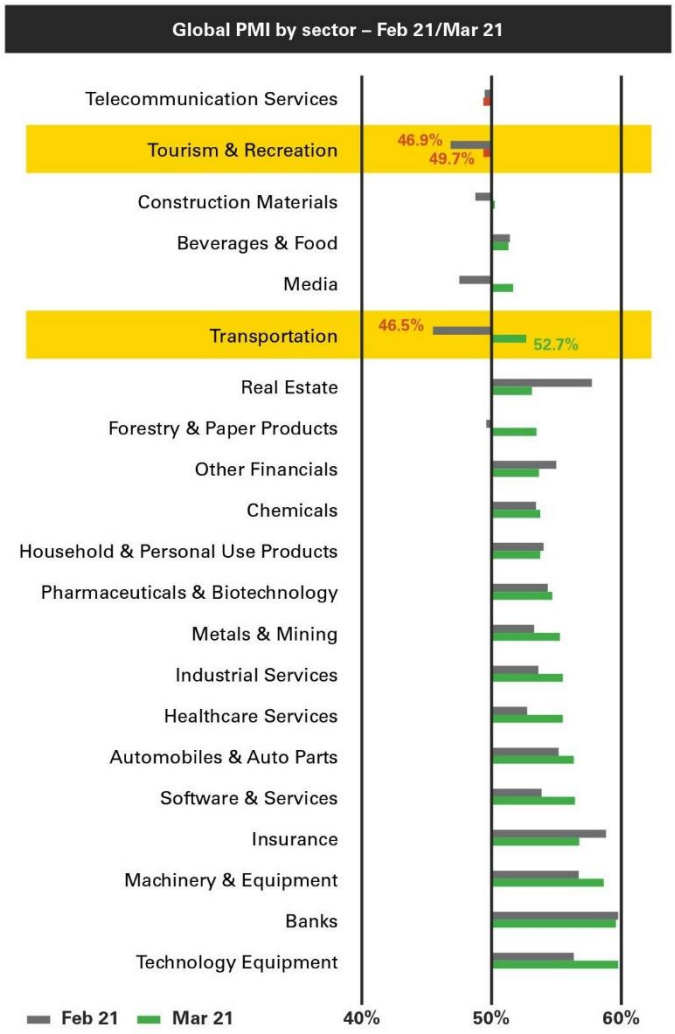

Fig. 5.9 The score indicates an expansion/decline of the sector. (Source: IRU analysis, 2021)

Based on the above data, they see neither predictability nor certainty in planning transportation services. This is evidenced by the negative PMI scores for transport, tourism, and recreation.

b. Accelerating Bankruptcies

In 2020, the IRU predicted an impending wave of bankruptcies. This looming wave is devolving into a wave of real bankruptcies as the sector faces continued earnings stagnation globally in 2021.

- **Freight transport bankruptcies forecast & Insolvency Risk Indicator**

According to the IRU's report, the loss of the global freight industry is expected to reach $347 billion in 2021. While this represents about half of the $679 billion in losses the

industry suffered in 2020, Insolvency metrics for free cash flow remain severe as shown in the figure below. The report further shows that cash shortage remains the most serious challenge for freight operators.

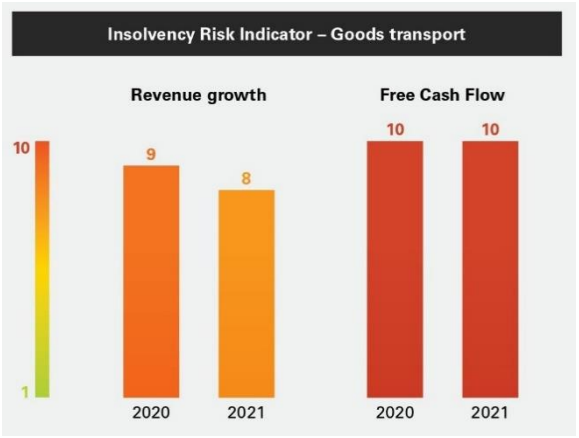

Fig. 5.10 freight road transport Forecast loses. (USD, global) and Insolvency risk indicator – Freight transport, Source: IRU analysis, 2021

- **Passenger Transport Bankruptcies Forecast & Insolvency Risk Indicator**

The IRU Intelligence report recorded that passenger transport services, especially coach and tourism services have been particularly hard hit during the pandemic. The report further stated that certain types of services remained suspended or were severely restricted and are unlikely to return to normal levels for some time.
The IRU report as shown in the figure below those revenue losses in the passenger transportation segment is projected to increase by $43 billion from 2020 to $543 billion in 2021. Also, about 30% of passenger carriers have already laid off their employees.

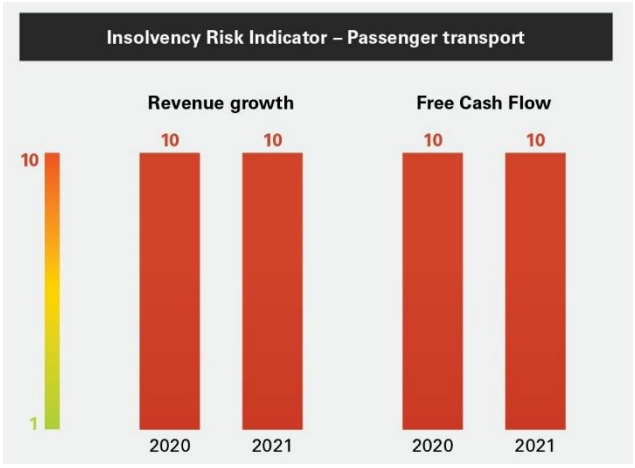

Fig. 5.11 Passenger Road transport forecast losses (USD, global) and Insolvency risk indicator – passenger transport, Source: IRU analysis, 2021

c. The Inaction by Governments

The last of the three main actions called according to the IRU's intelligence report is the negligence of governments. It reported that limited, unfocused, and mostly uncoordinated actions of governments around the world put many road transportation

companies at serious risk of bankruptcy. It further stated that without help, road transport companies will be unable to drive economic recovery as the global economy overcomes the impact of the pandemic. It further spelled out recommendations for governments to adopt to support the economic recovery and preventive measures efforts toward road transportation in the post-covid-19 pandemic phase. The IRU's recommendations are as follows.

- Coordinating global and transboundary pandemic response
- Implement targeted financial assistance measures.
- Leverage existing digital tools such as eTIR and e-CMR.
- Commercial driver's priority in national vaccination programs

Furthermore, the IRU stated the risk that affects the road transport sector, should the government neglect its call for immediate recovery action. The risks are.

- Bankruptcy for a significant number of road transport companies is unavoidable.
- The anticipated duration and severity of the worldwide recession are likely to surpass current predictions.
- Individuals and critical commodities will not be conveyed to their required destinations and times.
- Economic progress and recovery will come to a halt.

In addition to the report by the IRU, other scholarly studies (Isa et al., 2021) support the IRU's assessment of the impact. One of the studies revealed the five factors that affected the road and transportation sectors are the suspension of existing business and operations, followed by reduced sales, profits, cash flow, corporate revenue, disruptions in construction plans and schedules, disruptions in transport chains, mobility networks, and public transport use, and travel behavior and public transport ridership.

5.8. The Impact on the Road Transportation Sector in Nigeria.

5.8.1. The Nigerian Federal Ministry of Transportation Report Analysis

The Ministry of Transportation in Nigeria is a government ministry responsible for overseeing and regulating various modes of transportation within the country. It is headed by a minister who is also part of the cabinet of the executive branch of government. The minister is appointed by the President and reports to the President. The Ministry of Transport has an overview structured pillar of purpose, which is shown in Figure 5.9. below. The Ministry of Transportation consists of 8 major agencies, and 17 departments of which the National Road Transport & Mass Transit Administration is a part, others include, The Nigerian Railway Corporation, Council for Regulation of Freight Forwarding, Nigerian Maritime Administration & Safety Agency, and The

Nigerian Ports Authority to mention but a few. The Road Transport & Mass Transit Administration oversees the formulation of policies and the administration of road transportation and mass transit operations in the country.

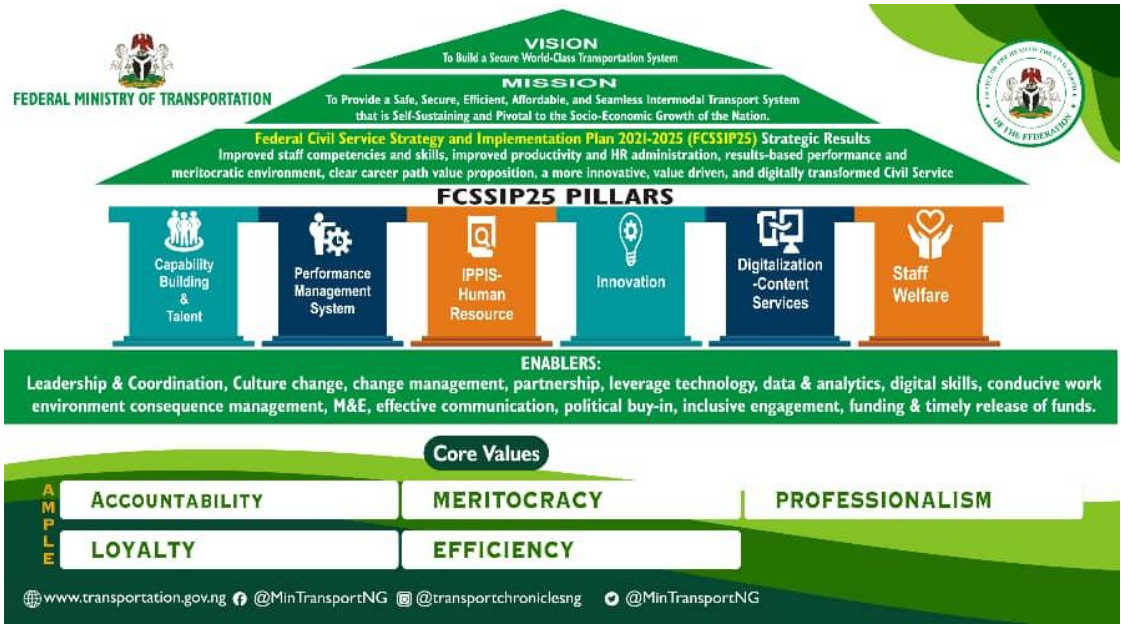

Fig. 5.12. Pillar of Purpose of the Ministry of Transportation (Source: https://transportation.gov.ng/)

The report published by the Ministry of Transportation of Nigeria termed Covid-19 Measures and Action Plan https://transportation.gov.ng/cat_doc/others/ extracts of measures taken by the Road Transportation Sector in Nigeria to mitigate the spread of the Covid-19 virus are explained below.

1. **Travel restrictions:** Imposing travel restrictions, including border closures, to limit the spread of the virus and control the importation of cases.
2. **Sanitization and hygiene protocols:** Requiring increased cleaning and sanitization practices in public transportation systems, such as buses, trains, and airports. This may include disinfecting vehicles regularly and providing hand sanitizers or handwashing facilities for passengers.
3. **Physical distancing measures:** Implementing measures to ensure physical distancing among passengers, such as reducing passenger capacity, marking designated seating areas, or enforcing queuing protocols.
4. **Mandatory face masks:** Requiring the use of face masks or face coverings for both passengers and staff while using public transportation.
5. **Health screenings**: Conduct temperature checks or health screenings at transportation hubs, including airports, bus terminals, and train stations.

6. **Public awareness campaigns:** Launch public information campaigns to educate passengers about COVID-19 symptoms, and prevention measures, and encourage responsible behavior.

7. **Contact tracing:** Collaborating with health authorities to support contact tracing efforts by collecting passenger information or using digital platforms for effective tracking and monitoring.

The measures itemized above was part of the methods implored by other countries around the world (Barbieri et al., 2021), and every transport company operating in Nigeria were mandated to comply with the measures.

5.8.2. The Nigerian National Bureau of Statistics Impact Report

The Nigerian Bureau of Statistics is responsible to provide thorough, well-timed, appropriate, responsive, and customer-centric statistical information on the socioeconomic activities and conditions of Nigerians. With dedicated cooperation with governments and their agencies at all levels in the production of administrative statistics; Adjust the statistical order and promote the common use of statistical standards. In July 2020, the agency published its impact monitoring findings of the covid-19 pandemic in many aspects of the socio-economic situation of the country. A report on the impact of the pandemic on business enterprises shows that restrictions in movement and the hike in transportation costs were both the topmost significant sources of hardship during the pandemic. As shown in Fig 5.10, this survey response covered both formal and informal business sectors.

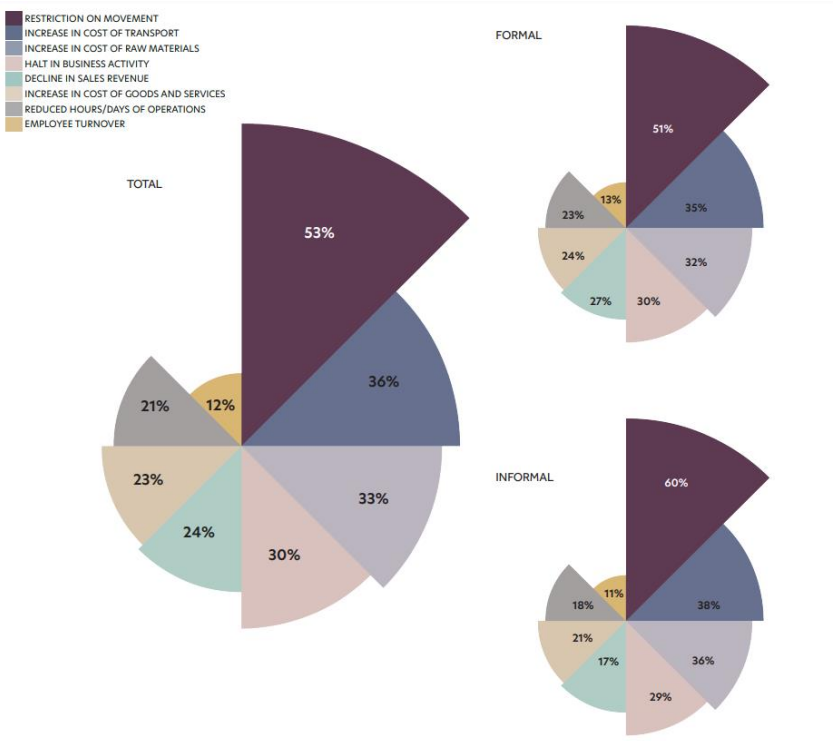

Fig. 5.13. Key Impacts of COVID-19 on Businesses (NBS, 2021)

The key impact of business operations survey results shows that the transportation industry was the most affected, this is not only true for Nigeria (Olokoyo et al., 2022; Mogaji, 2020), but also around the world, which is supported by various studies (Bucsky, 2020; Shortall et al., 2022; Anyanwu and Salami, 2021).

Other key impact areas examined by the report were Sales, Revenue, and Finances, as shown in the figure below, the transportation sector experienced one of the most significant declines in sales from the Q2 of 2020 to Q4 of 2020 when compared to other sectors.

Fig 5.14. Changes in Sales (NBS, 2021)

The chart shows that transportation sector recorded a sales decline of 80% within Q1 – Q4 of 2020, while a 7% sales increase, with no change recorded during those periods. Following the change in sales data, the report also revealed the revenue gains and losses due to the covid-19 crisis. The figure below shows that the transportation sector recorded a 100% decrease in revenue, when compared to other sectors. This report also confirms studies that the impact of the covid-19 pandemic on the transportation sector was very significant. Further confirming that the transportation sector irrespective of its division was one of the topmost sectors negatively impacted by the covid-19 pandemic.

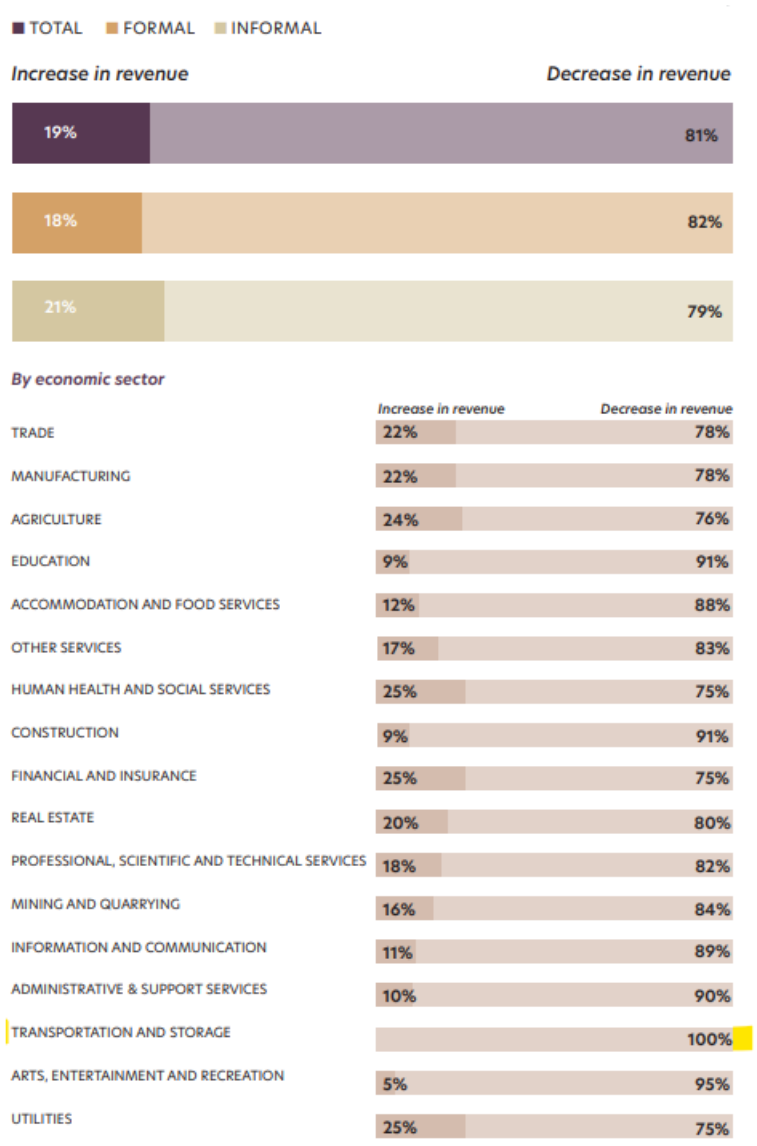

Fig 5.15. Revenue Gain / Loss by sector (NBS, 2021)

The report highlights several operational challenges, including access to credit and capital, the need to expand digital infrastructure, high utility and transportation costs, the cost of informal safety and security to do business, and the lack of adequate social safety nets, especially for informal workers.

5.9. Innovations Inspired by the Covid-19 Pandemic in the Road Transport Sector.

5.9.1 Global outlook

Innovation plays a crucial role in driving an economy forward, this can also be said for the transportation sector and logistics to help speed up the demand response process. Many sectors are still badly affected by the pandemic and are still facing a tough

economic test (Klein et al., 2022). However, history shows that innovation-driven firms not only performed better in times of crisis but also earned more in the post-crisis period (Am et al., 2020a).

With reference to the 2008/2009 global economic crisis, we see that innovative firms achieved average market performance ten times better than their competitors. Over the next few years, the difference increased, reaching a maximum of 30% in 2012 (Am et al., 2020b).

Despite researchers' valued contributions to the COVID-19 pandemic, scholarly attention remains limited to the opportunities posed by the pandemic. As most industries are disrupted and the markets create major uncertainties, the crisis is as well spurring a wave of innovative activity. (Osińska, 2021) in his paper, revealed positive aspects of the COVID-19 pandemic, which showed a wide adoption of IT applications as well as gas emission reduction. Arguing that both effects can cause innovative and sustainable solutions in the transportation industry.

According to (Medyakova et al., 2020) the pandemic became a trigger toward digitalizing transportation infrastructure. Prior to the pandemic, the digitization trend in transport included the following forms: Digitalization of roads through automatic traffic control systems; Citizens traveling on public transport using big data; Operation of an aggregator of taxi services. According to the paper, the fully digitized vector was performed after the spread of the covid-19 virus. The researchers analysed the implementation of the digital tool through 2019 to assess the deployment and coverage of digital innovations in the global transportation industry.

Analyzing the expansive Russian transportation system, ranked among the world's largest, within the backdrop of the COVID-19 pandemic, researchers (Medyakova et al., 2020; Maksimov et al., 2021; Ianenko et al., 2022) demonstrated alterations in the distribution of goods across different transportation modes and identified the industries bearing the greatest impact. Through computations projecting digital advancement and examining the evolving proportion of digitization procedures in the international transportation network, the researchers succinctly outlined the cumulative potential for digitization within the transport sector during the pandemic period.

Moreover, the field of road transportation witnessed the implementation of diverse measures aimed at preventing pandemics (Organization, 2020). These measures encompassed a range of actions such as decreasing the frequency of bus services, limiting passenger capacity, mandating the use of masks and gloves by passengers, reducing touch points, supplying personal protective equipment (PPE) to staff, ensuring passengers are evenly distributed within vehicles, conducting routine thorough cleaning, and disinfecting public transportation vehicles, facilities, stations, and commonly used items like ticketing machines, poles, and seats. Additionally,

disinfectant dispensers were installed as a proactive response to effectively address the challenges posed by the COVID-19 pandemic (Naveen, 2022).

Studies by (Zondervan et al., 2022; Chen et al., 2021) highlighted three main changes in logistical trends that was influenced by the pandemic, which includes the transition from biofuels and bioenergy to batteries and hydrogen energy, a step towards the digitization of logistics with blockchain, IoT and datasets, and a step towards automation with drones, robots, and unmanned vehicles, especially in last mile logistics. Furthermore, the results demonstrate a steady increase in awareness of resilience over time, specifically during the COVID-19 pandemic. The results also show that the digitization of logistics is accelerating significantly during the COVID-19 pandemic. Obviously, digitalization is a global trend that logistics businesses cannot ignore if they want to compete and survive in the industry.

According to (IRU, 2020), a passenger transportation company called Sales-Lentz in Luxembourg adapted its fleet of buses to offer an innovative way to comply with health regulations during the covid-19 pandemic. Some students were unable to attend school due to social distancing rules in Luxembourg. Sales-Lentz helped transform one of his tour buses into a classroom for 10 students and their teachers. Buses were equipped with a small desk, a plexiglass partition, and a student chair. The vulnerable in society, particularly the elderly, were isolated from families during the public health crisis. At the end of the quarantine period, some nursing homes were not equipped to welcome visitors in compliance with health measures. Sales-Lentz installed a plexiglass partition on one of its buses to create a space for unrestricted family visits.

5.9.2. The Nigerian Context

In Nigeria, the road transport sector accounts for 90% of movement of freight and passenger movements respectively (Okeke et al., 2023). Despite the poor road infrastructure in Nigeria, the road transport sector was the main mode to deliver essential services during the covid-19 pandemic. A study by (Okeke et al., 2023) revealed some instances of innovative strategies implored in the road transport sector, which includes a logistics and courier company pooling its technician into a WhatsApp group that leveraged the National Cash Register (NCR) technology for the monitoring and repairs of ATM machines and training on safety of drivers on essential duties in a particular geographical area.

The result of this approach helped people who took advantage of the relaxed curfew to make purchases with access to financial services. (Okeke et al., 2023) reported also that another road transport company utilized video calls to monitor drivers and passengers' compliance with government guidelines, and many transport companies in the capital city also presented enlightening lecturers to passengers helping to raise

awareness of the administration's guidelines and the safety of the NCDC COVID-19 protocol.
A June 2021 comparative study of three major cities transportation companies, which was conducted by Ikeoha Foundation, a think tank at the University of Nigeria Nsukka, reveals few innovative roads transport solutions done by some road transport companies. These innovative approaches in addition to the health preventive measures includes.

- Online communication with passengers to reduce face-to face contact.
- Introduction of other services in addition to transportation.
- Internet booking of transport services.
- Medical personnel (e.g., Doctors) at the terminal in some cases.

The study concludes that the pandemic has increased the use of logistics companies for the delivery of goods in Nigeria, increased the use of ICT to support delivery services, and increased the use of active modes of transport, especially bicycles.

5.10. Conclusion

This section offers an in-depth examination of the gathered data and aims to validate the hypotheses formulated within the framework outlined in chapter 3. The analysis showed that the case study company adopted a reactive approach as a response to the effect of the pandemic, this means adherence to lockdown directives, and observing the health guideline of the Ministry of Health. Due to the lockdown, operations of the company were temporarily halted, which had a significant impact on the company's revenue generation, and as a result, a cost-cutting strategy was implemented as a measure to avoid bankruptcy. This meant that the company had to lay off a significant number of staff, close some locations, and cut off some services. However, the post-lockdown period saw a gradual resumption of activities, but at a slow pace, and while the threat of the pandemic was still being monitored, the company saw a move to online boarding to maintain social distance measures, hence this reduced the number of passengers coming to board from its terminal.

Amidst the effect of the pandemic, the company's business model remained unadjusted, as no radical innovation was implemented as a reaction mechanism to the effect of the pandemic on its business operations. The data collected also revealed that the company is keen on digitalizing its operations based on a few ideas being considered. Some Business Information Systems that have already been implemented like ERP systems and online booking, and payment systems are gradually moving the company toward Industry 4.0 technology adoptions. However, there are still significant challenges to achieving this objective. The respondent data shows that most of the staff do not see any preparedness strategy toward the move to 4IR technology adoption. The data collected was then tested against various assumptions, which revealed that the response to the pandemic was a reactive one, followed by no move

to adopt any innovative strategies, but this was later implemented after a while when operations were restored. And while no adjustments were made to the company's business model, the company also had no significant preparedness strategy towards technologies of the 4IR. Overall, the practices investigated had a negative impact on the company's effectiveness.

While the secondary data examined the impact of the crisis on both a global transportation scale and the Nigerian Road Transportation Sector, the findings show that the pandemic had a significant cost effect on the transport sector. Also, the sudden nature of the pandemic made it difficult for most transport companies to come up with innovative strategies to mitigate its effect. However, a particular company in Luxembourg was quick to take advantage of the lockdown to continue its operations to ensure continual revenue generation, this showcased the ability to develop quick innovative strategy, which is paramount in crisis induced situation, as opposed to those who couldn't come up with any timely novel strategy. The findings further revealed that digitalization played a crucial role in supporting business operations during the lockdown, and post lockdown.

This chapter commences with section 6.1. that focuses on the conclusion of the research, while section 6.2 highlights the study limitations, and recommendations for future study.

6.1. Research Conclusion

The study objectives were to investigate the innovative strategies implored to mitigate the effects of the covid-19 pandemic on the road transportation sector, using a case study approach to give a focused view of how a road transport company managed the crisis. While crises of the such magnitude as the covid-19 pandemic brought a sudden suspension of numerous economic activities globally, hence such situations tend to lead to the liquidation of many companies. However, the literatures review also explains that while crisis can lead to the ultimate demise of business organizations, some companies tend to take advantage of the crisis to remain operational and gain competitive advantage, through the quick development of innovative strategies.

In times of crisis, innovation becomes a crucial factor in ensuring an organization's survival, resilience, and competitive advantage. The ability to adapt and create new solutions can be the difference between thriving and struggling during challenging times. This research proposed a conceptual model which identified the strategic innovation framework for crisis anticipation such as the recent covid-19 pandemic. The model can support organizations to become resilient, competitive, and innovative during crisis response. It is pertinent to note that the transportation industry is prone to crisis as shown in the literature study, and most of the respondent as shown under the appendix section believes that the transportation industry is prone to crisis also. Hence the need to need to adopt a strategic response in anticipation to crisis that impacts on business organizations becomes imperative.

6.2. Limitations and Recommendations

The research explored the impact of the covid-19 pandemic on the road transportation sector, with specific reference to the Nigerian Road Transportation Sector, taking a case study of Cross-Country Nigeria Ltd. Although a global outlook of the crisis impact was reviewed, no other specific country or organization rather than the aforementioned was taken as a case study. Every other organization or state mentioned are for reference purposes only. The researcher also considered the fact that study materials on this subject is still evolving, hence not sufficient information in the context of the passenger and freight services during the pandemic is available. The lack of study materials for the effects of the covid-19 pandemic in the field of study is also considered. Nevertheless, the study proceeded with referencing existing literatures on the subject, as it is the intent of this research to contribute to existing knowledge on the impact of the covid-19 crisis. Furthermore, the interview respondents were just 5 out of 8 of the targeted population size, drawn from the middle management level of

the organization. Others did not show interest in the study, as all efforts to get them to participate weren't promising. Another limiting factor was that not all respondent participated in answering all research questions, rather the respondents participated on the research questions, they showed some elements of reluctance to participate, and also companied about been busy, but preferred to answer research questions they found convenient.

It is imperative to note that the population size did not cover the whole employees of the company both within Nigeria and other neighbouring nations where the company has branch offices. The data represents the population size of employees within the head office of the study company. This method was adopted for the following reasons.

A. The head office controls all the operations of the company both within Nigeria and other locations outside Nigeria. The head office is where the management team of the company carries their day-to-day activities, and policies that affect the company's operations are formulated and pass down to other locations. Hence it is believed that firsthand data on the company's operations during the pandemic situation can be made available.

B. Time & Funding constraints to cover other locations of the company both within Nigeria and neighbouring countries respectively.

Going forward the company needs to develop a strategic innovative framework for crisis anticipation. Developing a strategic innovative framework for crisis anticipation is of paramount importance in today's rapidly changing and interconnected world. Such a framework combines strategic thinking, innovation, and proactive planning to enhance an organization's ability to foresee and respond effectively to potential crises. Developing a strategic innovative framework for crisis anticipation is not only a prudent approach but also a necessity in today's complex and fast-paced world. It enables organizations to stay ahead of potential crises, respond effectively, and position themselves as resilient and forward-thinking entities.

Furthermore, innovation is a key factor in an organization's ability to adapt and survive in the face of disruptions, economic downturns, technological shifts, and unexpected challenges. By continually exploring new ideas, products, services, and processes, companies can diversify their offerings and revenue streams. This diversification helps reduce dependence on a single product or market, making the organization more resilient to external shocks. Innovating also allows companies to identify and capitalize on emerging trends before they become mainstream, positioning them to stay relevant and competitive over the long term.

For further studies, it is recommended to investigate the innovation for survivability, resilience, and competitive advantage developed in the commercial aviation sector during the covid-19 pandemic.

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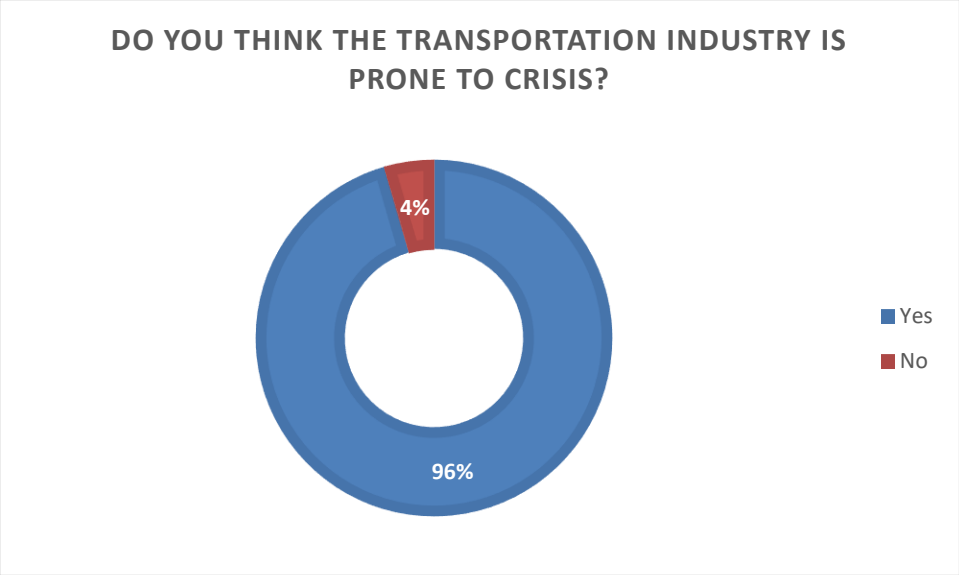
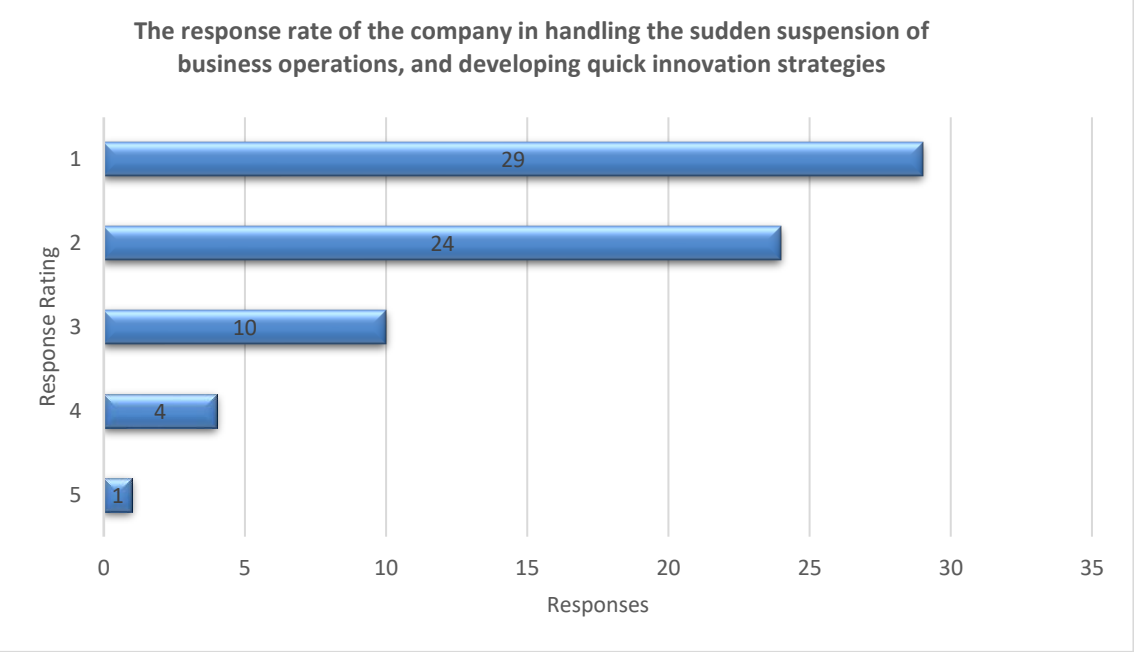
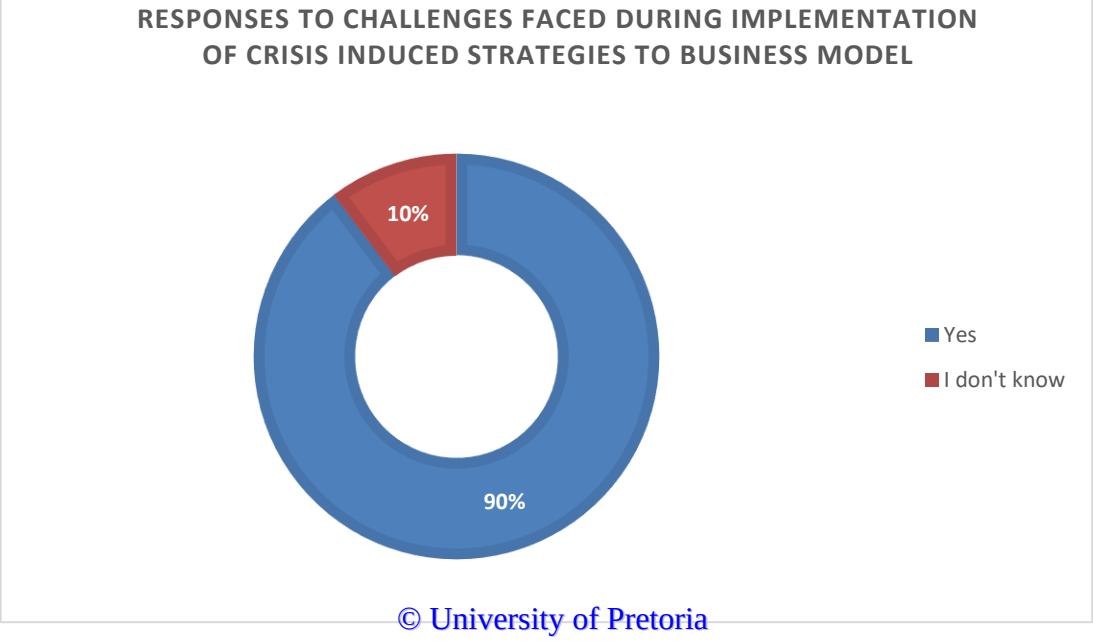
Appendix







QUESTIONNAIRES

Discussing the effect of the covid-19 pandemic on the road transportation sector

Research Topic

Innovation for Survivability, Resilience, and Competitive Advantage During a Crisis: A Study of Cross-Country Transport Ltd in a Covid-19 Pandemic.

1. **How long have you worked in the transportation industry?**
   ☐ Less then a year ☐ 1-5 years ☐ 5-10 years ☐ 10 years +

2. **What category of position do you fall under in the company?**
   ☐ Top Management ☐ Middle Management ☐ Lower Management
   ☐ Regular Staff ☐ Other ☐ None of the above

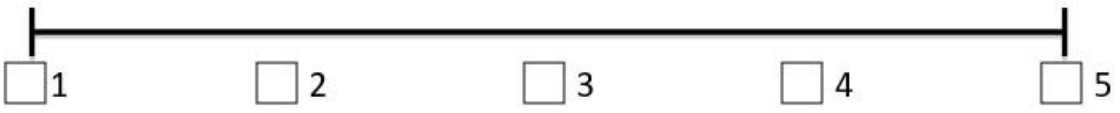
3. **Assigned department/section in the company?**
   ☐ HRM ☐ Operations ☐ Finance ☐ IT ☐ Marketing/Sales
   ☐ Engineering ☐ Maintenance ☐ Other

4. **Do you think the transport industry is prone to a crisis?**
   ☐ Yes ☐ No ☐ Don't Know

5. **Cross Country Transport Ltd is known for its innovation and forward-thinking; do you believe innovation plays/will play a significant role in the company's future?**
   ☐ Yes ☐ No ☐ Don't Know

6. **Do you believe the company responded positively to the impact of the covid-19 pandemic on its business operations?**
   ☐ Yes ☐ No ☐ Don't Know

7. **Can you assess the response rate of the company in handling the sudden suspension of business operations, and developing quick innovation strategies to help the company from going bankrupt?** (Please rate from 1 – 5. 1= Poor, 5 = excellent)



8. **Can you say that the innovation strategies adopted by the management during the covid-19 crisis helped the company to survive economically, amidst the bankruptcy experienced by many industry players globally?**

☐ Yes ☐ No ☐ Don't Know

9. **The innovation strategies implored by the company to tackle the covid-19 crisis; do you believe it helped/will help Cross Country Transport Ltd gain a sustainable competitive advantage during the crisis and into the future?**

☐ Yes ☐ No ☐ Don't Know

10. **From your perspective do you believe the covid-19 pandemic compelled the company to innovate its existing business model?**

☐ Yes ☐ No ☐ Don't Know

11. **Do you believe there were challenges faced during the implementation of the crisis-induced innovation strategies to the company's existing business model?**

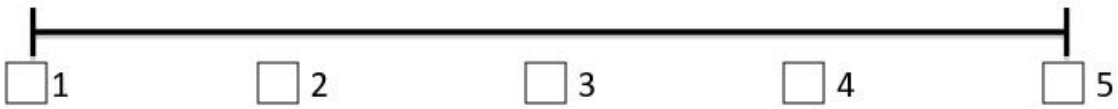
☐ Yes ☐ No ☐ Don't Know

12. **Do you have knowledge about Industry 4.0, and its potential disruptive factor to the future of the transportation industry?**

☐ Yes ☐ No ☐ Don't Know

13. **The fourth industrial revolution (4IR) or Industry 4.0 is set to radically impact the transportation industry in the not-too-distant future. How satisfied are you with the company's preparedness strategy for Industry 4.0** (Please rate from 1 – 5. 1= Poor, 5 = excellent)

14. **Cross Country Transport Ltd strives to be a company that is highly dependable for safety, promptness, and efficient service delivery that delights customers, within western Africa and to be their intercity transport operator of choice. where can you place the company in achieving this objective so far** (Please rate from 1 – 5. 1= Poor, 5= excellent)



INTERVIEW QUESTIONS

Research Q1 – How did Cross Country Transport Respond to the covid-19 pandemic? (Organizational Change management)

1. From your website, your vision and mission are very clear. How do you make sure these are communicated throughout your organization?
2. What strategies do you use to make sure that all are heading towards the goal you want to achieve?

3. History chronicles various crises that affected industries, do you anticipate crises both externally and internally that may affect operations, if yes, how do you respond to such crises?
4. How did cross country transport ltd respond to the covid-19 global pandemic in other to keep operations on?
5. What type of organizational change was introduced to keep operations moving during the covid-19 pandemic, and do you think it has been viable?

Research Q2 – What innovation strategies were adopted by Cross Country Tranport for a sustainable advantage during and into the post-covid 19 phases? (Resilience & Innovation Strategy)

6. How is/are your current strategy (ies) formulated?
7. Who is responsible for strategy formulation in Cross Country Transport Ltd?
8. How often do you review the organization's strategy (ies)?
9. What strategy (ies) does your department use to integrate activities from all other departments?
10. What strategy (ies) does your department use to match passenger demand during high or low seasons?
11. What Innovation strategies were adopted by the company for sustainable competitive advantage in the post-covid19 phase? What approaches and methods did you use to continue operating during the pandemic of covid 19?
12. What key challenges did the company encounter in the implementation of these innovative strategies?

13. How have the innovation strategies adopted by the organization affected its competitiveness in the industry?
14. Do you believe the adopted innovative strategies assisted the organization in the achievement of its strategic goals?

Research Q3 - What adjustments, if any were made to the company's business model to remain operational during the covid-19 pandemic? (Resilience/Strategic & Innovation management)

15. How would you describe your approach to business before covid and after? Any lessons learned from the pandemic?
16. Do you think the business model of Cross-Country Transport Ltd prior to the pandemic was/is effective in creating the needed value for the company during the pandemic, and moving forward, or does it have to be reviewed to create value?
17. How has the company created uniqueness for its services to its customers during the pandemic?
18. What other information would you like to provide that your department uses to effectively manage its operations to improve the company's performance?

Research Q4 – What is the preparedness strategy of Cross-Country Transport Ltd toward Industry 4.0 (Technology Management/Industry 4.0)

19. Which other similar road transportation companies do you compete with? Who else wants the same customers as you?
20. What makes Cross Country Transport Ltd unique from others?
21. Why would customers come to you and not go to your competitors?
22. How would you predict the Passenger transport of the future?
23. Industry 4.0 is set to revolutionize the transportation sector soon. Are you aware of this? If so, what has the company done or is doing to be with the rest of the world in this regard? If not, do you think you will catch up with Industry 4.0?
24. Are there policies that are put in place to leverage technologies to build, maintain, and enhance the competitive advantage of Cross-Country Transport Ltd, if so, how would you access the effectiveness of these policies?
25. How would you describe the level of competition facing the road transport sector currently in comparison to your competitors?

CROSS COUNTRY LTD
(Operator of the City Bus)
Head Office: 345 Muritala Muhammed Way, Yaba, Lagos, Nigeria.
Tel: 08055555595, 08028460890
www.crosscountry.com.ng. E-mail: crosscountryltd@yahoo.ca
Web Mail: info@crosscountry.com.ng

October 20, 2022

Faculty Committee for Research Ethics & Integrity
Faculty of Engineering, Built Environment & IT,
The University of Pretoria,
Lynnwood Rd, Hatfield, Pretoria, 0002, South Africa

To whom it may concern

I, **Mr. Yomi Daniel,** as a delegated authority of Cross-Country Transport Limited hereby give permission to the primary researcher Daniel Otuokwu of the GSTM, University of Pretoria the followings:

1. To engage (survey/interview) with the employees of the above-mentioned company. I have reviewed the questionnaire/interview questions given to me by the researcher. I hereby give my approval for using the questionnaire / interview questions by the researcher.

2. To collect and publish information relating to the above-mentioned company that is publicly not available.

For the research project titled: Innovation for Survivability, Resilience, and Competitive Advantage during a Crisis: A Study of Cross-Country Transport Limited in a Covid-19 Pandemic.

This authorization is based on a mutual understanding that the above-mentioned company's name **can be revealed** in his project.

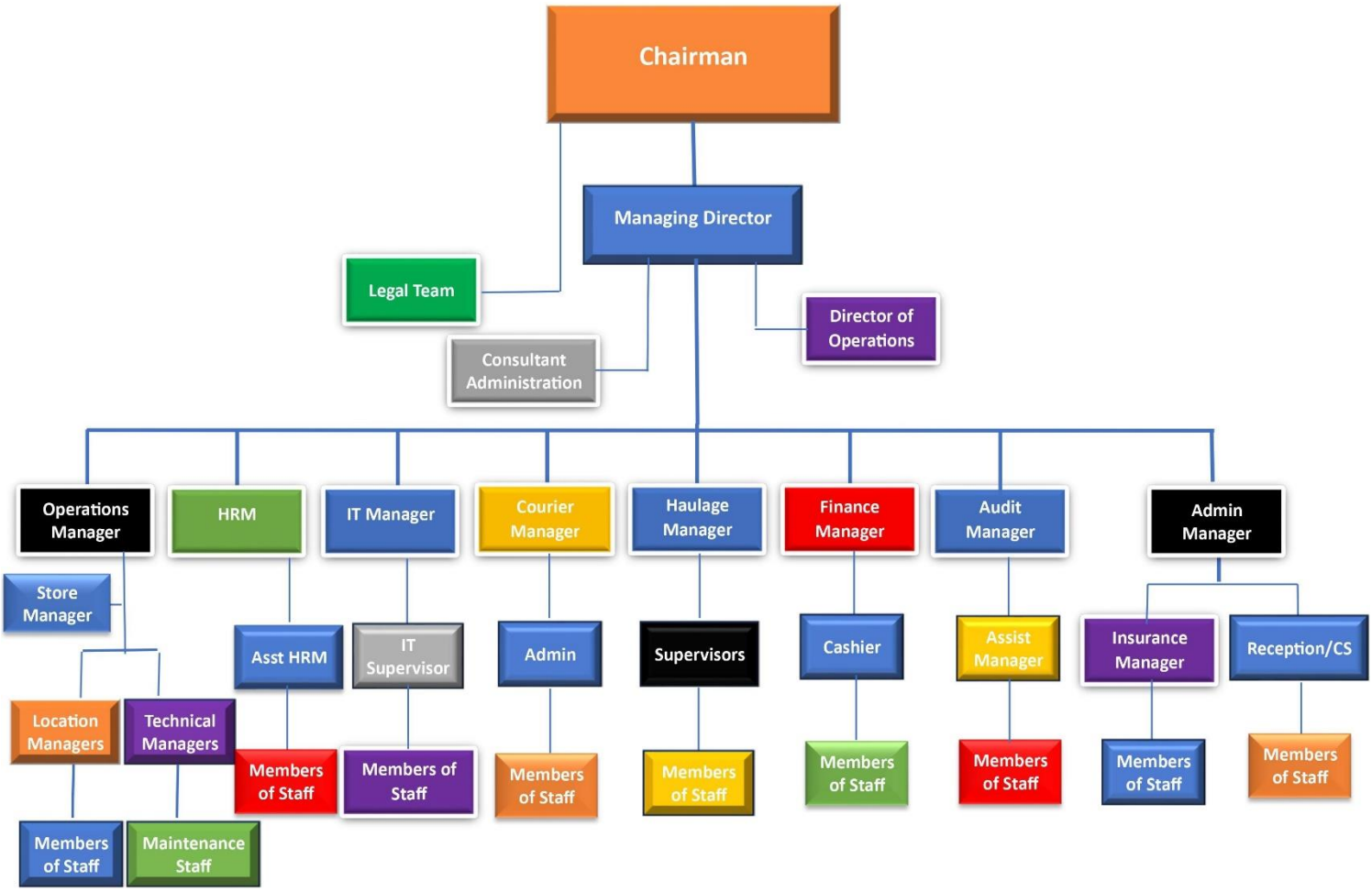
The information provided by the employees or any other means (such as the company's archived documents or reports) of the above-mentioned company is purely for academic purposes and cannot be used for any other purpose.

Regards,

Yours faithfully,
for: Cross Country Limited

Yomi Daniel
Head Operations Officer
Tel: +234-8034051316
yomibash17@gmail.com

Organogram of Cross-Country Transport Nigeria Ltd



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Engineering, Built Environment and Information Technology

Fakulteit Ingenieurswese, Bou-omgewing en Inligtingtegnologie / Lefapha la Boetšenere, Tikologo ya Kago le Theknolotši ya Tshedimošo

7 November 2022

Reference number: EBIT/268/2022

Mr DN Otuokwu
Department: Engineering and Technology Management
University of Pretoria
Pretoria
0083

Dear Mr DN Otuokwu,

FACULTY COMMITTEE FOR RESEARCH ETHICS AND INTEGRITY

Your recent application to the EBIT Research Ethics Committee refers.

Conditional approval is granted.

This means that the research project entitled "Innovation for survivability, resilience, and competitive advantage during a global crisis: A case study of Cross Country Transport Ltd during the COVID-19 pandemic" is approved under the strict conditions indicated below. If these conditions are not met, approval is withdrawn automatically.

Conditions for approval:

Contacts of the participants are to be sourced with compliance to POPIA.

This approval does not imply that the researcher, student or lecturer is relieved of any accountability in terms of the Code of Ethics for Scholarly Activities of the University of Pretoria, or the Policy and Procedures for Responsible Research of the University of Pretoria. These documents are available on the website of the EBIT Ethics Committee.

If action is taken beyond the approved application, approval is withdrawn automatically.

According to the regulations, any relevant problem arising from the study or research methodology as well as any amendments or changes, must be brought to the attention of the EBIT Research Ethics Office.

The Committee must be notified on completion of the project.

The Committee wishes you every success with the research project.

Kai-Yin

Prof K.-Y. Chan
Chair: Faculty Committee for Research Ethics and Integrity
FACULTY OF ENGINEERING, BUILT ENVIRONMENT AND INFORMATION TECHNOLOGY

Interview Part

Informed consent form
(Form for research participant's permission)

1. Project information

1.1 Title of the research project:

Innovation for survivability, resilience, and competitive advantage during a crisis: The Case of Cross-Country Transport Ltd during a covid-19 pandemic.

1.2 **Researcher details:** Daniel Otuokwu, Research Student, Graduate School of Technology Management, University of Pretoria. Contact: u21739502@tuks.co.za / +27 (0) 636034631

1.3 Research study description:

The research aims to identify and investigate the impact of the covid-19 crisis on the Nigerian road transportation industry, and to understand how effective the innovative strategies the crisis compelled road transport companies to adopt for their survivability and competitive advantage.

The participants will be required to answer the interview questions to the level of their knowledge, involvement, and capacity. No participant is obligated to answer questions that they have no knowledge of or are not in the capacity to answer.

Participants' identities will be protected and the only classification that will be mentioned in the research is the following:

(i) Department which the participant represents (HRM/IT/operations/maintenance, etc.)
(ii) Participant category of position (i.e.: top/middle/lower management).

2. Informed consent

2.1 I, _____ hereby voluntarily grant my permission for participation in the project as explained to me by Daniel Otuokwu.

2.2 The nature, objective, possible safety, and health implications have been explained to me and I understand them.

2.3 I understand my right to choose whether to participate in the project and that the information furnished will be handled confidentially. I am aware that the results of the investigation may be used for the purposes of publication.

2.4 Upon signature of this form, the participant will be provided with a copy.

Signed: _____ Date: _____

Witness: _____ Date: _____

Researcher: _____ Date: _____

University of Pretoria

Questionnaire Part

Dear Sir/Madam,

I am a master's student in the Graduate School of Technology Management, University of Pretoria.

My research titled: Innovation for Survivability, Resilience, and Competitive Advantage During a Crisis: The Case for Cross-Country Transport Ltd in a Covid-19 Pandemic.

The research is about understanding the role of innovation in supporting organizational survivability during a crisis. My study aims to identify and investigate the impact of the covid-19 crisis on the Nigerian Transportation Sector, and to understand how effective the innovative strategies the crisis compelled road transport operators to adopt for their survivability and competitive advantage.

The purpose of this questionnaire is to gather data from a target audience. You were chosen as a respondent because you are acquainted with the operations of the road transport sector, and how the covid-19 pandemic affected its operations. Your participation is voluntary, and you can withdraw at any time without penalty. Throughout the survey, your privacy will be protected, and your participation will remain confidential. I do not wish to analyze data individually and all the data will be transferred to a computer program to analyze the entire group. This means that you are assured of anonymity.

If you agree to participate, please complete the questionnaire that follows this cover letter. It should take about 3 minutes of your time at the most. By completing the questionnaire, you indicate that you voluntarily participate in this research. If you have any concerns, please contact me with the detail provided below.

Researcher name: Daniel N. Otuokwu
Email: u21739502@tuks.co.za
Phone: +27-0636034631

By selecting the "Yes" option I hereby voluntarily grant my permission for participation in this anonymous survey. The nature and the objective of this research have been explained to me and I understand them.

I understand my right to choose whether to participate in the research project and that the information provided will be handled confidentially. I am aware that the results of the questionnaire may be used for academic publication.

□ Yes
□ No