



Prifysgol Cymru
Y Drindod Dewi Sant
University of Wales
Trinity Saint David

**A QUALITATIVE INVESTIGATION OF THE ROLE OF
DIGITALIZATION IN TRANSFORMING THE BUSINESS MODEL AND
IMPROVING THE PERFORMANCE OF PETROLIAM NASIONAL
BERHAD (PETRONAS) IN MALAYSIA**

by

HASNORIZAL BIN CHE HASNI

1713763

Submitted in fulfillment of the requirements for the

DOCTOR OF BUSINESS ADMINISTRATION (DBA)

MARCH 2023

ACKNOWLEDGEMENT

Allah SWT, the author of knowledge and wisdom and his numerous acts of love, deserves praise and thanks for guiding me through all of the challenges I encountered while completing the doctoral program. I'm grateful for the opportunity to benefit from your instruction daily.

Thanks to several people who have been instrumental in making this thesis a reality and seeing it through to completion. Some, however, need special notice to show my heartfelt gratitude and indebtedness, notably those listed below:

Thanks to everyone who has supported and helped me throughout the years: my wife Nurulhasanah Abu, my sons, and daughter Muhammad Hariz Hakeem, Muhammad Haris Rayyan, Hanna Latifah, and my mother, Datin Paduka Hjh. Normah Sidek, my father Maj. General (R) Dato' Paduka Hj. Che Hasni Che Ahmad; and my in-laws – Hj. Abu Yusop and Hjh. Narimah Mahbob for all of their prayers, unwavering support, and understanding.

I would want to thank my doctoral program supervisor; Prof. Dr. Wan Norhayate Wan Daud, for her unwavering supervision, leadership, wisdom, and support throughout the years;

The senior leadership of PETRONAS for their consistent support, assistance, and endorsement; and

Because of the constant support, knowledge, and know-how that they have provided to me throughout my doctoral study at the University of Wales Trinity Saint David in the United Kingdom and my time at the Westminster International College of Malaysia, I have received the Doctor of Business Administration Studies and thesis program.

DECLARATION

This work has not previously been accepted in substance for any degree and is not being submitted in candidature for any degree at the same time.

Signed (candidate)

Date 8th March 2023

STATEMENT 1

Unless otherwise specified, this thesis is the result of my research. Where correction services are employed, the scope and type of the correction are specified in the footnote(s). In the footnotes, specific references to other sources are provided. A bibliography is included at the end.

Signed (candidate)

Date 8th March 2023

STATEMENT 2

With this consent, my thesis is made accessible for deposit in the University's digital repository if accepted.

Signed (candidate)

Date 8th March 2023

ABSTRACT

Digitalization is at the epicenter of the oil and gas industry's business models. It has reshaped the business landscape of global energy companies by transforming the business into a digital model with technology platforms to increase overall sales, branding, and market presence. Unfortunately, the current studies do not sufficiently investigate the role of digitalization in the oil and gas industries. There are gaps to be filled in the business model that has been infused with digitalization to improve business performance. Thus, this study aims to explore the roles of digitalization on the business model referencing Business Model Canvas and the performance of the PETROLIAM NASIONAL BERHAD (PETRONAS) from a strategic management perspective.

The researcher chooses the qualitative research design by exploring a case study approach to get the study's research questions and objectives. The researcher conducted semi-structured interviews with eight (8) executive leaders of the PETRONAS group of companies representing various business streams within PETRONAS. The data were transcribed and analyzed using the themes and subthemes. The findings revealed that the business model positively influences PETRONAS's performance. In this first theme, most participants stated that the business model enables PETRONAS to meet its targets, increase revenue, and minimize impairments.

The second theme focused on the importance of the business model infused by digitalization on PETRONAS's business performance, leading to three subthemes: efficient, competitive, and optimize, where digitalization may help PETRONAS generate new revenue streams. It also enables sustainable business by leveraging digitalization, redirecting resources to other value-added activities, and transparency. In short, most participants said that digitalization had improved PETRONAS' business performance, as reflected in their financial year 2020 and 2021 reports.

PETRONAS's single unified business model was the final theme, which spawned three (3) subthemes focusing on environmental, socio-economy, and health and safety. These subthemes indicated that PETRONAS should incorporate ecological, socio-economy, and health and safety elements into its business model to ensure its sustainability.

Aside from that, most participants also cited that culture, change, and digitalization act as enablers and catalysts to the business model in propelling PETRONAS's performance to greater heights where it creates an innovative and strategic workforce. The outcomes of this study contributed to various ways to theoretical ideas. Understanding and identifying the post-digitalization infusion and its roles contribute significantly to the formulation of a single unified business model for PETRONAS' performance by highlighting the critical elements that PETRONAS must consider and the business model building blocks.

On the other side, this research had practical ramifications since the conceptual framework produced according to the results was used to propose a single unified business model for improved business performance.

Table of Contents

ACKNOWLEDGEMENT	- 2 -
DECLARATION	- 3 -
STATEMENT 1	- 3 -
STATEMENT 2	- 3 -
ABSTRACT	- 4 -
LIST OF TABLE	- 10 -
LIST OF FIGURES	- 11 -
LIST OF ABBREVIATION	- 12 -
CHAPTER ONE	- 16 -
INTRODUCTION	- 16 -
1.1 Introduction	- 16 -
1.1.1 Background of the Study	- 16 -
1.2 Problem Statement	- 23 -
1.3 Research Questions	- 32 -
1.4 Research Objective	- 33 -
1.5 Significance of the Study	- 35 -
1.5.1 Theoretical Contribution	- 35 -
1.5.2 Practical Contribution	- 37 -
1.6 Scope and Restriction of Study	- 39 -
1.7 Definition of Key Terms	- 39 -
1.7.1 Digitalization	- 39 -
1.7.2 Business Performance	- 40 -
1.7.3 Business Model	- 41 -

1.7.4	Business Strategy	- 42 -
1.7.5	Health, Safety and Environment Management	- 43 -
1.7.6	Organization Culture	- 44 -
1.8	Organization of the Remaining Chapters	- 45 -
CHAPTER TWO		- 46 -
LITERATURE REVIEW		- 46 -
2.1	Introduction	- 46 -
2.2	Theory Underlying Digitalizaion, Supply Chain Management, Business Model and Business Performance	- 46 -
2.2.1	Digitalization Theory	- 46 -
2.2.2	Supply Chain Management (SCM) Theory	- 48 -
2.2.3	Empirical Evidence: Theory underlying Business Model	- 50 -
2.2.4	Empirical Evidence: Theory underlying Business Performance	- 54 -
2.3	The role of Digitalization to Business Model in Improving Business Performance	- 57 -
2.3.1	Digital Disruption in the Oil and Gas Industry	- 65 -
2.4	Business Strategy plays a role on Business Performance	- 73 -
2.5	Innovation Culture and Technology Adoption	- 74 -
2.6	Health, Safety and Environment (HSE)	- 77 -
2.7	The Gaps and unresolved questions in the literature	- 82 -
2.8	Summary	- 86 -
METHODOLOGY		- 87 -
3.1	Introduction	- 87 -
3.2	Research Design	- 87 -
3.3	Case Study	- 90 -
3.3.1	Types of Case Study	- 90 -
3.3.2	Designs of Case Study	- 92 -
3.4	The Population and Sample	- 94 -
3.4.1	Criteria for selection of cases	- 96 -
3.5	Data Collection	- 96 -

3.6	Case Study Protocol	- 99 -
3.6.1	Case Selection Procedure	- 100 -
3.6.2	Documentation	- 101 -
3.6.3	Site Visit	- 101 -
3.6.4	Arranging Interviews	- 101 -
3.6.5	Conducting Interviews	- 102 -
3.6.6	Verbatim	- 102 -
3.7	Data Analysis	- 103 -
3.8	Trustworthiness	- 105 -
3.9	Ethical Consideration	- 106 -
3.10	Summary	- 107 -

CHAPTER FOUR RESEARCH FINDINGS - 108 -

4.1	INTRODUCTION	- 108 -
4.2	Description of Interviewed Participants	- 109 -
4.2.1	Background Information of the Participants	- 110 -
4.3	Interview Themes and Findings in Answering the Research Questions-	115 -
4.3.1	Findings on Research Question (RQ) One	- 116 -
4.3.2	Findings on Research Question (RQ) Two (2)	- 132 -
4.3.3	Findings on Research Question (RQ) Three (3)	- 152 -
4.4	SUMMARY	- 167 -

CHAPTER FIVE DISCUSSION, RECOMMENDATIONS, AND CONCLUSION - 168 -

5.1	Introduction	- 168 -
5.2	Discussion of Findings and Results	- 168 -
5.2.1	Discussion for Research Objective One	- 168 -
5.2.2	Discussion for Research Objective Two	- 169 -
5.2.3	Discussion for Research Objective Three	- 171 -
5.3	Contributions of the Study	- 177 -
5.3.1	Theoretical Contributions	- 178 -
5.3.2	Practical Contributions	- 178 -

5.4	Limitation of the Study	- 179 -
5.5	Future Research	- 180 -
5.6	Conclusion	- 181 -
	REFERENCES	- 183 -
	APPENDIX A:	- 208 -
	CASE STUDY PROTOCOL AND IMPLEMENTATION	- 208 -
A.	INTRODUCTION TO THE CASE STUDY AND THE PURPOSE OF THE PROTOCOL	- 208 -
B.	DATA COLLECTION PROCEDURES	- 213 -
C.	CASE STUDY REPORTING	- 214 -
D.	NATURE OF INTERVIEW	- 223 -

LIST OF TABLE

Tables	Title	Page
Table 3.1:	Participating PETRONAS companies in the research study.	- 97 -
Table 4.4:	Summary of Research Question Two (2)	- 150 -
Table 4.5:	Summary of Research Question Three (3)	- 165 -

LIST OF FIGURES

Figures	Title	Page
Figure 1.1:	Oil and Gas Industry Value Chain	- 23 -
Figure 1.2:	Monthly OECD Crude & Petroleum Product Stocks in mil bbls.	- 24 -
Figure 1.3:	Oil Production in Oct 2019 vs Pre-crisis in mil BPD.	- 25 -
Figure 1.4:	Key economies forecasted lower economic growth percentage.	- 26 -
Figure 1.5:	PETRONAS transformation of a NOC into a global energy champion (PETRONAS Group Strategic Communications, 2016)	- 27 -
Figure 1.6:	PETRONAS Integrated Oil & Gas Value Chain	- 28 -
Figure 2.1:	The Canvas of Business Model Generation	- 61 -
Figure 2.2:	Apple's Performance, Before and After Business Model Changes	- 62 -
Figure 2.3:	The Stock Price of HTC versus Apple	- 63 -
Figure 2.4:	Digital Performance Score: Energy Companies versus Disrupters	- 67 -
Figure 2.5:	Categorising the Performance of Oil and Gas Companies	- 68 -
Figure 2.6:	Digital Disrupters Excel across Four Dimensions	- 69 -
Figure 2.7:	Top five most promising digital technologies in need of improvement	- 72 -
Figure 3.1:	The Research Process adapted from (Cresswell, 1994)	- 88 -
Figure 3.2:	Yin's Case Study Design Types	- 92 -
Figure 4.1:	Thematic Map of Business Model Influence on PETRONAS Performance	- 121 -
Figure 4.2:	Thematic Map of Business Model Outcome towards PETRONAS Business Performance.	- 131 -
Figure 4.3:	Thematic Map of Digital Benefits towards PETRONAS Business Performance.	- 151 -
Figure 4.4:	Thematic Map of the Improvised Business Model Canvas Proposal for PETRONAS	- 166 -
Figure 5.1:	Conceptual Framework of an Enhanced Business Model For PETRONAS Group of Companies	- 176 -
Figure A.1:	The Research Process adapted from (Cresswell, 1994)	- 214 -

LIST OF ABBREVIATION

AT&T	American Telephone and Telegraph
ASEAN	Association of Southeast Asian Nations
AI	Artificial Intelligence
API	American Petroleum Institute
BPD	Barrels per day
BOED	Barrels of oil equivalent per day
BTF	Behavioral Theory
BMI	Business Model Innovation
COP	Conference of the Parties
CNPC	China National Petroleum Corporation
COVID-19	Coronavirus Disease year 2019
CCS	Carbon Capture and Storage
CO ₂	Carbon Dioxide
CAPEX	Capital Expenditure
CSR	Corporate Social Responsibility
DX	Digital Transformation
DNA	Deoxyribonucleic acid
DIAL	Digital Artificial Lift
DOA	Decommissioning Option Assessments
DOF	Department of Fisheries
EU	European Union
e.g.	exempli gratia
E&P	Exploration and Production
ESTMZ	Enhanced Single Trip Multizone
FOF	Facilities of the Future
FAT	Factory Acceptance Testing (FAT)
4D	Four-dimensional
4C	Four-component
GDP	Gross Domestic Product
GNE	Gas & New Energy
GCEO	Group Chief Executive Officer

GHG	Green House Gas
GRI	Global Reporting Standards Initiatives
HTC	High Technology Computer
HP	Hewlett-Packard
HSE	Health, Safety & Environment
HSEQ	Health, Safety, Environment & Quality
HSSE	Health, Safety, Security, and Environmental
IR4.0	Industry Revolution 4.0
IEA	International Energy Agency
IMF	International Monetary Fund
IOC	International Oil and Gas
IT	Information Technology
ICT	Information, Communication and Technology
IBM	International Business Machine
IDC	International Development Corporation
IoT	Internet over Things
I-PIMS	Integrated Pipeline Integrating Management System
IPIECA	International Petroleum Industry Environmental Conservation Association
IOGP	International Oil and Gas Producers
ISO	International Organization for Standardization
LNG	Liquid Natural Gas
LCA	Life Cycle Assessment
ML	Machine Learning
Mtpa	million tons annually
mmBtu	million of British metric thermal units
MACC	Malaysian Anti-Corruption Commission
MNC	Multi-National Company
MP3	Moving Picture Experts Group Layer-3
MOE	Ministry of Education
MBA	Master in Business Administration
NIOC	National and International Oil & Gas Company

NOC	National Oil and Gas Companies
NZCE	Net Zero Carbon Emission
OPEC	Organization of Petroleum Exporting Countries
OGP	Oil and Gas Producers
OECD	Organization for Economic Cooperation and Development
OEM	Original Equipment Manufacturer
OT	Operational Technology
OPEX	Operating Expenditure
OE	Operational Excellence
PV	Photovoltaic
PETRONAS	Petroliam Nasional Berhad
PCSB	PETRONAS Carigali Sdn Bhd
PRPC	PETRONAS Refinery & Petrochemical Corporation Sdn. Bhd.
PDB	PETRONAS Dagangan Berhad
PFLNG	PETRONAS Floating LNG Sdn Bhd
PETCO	PETRONAS Trading Corporation Sendirian Berhad
PD&T	Project Delivery and Technology
PPRT	Pandemic Preparedness and Response Team
PCE	Process Cycle Efficiency
PDCA	Plan-Do-Check-Act
PROTON	Perusahaan Otomobil Nasional Berhad
R&D	Research & Development
RBV	Resource-Based View
RPA	Robotic Process Automation
RQ	Research Question
RON	Research Octane Number
ROA	Remote Autonomous Operations
RM	Ringgit Malaysia
RE	Renewable Energy
RAPID	Refinery and Petrochemical Integrated Development
SCM	Supply Chain Management

SSCM	Sustainable Supply Chain Management
SOPs	Standard Operating Procedures
TQM	Total Quality Management
TCE	Transaction Cost Economics
tCO ₂ e	tons of Carbon Dioxide equivalent
US	United States of America
USD	United State Dollar
UK	United Kingdom
UNSDGs	United Nations Sustainable Development Goals
WHO	World Health Organization
UAUC	You Act You See

CHAPTER ONE

INTRODUCTION

1.1 Introduction

The research issues that will be discussed are outlined in this chapter. It accomplishes so by discussing the context of the analysis, the issue statement, the research objectives, the research objectives and questions, the significance of the study, and the appropriate use of the research keywords.

1.1.1 Background of the Study

In the second half of 2018, economic activity slowed, but the world economy grew by 3.6%. (International Monetary Fund, 2019). Several things, including trade tensions between the United States (US) and China, have made business and financial markets feel worse and slowed growth in the US, China, and other major exporters. Growth also slows down because of things that are unique to each country, like tighter finances, geopolitical tensions, and higher oil import fees. The number of countries that are getting worse is also going down (PETRONAS, 2019).

For a third (3rd) year, upstream expenses rose as crude prices improved. With extensive resources in Brazil, Guyana, Mexico and Russia, the conventional sector accounted for two-thirds of expenditure. Oil companies have endorsed projects that use existing infrastructure to keep costs down. To achieve faster returns, companies were channelled to North American shale assets with unconventional expenditures quicker than conventional. After oil prices fell in 2014, upstream discoveries dropped to their lowest level in a decade and a half in 2018 (PETRONAS, 2019).

In 2017, demand for China Liquid Natural Gas (LNG) increased by more than 20%, helping to push the global market to more than 320 million tons annually (mtpa), another record year. After Japan, China was the world's second-biggest importer of LNG. On the other hand, Japan was the world's largest LNG importer. Changing from coal to gas was a key strategy in China's fight against pollution.

Because of this, the price of LNG imports has gone up to more than USD 11 per million British metric thermal units (mmBtu). LNG has been brought in, and now it makes up about one-third of the world's gas business. Buyers like Bangladesh and Pakistan use LNG to meet their growing energy needs. Even though Japan's demand for LNG went down, India's imports of LNG grew by 21%. This was because the economy was growing, which increased the need for electricity and led to natural gas being burned in power stations. On the supply side, four projects were finished in 2018, one of which was finished in 2017 (PETRONAS, 2019).

Despite overall price increases, the volatility of crude oil prices increased throughout 2018. The cost of a barrel of Brent rose to an average of USD 71 in 2018, up 32 per cent from the previous year's average of USD 54. Brent went from USD 86 at the beginning of October to USD 50 in 2019. This happened because the global oil market became tight due to an oversupply. In 2018, the world's need for oil went up by 1.3 million barrels per day, to 99.3 million barrels per day (BPD). Even though the Organization of Petroleum Exporting Countries (OPEC) and its allies decided to keep the agreed-upon production cuts in place until the end of 2018, oil prices went up.

From March 2018, it was raised to an average of 2.8 billion barrels for the next five years. It caused the Organization for Economic Cooperation and Development (OECD) to have less commercial oil on hand (OECD). But as major oil producers increased output after OPEC's decision in June 2018 to increase supplies by 1 million BPD, the global oil market turned into a surplus (PETRONAS, 2019).

This happened as worries grew that demand might slow down because of the trade war between the U.S. and China, more oil being made, and the U.S.'s decision in November to let eight major oil importers from Iran avoid penalties. The United States kept making more oil, and in November 2018 they made a record 11.7 million barrels per day (BPD). In 2018, they made an average of 10.9 million BPD. In December 2018, OPEC promised to keep the production cut going until June 2019.

In 2018, the amount of ethylene used in Asia-Pacific, North America, and the Middle East rose by 5.4% to 160.2 meters per million. 90% of the global demand for ethylene was in the three regions. Ethylene capacity, led by the United States, China and India, rose by 4.6% to 178.3 mtpa in 2018. Together, 80 per cent of global capacity increases came from these countries. With 6.4 mtpa of new ethylene and polyethylene capacity, the United States is still the best place to invest in petrochemical projects. This is up from 6 mtpa in 2017. Half of the global expansion in 2018 accounted for new capacity (PETRONAS, 2019).

Primary demand for energy grew by 2.0% in 2018 and accelerated by 1.7% a year ago. The growth in these regions—led by Asia and Africa—made up for the reductions in developed countries. In the global expansion of large-scale solar and wind power, renewable energy growth exceeded the growth of fossil fuels by 23 per cent. In addition, there were shifts in renewable energy policy this year, with China ending subsidies for solar energy projects in favor of competitive bidding and reducing feed-in subsidies. This policy led to a price decline of over 30 per cent for solar photovoltaic (PV) modules by year-end. With a decrease in costs, unsubsidised onshore wind and solar projects in nearly all major economies have become the cheapest electricity generator.

A few oil and gas companies have been renewing their interest in the new energy sector through climate change, corporate social responsibility, lower renewable costs and the drive to diversify. The majority of nations reached agreement on essential parts to revive the Paris Agreement for 2015 in December 2018 as part of the United Nations Conference of the Parties (COP) 24 climate accord (PETRONAS, 2019).

Looking at the outlook based on the past and present scenario, the future is expected to be even bumpier for the Oil and Gas industry. As a result, placing a strong emphasis on activities related to research and development (R&D) within an organization has evolved into an essential instrument for developing a competitive advantage. In the energy industry, cheaper and cleaner technologies are introduced almost every day, the customers' behaviours are constantly shifting, and market conditions shift without prior warning. For a company to remain competitive in the long run, it is essential to invest in new technology and digitalization.

Furthermore, as we are now entering the age of the Industry Revolution 4.0 (IR 4.0), digital business is the name of the game. The digitalization of everything in our lives, both professionally and personally, will be governed by its dictates. Emerging markets will see an increase in innovative technologies, which will lead to a rise in the number of new competitors and new business models. Customers will start expecting more from companies and will be more demanding of them due to the rapid change occurring.

Businesses may be able to expand into new markets with the help of digitalization and AI, which can also improve how they run their current operations (Haefner, et al., 2021); (Huang, et al., 2017). As a result, numerous companies across a wide range of sectors have lately launched dedicated digital transformation initiatives (Warner & Wäger, 2019); (Westerman & Bonnet, 2015). The COVID-19 epidemic has hastened these shifts and emphasized the importance of efficient digital operations. In many cases, more digitally advanced businesses fared better than their competitors in dealing with the issue (Shah & Shah, 2020); (Wittbold, et al., 2020).

In order for PETRONAS to fully appreciate and embrace these demands and expectations, not only would PETRONAS need to change themselves, but they would also need to do so in order for them to be able to take advantage of those chances. Even if advances in technology are among the most important factors enabling digital transformation, this is not the only one at play. The business model of an organization might undergo alterations as a result of digital transformation, which also has an impact on the organizational processes and procedures that are pertinent to all staff members operating at every level.

Over the past twenty (20) years, the proliferation of digital technologies has resulted in significant shifts in many facets of our lives and nearly every market sector. These shifts include how people navigate urban areas and how they shop for consumer goods. Lim, et. al (2017) estimated in their report that the digital economy of the Association of Southeast Asian Nations (ASEAN) will be estimated at USD 1 trillion for the region's Gross Domestic Product (GDP) over the following decade. This projection was based on the fact that the rate of digital growth in the area is accelerating (Lim, YS.; Teh, WV.; Esparan, Loganantha.; Bobby, J.; Karyn Chua, SY., 2017).

Capitalising on the point of the digital economy in ASEAN, the government of Malaysia has set a target date of 2020 to achieve its goal, which is for the country's digital economy to grow to make up 20 per cent of the country's total GDP. As members of ASEAN, the third-largest population market globally, Malaysian businesses have the advantage of expanding new business opportunities beyond the domestic market through digital innovation. However, in most Malaysian companies, digital transformation is still in its infancy stages. Companies have yet to appreciate the value and advantage of digital transformation fully. As such, digital strategies for improving or increasing financial performance remain implemented.

While the meteoric growth of organizations such as Uber and Amazon may have brought about the first and most noticeable changes, similar architectural changes in the oil and gas sector generally began. In order to maintain their relevance and viability, oil and gas firms must analyze "fast-clock-speed" sectors to deconstruct the market dynamics and competitive rivalries that have resulted in these shifts and significantly new business models.

Mustapha, L. (2019), Vice President of PETRONAS Supply Change Management, remarked that the prognosis for the oil and gas sector remains tough. Demand fluctuations occurred as a direct result of disruptions in geopolitical stability, protracted commercial disputes, and the global economic collapse. In order to address the global challenges, despite the current market instability, PETRONAS will need to keep a cost-conscious mentality, pursue activity levelling to retain offshore activities, and develop new solutions to unlock value in its supply chain by building a business model for the group. All of these things must be done simultaneously (PETRONAS, 2019).

Although cost management can be limited, efforts may focus on technological advances, digitalizing processes, and harmonizing equipment and services standards to significantly enhance organizational competitiveness, speed, accuracy, agility, and ultimate cleanliness. Progress in technology and human development is useless if not fostered in a good governance and integrity culture.

Awareness of the effects of climate change rises worldwide as consumers become more conscientious and demanding of a sustainable way of life, coinciding with a more competitive oil and gas business perspective and a larger demand for sustainable and responsible environmental policies. This burden falls primarily on the fossil fuel industry, which must also supply rising energy demands. Every person's way of life is being challenged by the rapid development of digital technologies, and business owners are being forced to question whether or not their tried-and-true methods are still relevant in light of the fact that they may have fallen behind the times.

There has been a shift in recent years toward making digitalization and sustainability central tenets of company strategy (Marcysiak & Pleskacz, 2021). In the post-pandemic era, when proactive measures are needed, this is especially true (Lichtenthaler, 2021). The game has changed, and the only way to ensure your success is adapting by making the most of the technologies at your disposal. Expanding and fortifying the network of cooperation between different sectors is more important than ever before and calls for a redoubled effort.

As it is evident that the creation of a digital firm would require significant changes, digital transformation is more of a managerial task than a technological one (Lichtenthaler, 2021). Gartner (2019) defines digitalization as "the strategic use of digital technologies to transform an organization and create new sources of value for an existing business model" (Bai, et al., 2021). Understanding how businesses feel about digitalization, many factors must be considered. It is important to examine technological readiness within the context of organizational readiness, as this determines how well an organization will be able to adapt to emerging technology (Denicolai, et al., 2021).

Thus, digitization can aid in the attainment of a company's financial objectives, but at the expense of aggravating existing social and environmental inequities (Gupta, et al., 2020). In an effort to settle the debate surrounding the connection between digitalization and sustainability, Lichtenthaler (2021) proposes a new framework to build the concept of "digitainability," which integrates the two movements as two dimensions of progress (which is occasionally mutually reinforcing, occasionally inhibiting). For example, the term digitainability was recently coined to describe "the cross-fertilization between the processes of digitalization and sustainable development" (Gupta, et al., 2020).

For the sake of the organization's continued existence, it is imperative that they do a thorough analysis of their existing business model in order to ascertain whether or not it needs to be reorganised, reengineered, or changed. As a result, PETRONAS needs to go through a period of self-reflection and transformation in order to prepare for the more difficult future. This involves the adoption of new technologies by new business models, an increase in the demand from stakeholders, and changes in regulatory compliance. It is necessary to have alignment between key business components and information technology, such as people, processes, data, systems, IT infrastructure, and products, in order to deliver business value and accomplish business goals. This alignment is necessary in order to successfully navigate through the continually shifting business models and technological advancements.

In addition, there is not a formal and single unified business model that is now available inside PETRONAS that may be referred to. Because of this, PETRONAS and its Group of Companies have an inconsistent approach to fulfilling the group's vision, purpose, and major goals. As a result, the primary emphasis of this research will be placed on the Petroliaam Nasional Berhad (PETRONAS) Group of Companies in order to take into account the aforementioned scenario and create a single unified model for the group. This will be accomplished through an investigation into the way in which the progressive influence of digitalization on the business model results in improved performance.

1.2 Problem Statement

H. Devold (2013) defined the Oil and Gas industry as the oil, gas, refinery, transport, storage and selling industry. As A. Inkpen; M. H. Moffett (2011) points to geophysics, boiling and gas production as the related sectors of the industry. Oil and gas production processes are divided into stage processes, such as exploration and manufacturing (upstream), preparation and transport (midstream), and processing and selling (downstream). Its primary phases are the developing, manufacturing, processing, transport, and marketing of hydrocarbons (Wolf & Tordo, 2009). Figure 1.1 shows the value chain of the oil and gas industry.

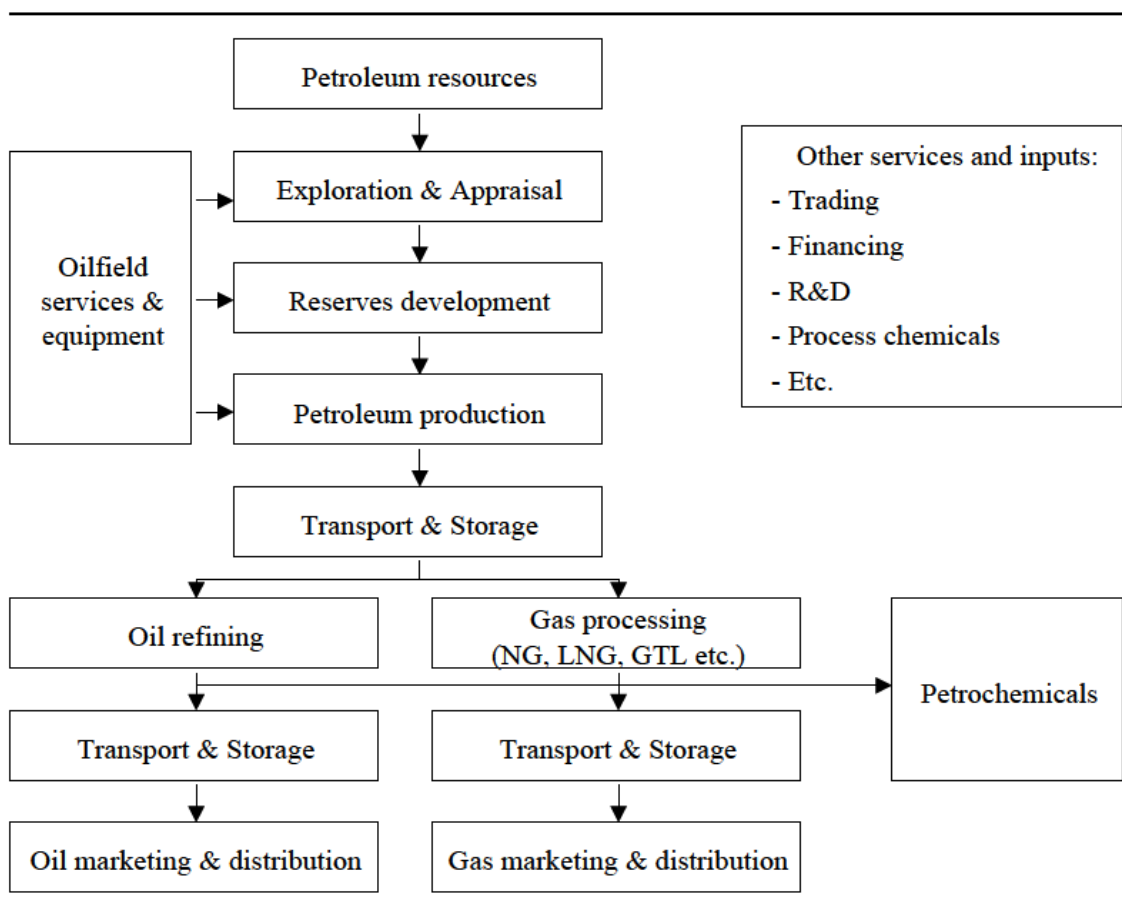


Figure 1.1: Oil and Gas Industry Value Chain

Source: The World Bank Group (2009)

The Upstream Business is primarily responsible for the monetizing hydrocarbon products through processes such as natural gas and crude oil exploration, development and production and licensing and commercialization of natural gas (LNG). Meanwhile, Downstream Business virtually adds value by processing the monetization of the hydrocarbons, including the refinement, processing, manufacture and marketing of the final product, such as refined base oil, oil and lubricants, petrochemicals and natural gas products. The oil market volatility prevails where the 2019 price has fluctuated from daily drops of 53 dollars per barrel to a high of 75 dollars a barrel, an average of 64 dollars a barrel, compared to 2018, an average of 71 dollars a barrel. The sharp fall in crude oil prices reshaped global energy companies' external business landscape.

At the beginning of 2019, the oil price continued to decline in 2018 with concerns about an increasing supply of oil and low demand (refer to Figure 1.2). This, in turn, exerts pressure on OPEC+ to expand further cuts in outputs against the background of low oil prices and the US continued strong production of crude oil. Low demand and strong non-OPEC supply outweigh OPEC+ output cutbacks between July and March 2020. The oil market remained volatile and risk-averse throughout 2019 due to factors such as trade conflicts, worries of a recession, and tensions in major oil-producing countries. Longevity and uncertainty in trade conflicts continue to dampen the outlook on oil prices to negative (PETRONAS, 2019).

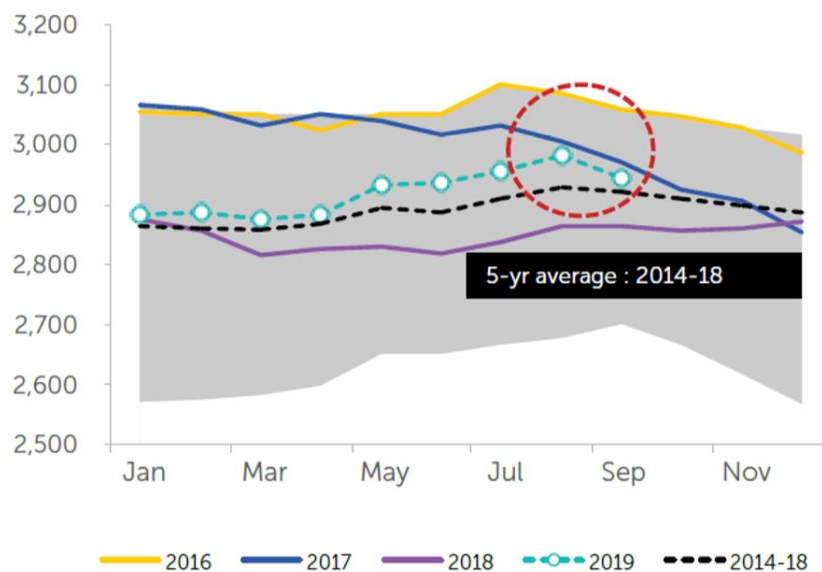


Figure 1.2: Monthly OECD Crude & Petroleum Product Stocks in mil bbls.
(International Energy Agency, 2019)

A growing surplus may lead to lower oil prices because solid supplies come primarily from the US from non-OPEC producers, causing oil inventory to grow. The US, which currently produces the most significant amount of crude oil, aims to become a net energy exporter by 2020. In Canada, Brazil, Guyana and Norway, other projects have accelerated. In its November 2019 report shown in Figure 1.3 below, the International Energy Agency (IEA) stated that the production of non-OPEC is expected to continue to rise; the supply of oil by the year 2020 will add 2.3 million barrels per day.

Trade and geopolitical instability in the oil-production countries. However, the sanctions only generated tremors in the petroleum market because the oil-producing countries were able to replace each of the displaced barrels. Disrupting supply, coupled with oil market tensions significantly in the Middle East, will continue to increase the volatility of oil prices in the major oil producers like Libya and Nigeria (PETRONAS, 2019).

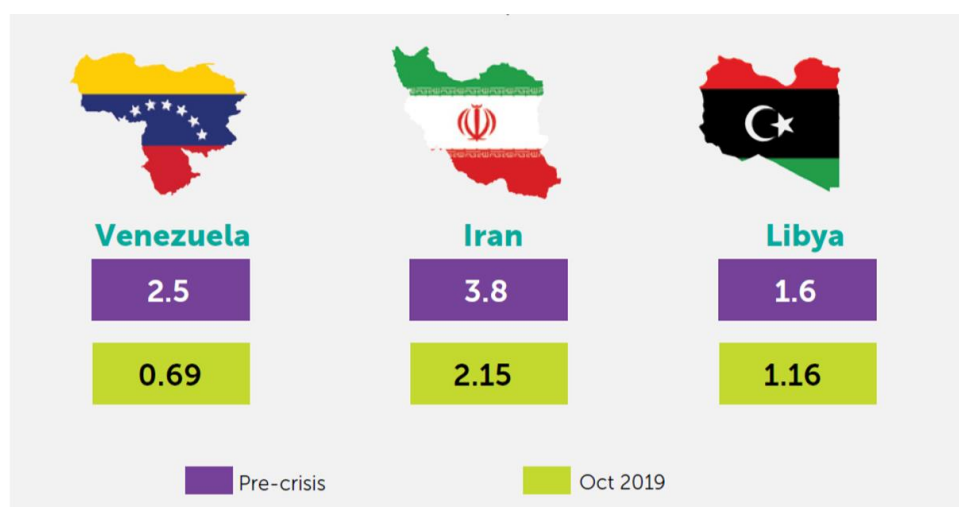


Figure 1.3: Oil Production in Oct 2019 vs Pre-crisis in mil BPD.

(International Energy Agency, 2019)

Slower economic growth in the world might weaken oil demand growth. In its most recent report in October 2019, the International Monetary Fund (IMF) revised its 2019 and 2020 global gross domestic product (GDP) growth estimates from 3.2% to 3%, 3.5% to 3.4%, respectively, compared to April 2019 projections. The reduction may be due to US-China trade tensions, hurting China's GDP growth.

In 2020, the IMF planned to achieve a 5.8% growth in China's economy (refer to Figure 1.4). Oil prices could rise as a result of the trade conflict since slower economic development could reduce the demand for energy (PETRONAS, 2019).

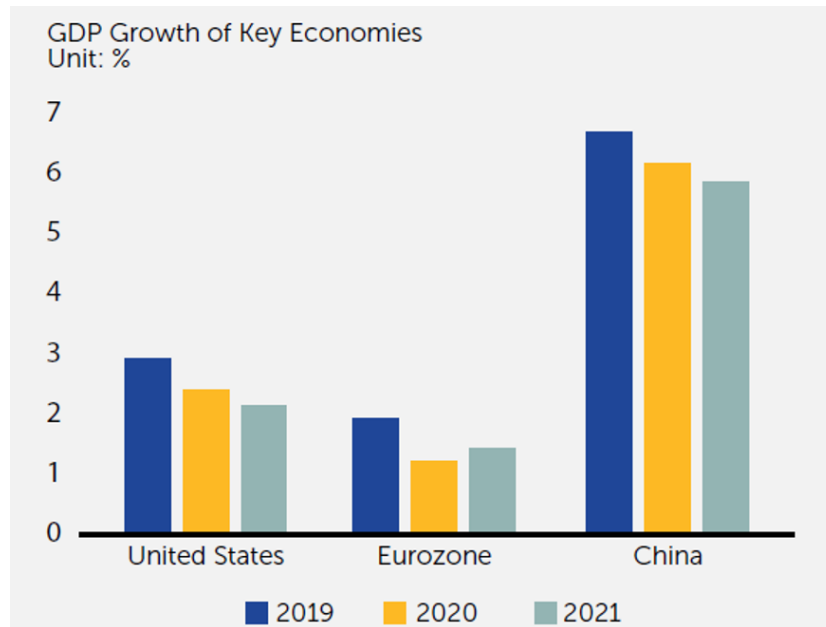


Figure 1.4: Key economies forecasted lower economic growth percentage.
(International Monetary Fund, 2019).

Since 2017, the OPEC has agreed on cutbacks of oil production to maintain oil market stability with ten (10) non-OPEC countries, including Russia, Mexico and Kazakhstan (OPEC+). The most recent meeting, which took place on December 6th, 2019, was attended by producers who agreed to further reduce production by 500,000 barrels per day (BPD) to 1.7 million BPD beginning in January 2020. In short, it remains a challenging outlook for 2020. To achieve growth and sustainability under the constant volatility of the market, the industry must concentrate on prudent expenditure, along with a cost-conscious approach (PETRONAS, 2019).

This research work will focus on the Petroleum Nasional Berhad (PETRONAS) Group of Companies as the case study subject. PETRONAS is a National and International Oil & Gas Company (NIOC), and it has been recognized with the status of the global 500® company (PETRONAS, 2016). PETRONAS has continuously evolved from a Malaysian based company to a Multi-National Company (MNC) since its foundation in 1974.

An multinational oil and gas firm that is committed to operational excellence, human capitalism, and innovation is always adapting to the ever-changing oil and gas industries. As a result, PETRONAS has steadily grown and competes with other energy companies. The NIOC transformation journey to the global energy champion in PETRONAS is shown in Figure 1.5.

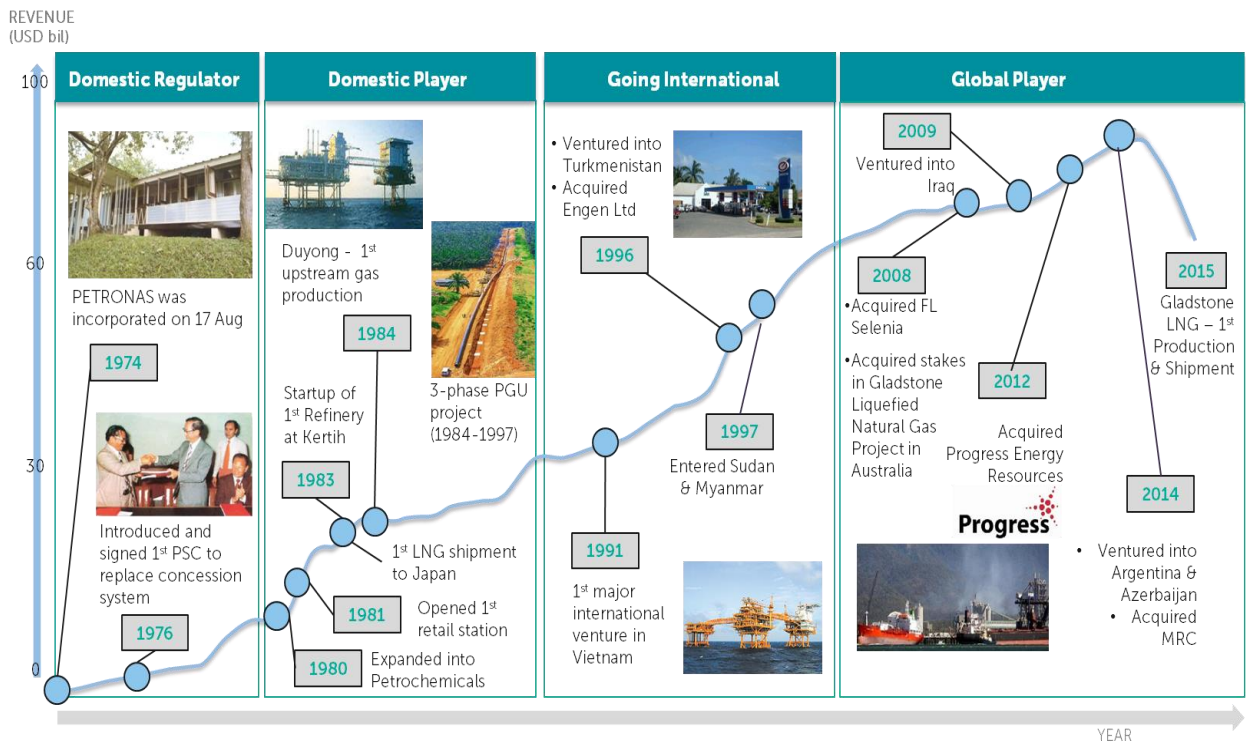


Figure 1.5: PETRONAS transformation of a NOC into a global energy champion (PETRONAS Group Strategic Communications, 2016)

Malaysia's oil and gas reserves are entrusted to PETRONAS, which is in-charge with maximizing the country's profit from them. Therefore, PETRONAS has grown to become a significant player in the oil and gas market. It explores for, develops, and produces crude oil and natural gas from a network of more than 216 fields serviced by more than 381 offshore platforms across the world.

PETRONAS is a fully integrated international oil and gas company with an extensive and diverse business portfolio in a broad range of oil and gas activities (PETRONAS, 2016). The integrated oil and gas value chain PETRONAS is shown in Figure 1.6.

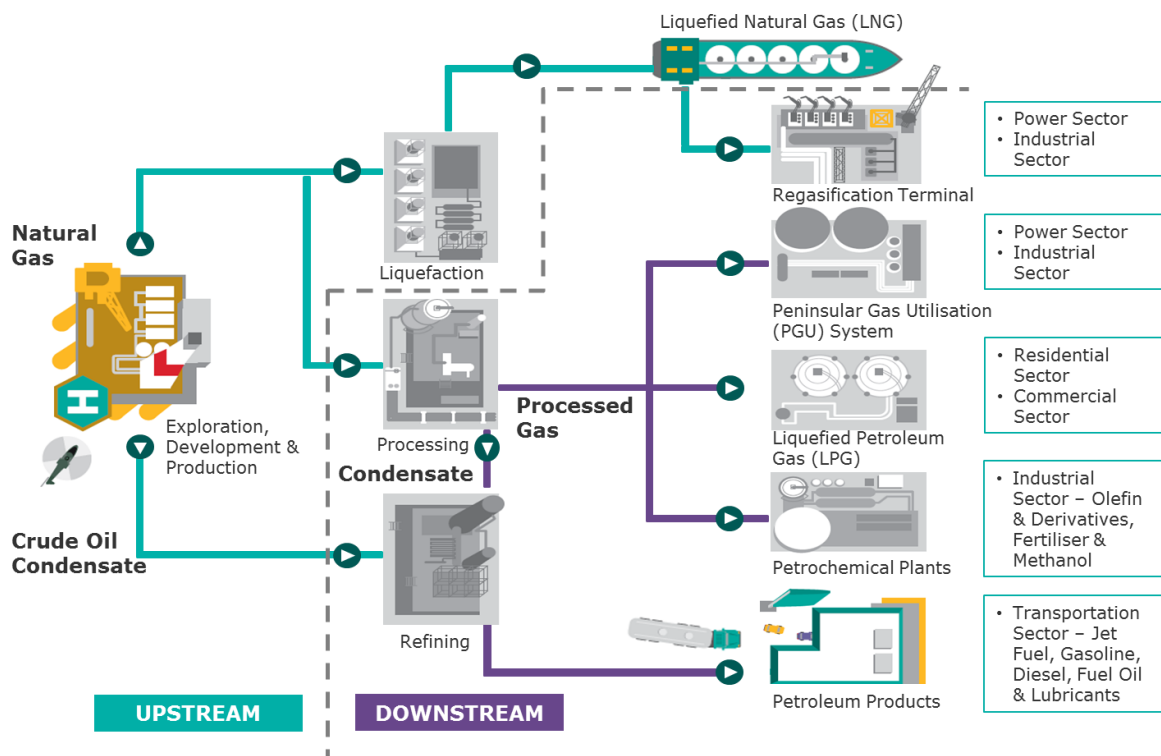


Figure 1.6: PETRONAS Integrated Oil & Gas Value Chain
(PETRONAS Group Strategic Communication, 2014)

To make high profits in oil and gas fields, the development of intellectual oil and gas complexes is therefore necessary. High levels of automation, unmanned manufacturing facilities, intelligent technology, energy, transportation, and industrial management systems characterise the complexes. Beyond regulatory compliance, sustainability is a genuine concern for the welfare of present and future generations. Despite the importance of incorporating socially and environmentally responsible practices and ensuring the continued relevance of its strategies in the future, the organization's survival depends on its ability to adapt to the rapid changes in its external operating environment.

PETRONAS, in past years, has developed its businesses, including its inclusion in unconventional hydrocarbons, which have a significant resource potential. To monetize these resources, PETRONAS develops their technology and capacity to develop non-conventional resources, i.e. shale gas and coalbed methane.

Progress has, in the last years, brought innovation to the oil and gas industry (McKinsey Global Institute, 2015) (S. Z. Kamal; J. Williams; J. Liddle, 2014) (Bravo C. E.; L. Saputelli; F. Rivas; A. G. Perez, 2013). In addition to the latest technology in recent decades, the oil and gas industries have improved their technology and technological development. Managing and analyzing massive amounts of data is an integral part of the oil and gas industry, thus researchers are building high-performance computing systems to collect geological and other sensor data across the whole production and processing pipeline (Speight J. G., 2014).

Innovation was increased in the oil and gas industry with the advancement of computing and communications technology. From 1980 to the 1990s, the digitalization and intellectualization of the oil and gas chain caused the widespread information technology institution (Speight J. G., 2014) (Devold H., 2013). Therefore, the majority of the work will be performed remotely, decision precision and effective interaction between functional units will increase, maximum oil production, operating and maintenance costs will decrease, and maximum oil production will be increased. In the oil and gas industry, some authors often refer to this situation as a "digital revolution" (Barber, et al., 2007).

The leading actors in the industry as described by A. Inkpen and M. H. Moffett (2011) includes the international oil and gas (IOC) and the National Oil and Gas Companies (NOC). Oilfield service companies perform crucial tasks in the oil and gas industry, part of the enterprise ecosystem; the innovation in the field is reliant on the technology used by the contractors (including information technology).

In Malaysia, digital transformation is not just a buzzword among business professionals. Due to its centrality, this idea has been adopted by the field of business models. It requires adapting an existing company to operate in a digital environment. For example, digital transformation can be generated by using technology platforms as a source of advertisements and business transactions to increase the overall sales, branding and market presence. As Sudev Bangah (2019) points out, digital disruption is present across many sectors, and digital transformation (DX) is picking up speed. These days, many businesses have seen the light on DX and are making investments in disruptive digital developments.

Downes & Nunes (2013) in their report, the major challenges companies currently face incorporating innovative digital technologies and taking advantage of them. All sectors, especially companies, are affected by digital transformation. The ever-evolving commercial potential of digital technologies fundamentally alters and inverts all company models on a regular basis. Bonnet, et al. (2012) reported that the leadership agendas of Information Technology (IT) and digital technology have become a high priority, with a strategic impact on their entire activities in the future.

Claims that "Corporate Sustainability" prioritizes value creation, environmental responsibility, environmentally friendly production methods, and the development of talented employees (Van Marrewijk, 2003). According to Mitchell et al. (2010), a sustainable market orientation as "a framework within which firms achieve beneficial, long-term results in terms of the economy, society, and environment that are acceptable to all of their major and secondary stakeholders." As part of this framework, we aim to please our patrons while also reducing our impact on the planet.

Recently, digitalization has risen to the top of many companies' strategic agendas, joining the previously popular topic of sustainability (Balsmeier & Woerter, 2019); (Berman, 2012). Digital technology, advanced data analytics, and artificial intelligence applications have increased the technical potential of organizations, prompting executives to modernize (Boldosova & Luoto, 2019); (Lichtenthaler, 2020); (Loebbecke & Picot, 2015). Digital maturity models help firms assess their level of digital transformation by considering the development of processes, objects, the human element, corporate culture, and organizational structure (Gubán & Sándor, 2021).

Another word that pops up in the literature is "digital orientation," which, according to Ardito, et al. (2021) is the conscious decision to move toward full digitalization of all of an organization's processes. Business preparedness and maturity in terms of technology reflect an organization's current state, whereas digital orientation describes its long-term strategic goal. Studies of a company's strategic direction have traditionally focused on three areas: customers, competitors, and technology. More recently, however, studies have begun to include the digital and environmental spheres as well. Environmental orientation refers to a company strategy that prioritizes environmental protection over profit (Muñoz & Dimov, 2015); (Zulfikar, et al., 2021).

PETRONAS's present infrastructure and expansion plan allows it to compete for consumers and meet their demands without compromising its essential value and quality. The global socio-economic and political landscape (particularly in Asia) has rapidly changed and has led to the achievement, growth and urbanization of education, income and health. Hence, there's a need for PETRONAS to focus on new areas of critical development that meet the demands of businesses which also that traditionally are not under the scope of the oil and gas portfolio, e.g. pharma, automotive by enabling digitalization for its sustainability and business performance.

PETRONAS is actively searching for visionary entrepreneurs in Malaysia and around the world in order to solve critical problems in the industrial and energy space through the use of ground-breaking technology and innovative business models in order to support the company's business growth and sustainability agenda. This is in alignment with the global change and demand that is currently taking place.

However, the organization was forced to operate in a reactive way because there was no single unified business model within PETRONAS to refer to. This model would have served as a source of references for the other PETRONAS Group of Companies. PETRONAS needs to reimagine itself so that it can accommodate the higher expectations of the future. This involves the development of new business models that call for the use of new technology, a growth in the demand from various stakeholders, and modifications to regulatory compliance. It is essential to have alignment between key business components and information technology (IT), such as people, process, data, system, IT infrastructure, and product, in order to offer value to the business and accomplish the business goals that have been set while navigating continually changing business models and technological innovation.

1.3 Research Questions

The study attempts to answer the following questions:

- i. What are the importance of the business model on PETRONAS' business performance?
- ii. What are the roles of the digitalization infused to business model on PETRONAS' business performance?
- iii. How does the business model improve an organization's business performance that embraces digitalization as its competitive advantage?

1.4 Research Objective

Maintaining one's competitive edge in today's corporate environment requires a complete and total digital transformation. If the company is serious about maintaining its current trajectory of development, it must undergo digital transformation. Without this kind of procedure, the company risks falling behind its competitors and eventually collapsing. Digital Transformation has a role to play and addresses the technological changes affecting the organization and its industry. Organizations anticipating such transformations could address and turn the causes and variables into business opportunities.

The COVID-19 problem has raised public consciousness about issues of sustainability and digitization, although these shifts are not novel (Fowler & Hope, 2007); (Lohrmann, 2017); (Mention, et al., 2020). But as the world's population rises and new environmental problems emerge, there has been a resurgence of interest in sustainability (Keller & Bette, 2020); (Mühlbacher & Böbel, 2019). Potential development options that involve dealing with global markets, digitization, and the adoption of sustainable business models are not without their challenges (Denicolai, et al., 2021). Less developed economies are particularly affected since their market players are lagging behind in areas such as digitalization (Marcysiak & Pleskacz, 2021) and the incorporation of sustainable business models and globalization (Zamfir, et al., 2017).

However, new studies have discovered significant contradictions in how globalization, digitalization, and sustainability all work together. Only recently has research started to look into this issue, which is similar to how little has been done to bring sustainability and digitalization together in real life (Gupta, et al., 2020). For many years, a lot of management research has been done on sustainability and related topics (O'Connor & Gronewold, 2013); (Schaltegger & Wagner, 2011).

This research shows how strategic goals and creative solutions can have unintended consequences. There has also been a recent uptick in research devoted to the topic of digital management (Dellermann, et al., 2017); (Svahn, et al., 2017). Despite the topic's theoretical and managerial weight, few works have focused specifically on combining sustainability with digitalization (Gebhardt, 2017); (Linkov, et al., 2018).

This study, therefore, aims at contributing to an understanding of the strategic management field of study specific to the business model using the element of technology and digitalization to improve business performance by exploring the company's oil and gas business in Malaysia – PETROLIAM NASIONAL BERHAD (PETRONAS) and its Group of Companies. The objectives of this study can be described as follows, based on the overall goal:

- a) To understand the importance of the business model on PETRONAS business performance.
- b) To explore and investigate the roles of the digitalization infused at business model on PETRONAS business performance.
- c) To formulate a single unified business model infused with digitalization in improving PETRONAS business performance.

An inductive approach with an exploratory research design will be applied with a case-study research strategy to achieve the research objective. PETROLIAM NASIONAL BERHAD (PETRONAS) Group of companies will be used as the research focus for the approach.

1.5 Significance of the Study

1.5.1 Theoretical Contribution

Using Osterwalder and Pigneur's (2010) Business Model Canvas as a starting point, this research looks at how digitalization has facilitated innovation in business models, and how that, in turn, has changed the performance of various types of businesses. Improved business model canvas building blocks appropriate for the Oil and Gas sector setting is the primary theoretical addition of this work to the current literature. To boost PETRONAS's commercial effectiveness, the company will use the business model innovation made available by digitalization to enhance the foundational elements of the business model canvas.

The purpose of this research is to broaden our understanding of the business model literature by highlighting the elements that lead to successful business performance inside organizations. A better understanding of business model theory may be gained from the new construct, leading to an improved performance model. To explain "the logic of the company, how it runs, and how it produces value for its stakeholders," researchers have turned to the business model theory (Casadesus-Masanell & Ricart, 2009).

Based on what Casadesus-Masanell and Ricart (2009) have said, it seems that the business model theory is analogous to strategy, which links the two together. In the case of modest and viable situations, a relationship exists between the business and the strategic pattern, which makes it challenging to isolate both concepts; this type of model reflects the organization's strategy as Casadesus-Masanell & Ricart (2009) argues the idea. It also indicates that both concepts vary due to the imperative possibilities (Casadesus-Masanell & Ricart, 2009).

Although this is often the case, there are a few significant exceptions, such as the newly suggested concept of digitainability, which implies the marriage of digitalization with sustainability (Gupta, et al., 2020), and previous research into sustainable design. Recent work by Gartner, a research and consulting group, describes sustainability management in business as an optimal balance between economic, environmental, and social objectives across all time scales, "sustainability management" focuses on products and services, the organization and the supply chain (Gartner, 2021). Innovations in goods, services, processes, and business models may improve sustainability's three aspects (Fichter & Clausen, 2016); (Lichtenthaler, 2017); (Pfitzer, et al., 2013).

The consulting and research firm Gartner has suggested a definition of digitalization that has gained traction: "Digitalization is the use of digital technology to modify a corporate model and produce new revenue and value; it is the process of converting to a digital business" (Gartner, 2019). Already, the process of converting to digital operations reveals the extensive change that is usually required of businesses in order to fully embrace digitalization (Lichtenthaler, 2020); (Westerman & Bonnet, 2015).

The gaps in the business model innovation provided by digitalization towards business performance are an area that needs greater research, since the present literature does not fully assess the roles of digital transformation on oil and gas firms. Oil and gas businesses may take a new, more fruitful approach to their transformation and innovation with the help of this new body of knowledge. Because of this, it is hoped that this study may inspire more investigation and make contributions to a variety of fields, not only the oil and gas sector.

1.5.2 Practical Contribution

All companies across all industries, regardless of their initiative or external pressure from competitors, are experiencing the waves of digital transformation because of the changes or reinvention of companies' operations under advanced technology.

Even if companies can transform over the long term with advancing technology such as the internet, the cloud, big data analytics and mobile and social, they are obliged to grow more quickly by transforming their way of operating, innovating and servicing their customers regardless of how ready they are to be. In this respect, digital transformation can either disrupt business, especially if the strategy fails to address change or if companies that have previously recognized the value of transformation are unparalleled and forthcoming.

The positive connection between these two megatrends suggests that digitalization may lead to improved levels of sustainability as a result of the increased options it gives. Connecting individuals all over the globe via digital means may speed up the shift toward reducing carbon footprints by encouraging a culture of global cooperation and a sense of urgency to tackle environmental challenges (Aksin-Sivrikaya & Bhattacharya, 2017); (Gupta, et al., 2020); (United-Nations, 2015).

Digitalization may boost profits for certain businesses, but it also has negative effects on the environment and can exacerbate social divisions (Aksin-Sivrikaya & Bhattacharya, 2017); (Gupta, et al., 2020); (Sachs, et al., 2019). Putting all of one's attention on analogue, non-digital efficiency, for instance, is not enough. Rather, as the world becomes more digital, companies may need to focus on digital efficiency (Lichtenthaler, 2021) to reduce the power needed to run computers, smartphones, tablets, smart home gadgets, the Internet of Things, and other AI programmes (Hao, 2019); (Huelsenbeck, 2007).

It is not only about catching up in the digital transformation. It involves thinking ahead of the competitors. Learning how to adapt requires a fresh perspective on antiquated concepts. Being the first to apply these concepts in a different setting entails being the first to recall them. Beginners always profit from initiating "competitions" and being imprinted in consumers' brains for life. This approach drives the corporation to actively consider how its business processes may be optimized. The organization will soon be seeing its problem in different ways with adequate training and the desire to transform.

Their journal article Lukac & Frazler (2012) mentioned that top management often faces dual challenges. On the one hand, to show the market that the organization generates value for its shareholders. Their effectiveness focuses on determining and prompting techniques that help customers faster, better and cheaper than competitors.

Cyert and March (1963) pointed out that there are several structured theories about how companies deal with how they operate on the market and what controls inter-organizational relations in sociology, business & management and the economy. This was called the "Company Behavioral Theory (BTF)" (Cyert & March, 1963). Todeva (2007) noted that the company's conduct theory seeks to complement and reconcile the company's business theory by examining what occurs within the organization, how production is carried out as an economic activity, and what decisions are made regarding the manufacturing, planning, and inventory.

According to Nielsen and Lund (2014), the business model is made up of a value chain, which may be thought of as a company's strategy, and multiple value configurations, such as networks and hubs. Thus, Nielsen and Lund (2014) argue that a company model provides the basis upon which strategic choices might increase profits. By incorporating the IR 4.0 era's shifts in digitability, environment, health, safety, and culture into the company's business model, it may be possible to boost the company's performance, ensuring its long-term viability.

1.6 Scope and Restriction of Study

Studying the roles and importance of digitalization on PETRONAS's business model and bottom line is the primary objective of this investigation. PETRONAS and its Group of Companies, with headquarters in Kuala Lumpur, Malaysia, will serve as the research's case study organization. Data will be collected and limited within PETRONAS and its Group of Companies, which will be compiled, with the details later being used to create a conclusion for the company and serve as a reference for Oil and Gas companies in the industry.

1.7 Definition of Key Terms

1.7.1 Digitalization

After the COVID-19 pandemic broke out, several governments throughout the globe initiated recovery plans and investment initiatives to help their economies and companies rebound from the crisis (Carlsson-Szlezak, et al., 2020); (Reeves, et al., 2020). It's predicted that Europe would become more sustainable, digital, and robust (European-Commission, 2020). For this reason, the European Commission, the European Parliament, and the heads of the member countries have all agreed that sustainability and digitalization are essential for laying the framework for a future-focused Europe (European-Commission, 2020). This is only one illustration of how the convergence of the digital and sustainability megatrends will shape the future of economies and enterprises (Aksin-Sivrikaya & Bhattacharya, 2017); (del Río Castro, et al., 2020).

As a result, the COVID-19 epidemic has drawn even more attention to the critical role that sustainability and digitalization play in today's world. Many firms have been responding to these shifts for quite some time by adopting new strategic and operational approaches (Bradley, 2007); (Cokcetin, 2017). Most of these initiatives have concentrated on one megatrend—sustainability or digitalization (Gupta, et al., 2020).

In contrast, attempts to combine certain sustainability and digitalization issues are sometimes only getting started, and they still don't make up the bulk of activities carried out by most businesses in this field (Holst, et al., 2017); (Osburg, 2017). Even yet, digital sustainability has great potential; for instance, digital technology may be crucial in reducing a company's carbon footprint (Gensch, et al., 2017); (Ordieres-Meré, et al., 2020). However, there is a possibility that increased use of digital solutions might have a negative impact on the environment, hence sustainable digitalization is needed to lessen the impact (Stuermer, et al., 2017); (Wenzel, 2017). However, with a few noteworthy exceptions, most organizations are still not proficient at tackling the linked nature of sustainability and digitalization (Benetello, 2021); (Kiron & Unruh, 2018). Companies who have historically only concerned themselves with the local market and have been slow to adopt digital technologies may soon find themselves obsolete (Park, 2018).

1.7.2 Business Performance

The performance of an organization refers to its ability to achieve its goals and objectives (Ricardo & Wade, 2001). The output of products and services over which the organization has significant influence (Sun & Scott, 2003). Superior financial performance is an important component of business performance, but it should not be expected to be the end goal of all management and investor action in commercial organizations. A positive outlook of performance for example in the area of products, services, channel and customer segments of an organization where the performance increases from previous financial year with the enablement of digitalization is considered as an achievement of the organization business performance in this study context.

Typically, accounting measures of cash flows and profitability are used to evaluate financial performance, as well as financial market indicators of investor value as an economic outcome, such as return on equity, claims ratio, average commission ratio, average expenses ratio, reinsurance ratio, investment composition, and investment returns (Ernst & Young Global Limited, 2012); (O'Shannassy, 2004).

Operational measurements on customer happiness, internal business processes, and the organization's innovation and improvement operations are non-financial performance indicators (Kaplan & Norton, 1992).

1.7.3 Business Model

The business model was referred to as a statement by Morris, et al. (2005), an architecture by Dubosson-Torbay, et al. (2002); Timmers (1998), a conceptual tool or model by Osterwalder (2004); Osterwalder, et al. (2005); George & Bock (2009) and a structural & a description by Applegate (2000); Weill & Vitale (2001); Shafer, et al. (2005); Osterwalder, et al. (2005) in general. Moreover, business units can employ different business models and strategic approaches (Kohtamäkia, et al., 2019). A business model is therefore a set of client processes for the generation, dissemination, and manufacturing of value (Osterwalder & Pigneur, 2010); (Teece, 2010).

Digital business model is used to describe how a company generates, distributes, and ultimately reaps the rewards of its customers' patronage in the context of digital infrastructure and tools. It entails making use of digital tools and resources to expand markets, lower expenses, and increase profits. High levels of mechanization, data analytics, and continuous interaction with customers are hallmarks of digital business models. It can help businesses compete with more established ones, gain a larger client base, and penetrate new marketplaces (Amit & Zott, 2001). Developing digital goods and services, mining customer data for actionable insights, and interacting with consumers via digital platforms like social media and mobile devices are all essential parts of a successful digital business model.

In addition, digital business models typically feature nimble and adaptable procedures, allowing businesses to swiftly respond to shifting market circumstances and consumer preferences. By streamlining decision-making processes and forecasting future patterns, AI and ML can make digital business models even more efficient. By adopting a digital business model, companies can increase their rate of development, boost their revenue, and gain a competitive edge (Zott & Amit, 2007).

Investment in technology and infrastructure, as well as in people with the knowledge to effectively handle and maximize digital platforms, is essential for a successful digital business model. In summary, a successful digital business model can pave the way for a company's development and creativity in the digital market.

1.7.4 Business Strategy

Frequently, a strategy is a contingent plan of action designed to accomplish a particular purpose. As Caves, (1984) and Ghemawat (1991) pointed out, the set of "committed choices" made by management is an essential component of the strategy. Similarly, Porter, (1996) asserts that "strategy is the creation of a unique and valuable position, involving a diverse set of activities". The term "creation" refers to choosing an organization's particular competitive strategy. In addition, the "created" activity system reflects the organization's strategy.

A company's digital business strategy uses technology to attain its goals. Integrating digital tools, methods, and processes into a company's activities creates new value and income sources. Customer-centric, data-driven, agile digital business strategies work. It should help firms provide a better consumer experience across websites, social media, mobile devices, and other digital networks. Digital business plans use data analytics to understand consumer behaviour and tastes, which can guide company choices. AI and ML can automate tedious jobs and foresee future trends to improve digital company strategies. Modern company tactics can boost working efficiency, lower costs, and enhance supply lines. It can help firms join new areas, gain customers, and outperform rivals. However, a digital company strategy needs careful planning, investment in technology and infrastructure, and a trained staff. Companies must also alter their plan to shifting market situations and new tools.

However, the best approach is not to use an activity system already in place but rather to design a new one from the ground up (Caves, 1984); (Ghemawat, 1991) and (Porter, 1996). Strategy impacts competitive outcomes at a high level. When deciding on a business model, one must decide on a competitive strategy, an organizational rationale, a management framework, and a value creation plan for the company's stakeholders (Casadesus-Masanell & Ricart, 2009).

1.7.5 Health, Safety and Environment Management

Interior design may change with a new health definition. Disease-free does not equal health. Designers must understand this new public awareness to build secure and loving workplaces (Danko, et al., 1990). Occupational safety is defined as working in an environment with an acceptable low probability of hazards that endanger people, equipment, facilities, and the business (Friend & Khon, 2007). Furthermore, the ILO (2009) defines workplace well-being as "what is related to aspects of working life, such as safety and quality of the physical environment, workers' feelings about their work and workplace, and their level of satisfaction with work organization" (Buffet, et al., 2013).

Workplace wellness keeps workers safe, healthy, contented, and engaged. In addition, BHPbilliton (2005) defines occupational safety, health, and environment means improving the health of workers and the communities where the company is based, making sure employees can work without getting hurt, making good use of resources, preventing pollution, and protecting biodiversity. In this definition, the community is also the fourth dimension, which includes things like doing business in an ethical way, growing the economy, and protecting basic human rights.

According to Friend & Khon (2007), occupational safety and health aim to protect human and facility resources by identifying, evaluating, controlling, and eliminating workplace hazards to prevent severe injuries and damages. In addition to moral concerns, they believed that occupational safety and health must also address economic issues, as covering the costs of accidents may far exceed maintaining a safe and healthy workplace.

1.7.6 Organization Culture

Schein (1988) defined culture is a group attribute that can be conceptualized as a given group's historical accumulation of knowledge. Culture is defined by Alvesson (2002) as "the shared rules governing cognitive and affective aspects of membership in an organization, and how they are shaped and expressed". Alvesson's explanation states cultures don't always provide clarity, common attitudes, or unanimity among huge populations. They provide rules for handling uncertainty without chaos or misunderstanding (Alvesson, 2002).

According to De Wit & Meyer (1999), there are two distinct sorts of strategic shifts: evolutionary and revolutionary. The advocates of each strategy have quite different ideas about how change should be brought about. There are others who argue that revolutionary or radical transformation is necessary to overcome the inertia of organizations and achieve the required strategic goals, especially during times of crisis. Proponents of evolutionary or continuous change, on the other hand, say that it is more successful in the long run because it calls for employees to have an attitude of openness to change and a commitment to continual progress. They claim that revolutionary transformation will only provide temporary benefits if this mindset is not in place. Such a mindset is inextricably linked to the established norms of a company.

An organization, in Sange's (1990) view, is a system. An organization with a culture of continuous self-examination and progress is known as a learning organization, but this can only be achieved if its practitioners engage in a similarly reflective and proactive manner. A company with such a culture is better equipped to meet the challenges of the 21st century. Reduced levels of anxiety and aversion to change are expected. Organizational culture, therefore, is vital to the achievement of strategic goals.

1.8 Organization of the Remaining Chapters

There are five (5) chapters in this research. Chapter one (1) talks about the study's background, problem statement, research questions, goals, importance, and how the other chapters are set up. The second chapter examines the pertinent literature on Digital Transformation, Business Models, and Business Performance. This chapter discusses the theory underlying the business model innovation made possible by digitalization. It then examines the relationships and roles of the business model on an organization's performance and the internal and external factors that influence the business model enabled by digital transformation. In addition, the chapter addresses the gaps in previous research on business models.

The methodology of the study is outlined in chapter three (3). This chapter consists of research design, population, sample, data collection procedures, data analysis, and ethical consideration. Overall, this chapter discusses data gathering and how the data is collected and analyzed in the study. Chapter four (4) is concerned with the results and findings of the data. PETRONAS and its group of companies will be the case study presented in this chapter. Data gathering from all cases answered the research questions of the study. The final chapter of this research is chapter five (5). In it, the study's results are summed up and their ramifications are discussed. In this section, we'll go through what we might have done better and what we think should be done next time we do research of a similar nature.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This study proposes improving an organization's business performance by leveraging and integrating digitalization initiatives through innovation in the business model. This chapter extensively examines the research literature, including business performance, business model, innovation, and digital technology. Next, this chapter discusses the connection between the variables, which form the foundation of the conceptual research model.

2.2 Theory Underlying Digitalizaion, Supply Chain Management, Business Model and Business Performance

2.2.1 Digitalization Theory

Now, as "industrial society" gives way to "information society" as a consequence of revolutions like Industry 4.0, the creation of digital values in the new economy is more important than ever. The development of the oil and gas sectors, like that of many others, will undoubtedly be influenced by the spread of digital communication networks, the advent of cryptocurrencies, and the advent of blockchain technology. The shaping of the components of change in the economy as a consequence of digitalization makes studies on the interaction between economics and technology important in the oil and gas industry as well as many other industries (Turkay, et al., 2019).

The term "digital transformation" refers to the implementation of new digital technologies (such as social media, mobile, analytics, or embedded devices) to facilitate substantial organizational shifts (such as improving the customer experience, streamlining processes, or creating new business models). It is recognised as a critical enabler for the company's operations and development, and its importance to the company's competitiveness is only expected to grow (Fitzgerald, et al., 2013).

In order to provide cutting-edge products and services, businesses must update their models and processes, rethink their strategy, and collaborate with the broader business ecosystem. Issues related to digitalization, coding, and software will rise in priority as businesses enter the era of Industry 4.0. As a result, the propagation of these novel ideals is essential to the growth of oil and gas-oriented companies with a focus on the needs of customers. The rise of e-commerce provides a fresh perspective to the economy and compels companies of all sizes to prioritize digitalization (Turkay, et al., 2019).

The new economy relies heavily on the many technical advances that the digital era has made available. With the advent of digital communication networks, traditional intermediaries between producers and consumers will become obsolete. In the absence of fresh benefits, intermediate companies will be unable to evolve into other types of enterprises and would finally fail. The Internet is a dynamic and ever-changing medium that has facilitated the convenience of online product research and purchase. Businesses like Uber and Airbnb are among a growing number that are shifting from traditional to consumer-to-consumer models. The oil and gas industry aspires to meet the needs of its customers by merging resources, technology, and experience to establish novel platforms (Turkay, et al., 2019).

Business leaders see the potential for digital technology to open up new ways of doing business, but they often lack the expertise to implement these changes. Since this is the case, they consult experts for guidance on how to most effectively affect change in their respective spheres of responsibility. Due to the pace at which resources are being depleted, it will be difficult to provide all people with the standard of living enjoyed by the world's industrialized economies. That's why several nations have launched programmes like Japan's Society 5.0 Agenda to create more sustainable economies and social structures over the next few decades (Ferreira & Serpa, 2018); (Seele & Lock, 2017); (Wong, 2013).

Moreover, in 2015, UN member states ratified the 2030 Agenda for Sustainable Development, which contains the SDGs (United-Nations, 2015). All 169 Sustainable Development Goals are interconnected and inseparable, and they strike a delicate balance between the three pillars of sustainable development: economic, social, and environmental (United-Nations, 2015).

The triple bottom line of economic, environmental, and social issues has been the focus of many companies' strategic attempts to enhance their sustainability (Elkington, 2018). Automotive parts producer Bosch in Germany, for example, has achieved considerable environmental improvements and aims to become carbon neutral across all 400 of its locations by 2020 (Bosch, 2020). To be more specific, a growing number of CEOs are beginning to see the vast opportunities for creativity that sustainability initiatives bring. (Lichtenthaler, 2017); (Pfitzer, et al., 2013).

As a consequence of this, chief executive officers may find that they need to make adjustments to their companies in order to successfully achieve a balance between their organizations' financial and environmental objectives in an increasingly digital corporate environment (Alberti & Varon Garrido, 2017); (Motwani, 2014). In relation to this topic, the term "digitainability" was very recently developed; according to its official definition, it "refers to the cross-fertilization of digitalization and sustainable development processes" (Gupta, et al., 2020).

2.2.2 Supply Chain Management (SCM) Theory

SCM has grown in significance in operations management and the broader management discipline. In the last 20 years or so, scholars from various academic disciplines have increased their focus on SCM, contributing to the field's growth in breadth and depth of knowledge and theory. In addition, practitioners have started adopting and adapting new supply management techniques that boost organization performance.

The entirety of the company's supply operations was typically referred to as the "supply chain" when "supply chain management" was used. Even though many writers oppose the word and despite efforts to advance the discussion and provide other names such as pipeline management, network sourcing, demand management, and value stream management, the worldwide academic community has accepted SCM (Christopher, 1992); (Farmer, 1972); (Farmer & van Amstel, 1991); (Hines, et al., 1999); (Lamming, 1993).

The increased visibility of supply chain management in academic institutions has been mirrored by an equivalent increase in purchasing visibility within businesses. The late 1970s oil price crisis, greater worldwide rivalry, the development of Japanese manufacturing, and global recessions have made buying a crucial activity in many firms. World-class manufacturing, benchmarking, and "business process re-engineering" no longer worked in this setting (Schonberger, 1986); (Hammer & Champly, 1993). While lean manufacturing has been around for some time (Womack, et al., 1990), it helped shift the focus from optimizing the production process to looking at the supply chain constraints. Tiers, cooperation, cooperative design and development, and supplier partnerships were lean supply methods (Lamming, 1993); (Rich & Hines, 1997).

Currently, there is a lot of discussion about SCM in academia. Practitioners and academics alike recognise the significance of this branch of management and its global reach. Because of this, practitioners of supply chain management (SCM) feel that they are undervalued by their employers and that their contributions are underappreciated. SCM scholars have advocated for SCM to have its own "theory" while advancing research into theory and practice (Chen & Paulraj, 2004).

2.2.3 Empirical Evidence: Theory underlying Business Model

Most companies struggle to integrate internal business operations. Furthermore, purchasing duties must also link with internal functions and supply chain activities. Scholars have discussed purchasing integration from internal (Narasimhan & Das, 2001) and external perspectives (Frohlich & Westbrook, 2001). According to Narasimhan and Kim (2002), "organizations need to proactively seek efficient linkage or integration among its various internal functions and its suppliers and customers comprising its supply chain". In this study's context, purchasing integration is defined as "the integration and alignment of strategic purchasing practices and goals with those of the organization" (Narasimhan & Das, 2001).

Insufficient buying integration with other tasks often leads to slow problem-solving, inadequate information sharing, and low organization performance (Pagell, 2004). At the same time, integration at a high level can improve business performance. Integrating buying and production divisions improved performance (Narasimhan & Das, 2001). Thus, strong integration indicates a proactive, strategically oriented buying operation that boosts the company's competitiveness.

According to Osterwalder and Pigneur (2010), the business model is a conceptual model of an organization's corporate and financial income-focused logic (acting as a kind of glue). The operational, strategic, and tactical layers of an organization's business model are determined when strategic decisions are congruent with process control and value-creating connections. Thus, the business model converges resources, processes, and services that build the company.

Meanwhile, Casadesus-Masanell and Ricart (2009) postulates that the researchers use the business model theory to describe the company's logic, how it operates, and how it creates value for its stakeholders. They argue that the business model reflects the organization's approach, despite the fact that these two concepts are derived from separate sources and are therefore distinct.

Recent rapid advances in Information, Communication, and Technology (ICT) – particularly the Internet and broadband technologies – have enabled new forms of technology-media interactions between economic agents, making business models an important new contingency factor for strategic management thinking, as reported by Geoffrion and Krishnan (2003) in their findings.

Consequently, the design appears to have shifted from the company's external stakeholders to the company's internal structure. Dyer and Singh (1998) and Gulati, et al. (2000) both convince that in response to this shift that the value-generation site is increasingly expanding traditional corporate limits and that they, therefore, demanded that organizational frontiers be more broadly and conceptually designed than the legally applicable demarcation from the environment of the enterprise where Santos and Eisenhardt (2005) argue that a broader concept is the business model.

Strategic management scholars should focus on business models since they have a significant impact on a company's capacity to produce and capture value (Amit & Zott, 2001). Researchers and managers need to comprehend the impact of business models and digital strategy on company performance prospects alone and in tandem, as organizations' strategies for maximizing value generation and capture are also picked or created. That is to say, a novel contingency element that affects the strategic-performance connection must be taken into account as an integral component of the business model (Zott & Amit, 2008).

The Nielsen and Lund (2014) report verifies that business models do not consist of simply a corporate strategy or value chain but are different from value chain concepts, including value networks and hubs. Variance value configuration Thus, the platform leading to profitability from strategic choices is the business model. Teece (2010) postulates regardless of where a company is located, the value creation, delivery, and capture mechanisms are explicitly or implicitly described in a business model. The management hypothesis is what consumers want and how they want it, and how the organization can arrange to provide these demands, pay for it, and benefit.

The rationale of an organization in connection with an exchange network of partners creating, delivering, and capturing value, define business models (Massa & Tucci, 2013). Amit and Zott (2012) advances with six key issues to be addressed to innovate business models. First, a clear need must be addressed for the customer. In steps two to four, they propose to consider whether the need to carry out their activities can be met by "new activities," by a "new linkage" of activities or by "new governance arrangements". The value for each stakeholder must then be clarified. Finally, the streams of revenue have to be rethought.

According to Amit and Zott (2012), a company's business model is an integrated and interdependent business system that dictates how it "does business" with customers, partners, and suppliers. Enterprise models are defined as a set of specific activities, or an activity system, that meet the market needs to be perceived are responsible for the operations and their interactions. Amit and Zott (2001) began a decade ago by investigating the commercial models of 59 European and US e-business enterprises that initially offered public services to them.

Zott and Amit (2008) supplemented these company model data with another manually collected corporate strategy dataset, thereby providing empirical evidence to support the proposition that a company's market strategy for its products and model of its business are two distinct corporate performance constructs. Loch, et al. (2008) has developed more recent cases for the selection and development of business models.

The business model is often discussed without defining it. More than one third (37 per cent) out of 103 business model publications examined by Zott, et al. (2011) have no definition of the concept or any meaning. Less than half (44 per cent) are exploring or conceptualising the business model, for example, by listing its main components. Other publications (19%) contribute to other researchers' research defining the concept.

There is also only a small degree of overlap between the several current definitions, leading to a wide variety of conceivable applications. Inconsistencies in terminology may lead to misunderstandings, promote competing viewpoints rather than collaboration, and slow the progress of comprehensive studies of business models.

Scholars' conceptual refinements have helped define the business model's limitations in the lack of a consensus definition (Zott, et al., 2011). First, the business model does not create value linearly from suppliers to the firm to consumers. Business models produce value via complex trading connections between several participants. Second, business models and product strategies are different. Thirdly, activity systems, however centred on focal firms, often cross corporate borders, therefore the business model cannot be limited to internal company challenges. However, the company business model may provide an edge.

Essentially, a business model is a company's organizational and financial 'architecture' of a company, as evidenced by the term 'architecture' (Teece, 2010). Teece advances by stating that it is not a computer model or a sheet. Still, a business model that could well be incorporated into a business plan, income statements and cash flow projections. But the concept refers, first of all, to a conceptual model of a company rather than a financial one.

Considerations for the changing nature of user requirements and possible responses from competitors are all implicit in this premise. It explains the business logic required to make a profit (if available) and defines how the company "goes on the market" after adoption.

2.2.4 Empirical Evidence: Theory underlying Business Performance

Over the past decade, the significance of purchasing and supply management in determining organization performance has become increasingly apparent. Many organizations now consider the purchasing function a strategic capability rather than a tactical support function (Ellram & Carr, 1994). The transition of purchasing from a clerical function to a process with a strategic focus has been documented in the relevant academic literature. Purchasing was defined broadly, referring to the entire range of potential activities within the function.

These activities could range from strategic supply chain management to tactical purchasing. Purchasing, or supply management as it is more commonly known, is currently regarded as a mainstream value-adding process that is "strategic" to the success of the organization as a whole (Cousins, et al., 2006). In the decade of the 2000s, many authors believed that competition would be determined by which companies have the most (Carter & Ellram, 2003); (Lamming, 1993); (Cousins, 2005).

They contend that a sustainable competitive advantage can be gained by a company's supply chain if it is able to respond quickly and effectively to changes in market demand. However, as Carr and Smeltzer (1997) state briefly, "...due to general management's failure to recognize the critical role of purchasing, the evolution toward becoming a strategic partner has been slow".

Previous claims that purchasing is not essential or should be viewed as a "passive" function, as Reck and Long (1988) argues in their evolutionary model, are fairly dated. It is generally accepted that purchasing has a significant role on the competitive position of an organization, and this holds for the majority of medium-sized to large-sized businesses. Nevertheless, for purchasing to function at a more strategic (significant) level, it must be correctly configured and focused (Cousins, et al., 2006).

An organization is made up of purposefully organized and coordinated systems of activities (Thompson, 1967), which are targeted social entities; it is possible to think of it as an open system that constantly communicates with its surroundings. Meanwhile, Daft (2004) states that it is possible to classify its subsystems as "internal" or "boundary spanning". Considerable attention has been paid to internal organizational design issues like centralization, control scope, stationery ratios, and authority lines in the research that has been conducted (Nystrom & Starbuck, 1981).

However, some scholars (e.g. (Foss, 2002) state that organizations "experiment increasingly with their management of transactions, i.e., they adopt new ways to structure their borders". As a result, the focus has shifted from internal planning to methods of transaction management within the context of the corporation as a result of a growing workforce (e.g., (Ilinitch, et al., 1996), (Lewin & Volbverda, 1999), (Miles & Snow, 1986) and (Romanelli, 1991). While the understanding that managers and entrepreneurs set organizational limits has been strengthened by research Amit and Zott (2012), important questions remain open.

The new forms of borderline-organizing structures have accentuated the latest advances in the area of communication and information technologies convinces by Daft and Lewin (1993), Foss (2002), Ilinitch, et al. (1996), such as the development of the Internet and the quickening of the rate at which costs and communication costs are decreasing. Mendelson (2000) verifies such innovations have opened up a new frontier to build business models by enabling companies, both within and across client and sector boundaries, to radically change their way of organizing and sharing economies.

The relationship that businesses have with their customers and suppliers has been fundamentally altered as a result of the proliferation of information technologies (Brynjolfsson & Hitt, 2004). These emerging works complement a broad spectrum of literature on boundary-scale projects, which highlight the connections issues pertaining to the internal design of the organization, such as the level of decentralization, among others, incentive structures and productivity impact for IT investment (e.g., see (Bresnahan, et al., 2002) and (Ichniowski, et al., 1996).

Stinchcombe (1965) judges the design of the business model and states that it is a significant problem for companies that are less restricted than established organizations by road addiction and inertia. Bhide (2000) define enterprise businesses are considered to be relatively new organizations that have the potential to grow significantly and become profitable. Added by Hite and Hesterly (2001) where business enterprise performance often depends critically on organizational arrangements that extend across borders. As a result, one of the most important things for entrepreneurs to design is the manner in which their new businesses interact with their partners, customers, and suppliers.

According to Ireland, et al. (2001), entrepreneurs often' such as Dell, a leading un-integrated flexible business company," find fundamental new ways to carry on a business that will disrupt existing competitive regulations in the industry, which leads to the development of new business models. Even when business enterprises replicate existing organizations' business patterns (Aldrich, 1999), these designs may have to be adapted to their environment (McGrath & MacMillan, 2000).

Although the role of design is essential in the entrepreneurial process, Hargadorn and Douglas (2001), Romme (2003) and Ven, et al. (1984) question entrepreneurship, and organizational theory, the specific roles and performances of corporate model design are still relatively unknown, which has the potential to have a broad impact. For example, Hargadorn and Douglas (2001) attributes Prodigy's failure to design his business model to customers' needs, an online service that investors invested USD 600 million.

Anchoring on Milgram and Roberts (1992) argumentation in the perspective of transaction costs (Williamson, 1975) and the theory of innovation by Schumpeter (1934), where Zott and Amit (2007) advance the hypotheses concerning has a role on the business model's performance themes relating to the company in question, with consideration for how the environment might act as a moderator. Overall, Zott and Amit (2007) conclude that designing a company's business model is critical to its success.

This study underpins the business model canvas theory where it provides a framework for designing and analyzing digital business models. The Business Model Canvas is a strategic management instrument that provides a visual representation of a business model's essential components. It is commonly used for designing, analysing, and refining digital business models. It identifies nine essential elements of a business model, such as customer segments, value propositions, channels, revenue streams, and cost structure.

2.3 The role of Digitalization to Business Model in Improving Business Performance

"Digitalization is the use of digital technologies to change business patterns and offer new revenue and value-productive opportunities; it's the process to move to a digital business". Gartner Inc. (2020) defines digitalization with a more business-oriented focus. This definition extends beyond business and government relationships between different companies and essential customer relationships. One of the project's objectives is to digitalize the services provided by companies so that the actual needs of customers are linked to them.

Digitization and digitalization are two-term concepts that are closely linked and often interchangeably used in a wide variety of literature. An analogue information stream is converted into digitalization (Brennen & Kreiss, 2016). BusinessDictionary.com (2020) describes the digitization of everything as the integration of digital technology into daily life. Verhoef and Bijmolt (2019) indicates that strong digital developments change markets, and companies can follow a digital business model to address those developments. The first books were ordered online through Amazon approximately 25 years ago. At the time, no one could have imagined Amazon as one of the most valuable corporations in the world. Not only has Amazon been growing enormously in the digital industry.

Indeed, in 2018 the top three companies, namely Apple, Google and Amazon, were all digital and relatively young compared to companies like Coca Cola, General Motor and Exxon-Mobil, according to brand stock rankings. Furthermore, digitalization takes place globally and is not just a phenomenon in Europe or the United States (Verhoef & Bijmolt, 2019). In China, there have been new digital giants like Alibaba and JD Sports, serving the US and European Union (EU) markets. An annual growth rate of 18-20% is predicted for global e-commerce, which is expected to account for about 18% of total retail sales by 2020 (e-Marketer, 2018). In light of the preceding, it is clear that the retail industry, and other sectors, such as media, have been profoundly affected by digital developments. The new standard for serving customers appears to be digital.

Digital technology's plays a role on business and the need for existing businesses to be digitally transformed have been widely discussed in the popular management press (Brynjolfsson & McAfee, 2014); (Hess, et al., 2016). In the strategic literature, the creativity of business models and their effect on businesses is taken into consideration (Teece, 2010). Concepts like digital transformation and the role IT plays in fostering it dominate the IT literature (Agarwal, et al., 2010); (Karimi & Walter, 2015); (Li, et al., 2017). The business model notion has also been discussed in the study of innovation and technology management, as stated by the authors Zott et al. (2011). The research seems to have two complementary ideas. To start, businesses should focus on marketing their business models as incubators for innovative ideas and technologies. The second reason is that the business model is an innovation subject that, when added to the more traditional subjects of process innovation, product innovation, and organizational innovation adds new forms of cooperation and collaboration. Unlocking value potentials in new technologies could be an essential part of the business model and turn them into market results.

Details of an extensive case study Chesbrough and Rosenbloom (2002) demonstrate that the company's growth is partly due to its effective business model for marketing a technology that other leading organizations have rejected. Comparing successful and unsuccessful technological spin-offs with similar market potential, the research finds that seeking for and learning from a successful business model is much preferable than failing initiatives.

Kohtamäkia, et al. (2019) cited the digital platform for the development of sharing services in their journal article. The development of digital solutions across organization ecosystems such as airports, harbours, and mines is one way that digitalization is transforming business models and reshaping the choices that solution providers are making regarding their organization frontiers. New business models that go beyond the bounds of ecosystems may be developed thanks to the digitalization of component manufacturers, system suppliers, system integrators, solution providers, operators, distributors, and consumers. Alterations made to the business model of an organization have the potential to have a significant roles on the operations of other companies.

For instance, when one company makes changes to its business strategy, value propositions, organizational structures, or information technology systems, those changes might ripple throughout the ecosystem and affect other organizations (Kohtamäkia, et al., 2019). As a result, it is essential to have a solid understanding of the concept of business models as a fluid one that is consistently being constructed and reconstructed. When an organization transforms its business model, a significant number of these shifts take place at the micro-level.

The macro-level of the ecosystem is frequently shaped by shifts in the micro activities involved, as the overarching, global scale environment is micro-level (Kohtamäkia, et al., 2019). Changes to the configuration of a company's business model can affect the business models of other companies on ecosystem levels. Dass (2017) judges that because of the swift rise in several households with new digital technology, as a result, companies have to transform their business models and structures, which include their value chains, internal procedures, management, skills, investments, social roles and accountability. Dass (2017) further advances, stating if companies do not respond to transformation, they will have to ratchet up with their evolving competitors as their conventional business method is disrupted by other transformations. Hence, business needs to quickly understand the challenges and transform their old business model into an opportunity for businesses to grow and compete. The issues of sound business model design are intertwined and central to the corporate strategist's question of establishing a sustainable competitive advantage and generating a net profit (Teece, 2010).

According to Tecce (2010), a business model specifies how a company creates value and converts received payments into profit. To benefit from this new product, business pioneers need to distinguish themselves, not only with product innovation but also with the design of business models. In addition, he hypothesises that the development of a successful business model is insufficient to provide a competitive advantage due to the fact that imitation is frequently straightforward. It is more likely to yield profits from a differentiated business model that is efficient, despite the fact that it is more difficult to imitate.

In their survey, Economist Intelligence Unit (2005) convinces the business model innovations to help businesses to stay ahead in a game of product innovation. In contrast, one of their CEOs explained from another study that they are always away from the sweep of innovation, which eliminates the need for the organization's product. But it is less easy to shun a good product integrated into an innovative business model. Tomorrow someone may have a better Moving Picture Experts Group Layer (MP3) player than what we have now.

Amit and Zott (2012) postulates that the managers, entrepreneurs and academics are concerned about the business model for innovation for several reasons. Second, the basis of future value is often underused. Thirdly, as innovation in the business model can be such a powerful competition instrument, managers need to be aware of the potential of competition in the field. Competitive threats also come from beyond traditional industries.

There are different modelling methods available to conceptualize new business models. Business Model Canvas (Osterwalder & Pigneur, 2010) is the most common tool mentioned in literature and practice, which offers a holistic view of all business logic (see Figure 2.1). In contrast, the value methodology by Gordijn and Akkermans (2003); Gordijn, et al. (2005) offers a mature modelling tool for the describing the value exchange and modelling of interconnections between various stakeholders in networked ecosystems.

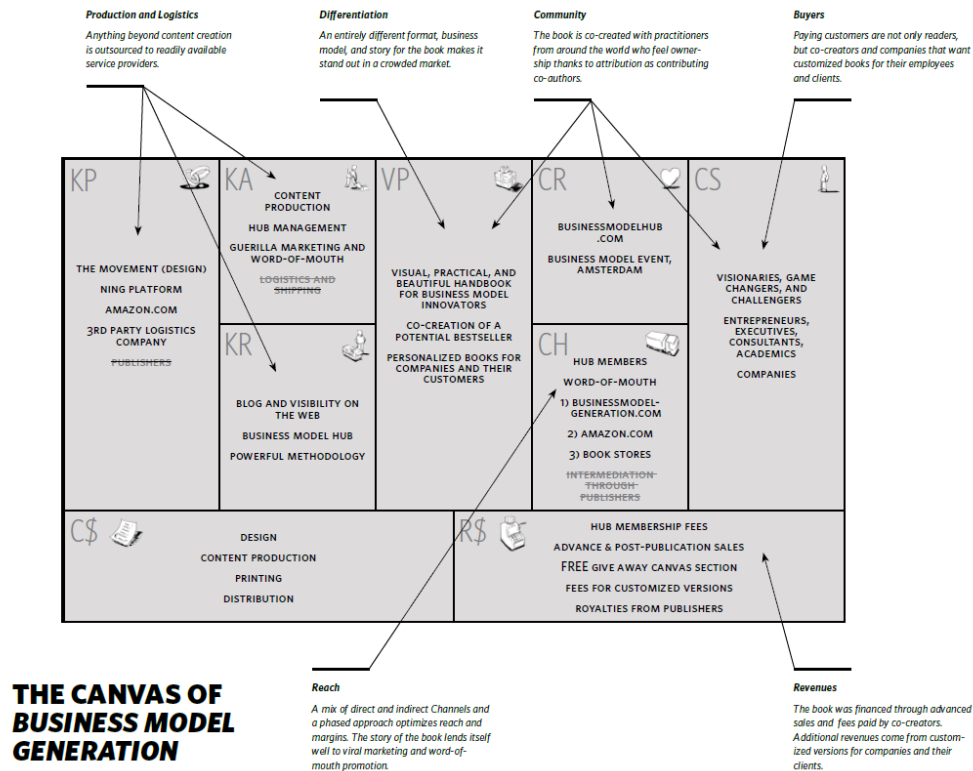
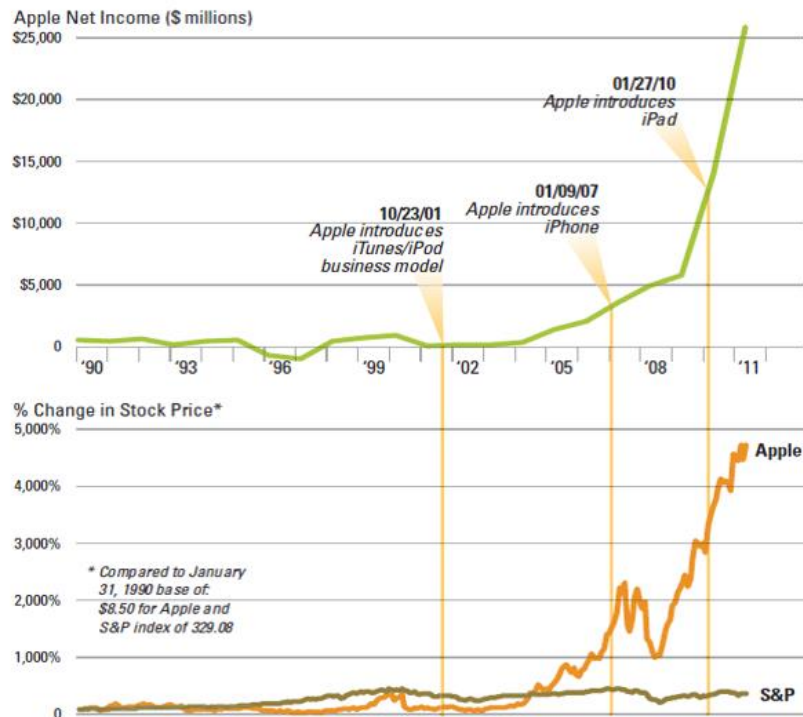


Figure 2.1: The Canvas of Business Model Generation (Osterwalder & Pigneur, 2010)

In the context of established business enterprises, Amit and Zott (2012) focus on Business Model Innovation. These concepts, however, are equally applicable to those who create whole new business models and those who lead organizations that must make subtle but cumulative changes to existing business practices in order to implement a new business strategy. Even in the scarcity of resources, organizations must not give up innovation to increase their outlook. Instead, management should consider opportunities to complement, if not replace, product or process innovation offered by business model innovation. Innovation in the business model can help managers to resolve the apparent trade-off between cost and benefit of innovation by, for example, engaging partners in new value-creating activities.

Amit and Zott (2012) cited the innovation business model of Apple Inc. as an example of business performance. Apple's main emphasis has been personal computer hardware and software. Apple's iPod and iTunes, a legal online music download service, revolutionized its economic strategy. Apple was the first computer maker to merge iPod hardware and software with music distribution. Apple changed music distribution by linking record label owners with end-users.

Apple's business strategy has grown into a continual interaction with clients, like Gillette's. Therefore, Apple and its business model partners have benefited from Apple's usage of software and hardware. This has allowed Apple to expand its innovation location from the production space to the business model and reflect its successful innovation in terms of revenue, profit, and stock price changes (see Figure 2.2). Even high-performance companies that rely exclusively on product innovation can have difficulty matching such performance.



**Figure 2.2: Apple’s Performance, Before and After Business Model Changes
(Amit & Zott, 2012)**

Amit and Zott (2012) also postulates High Technology Computer’s (HTC) performance as a business model that embarked on product innovation. HTC has established itself as a leading manufacturer of original equipment since its inception in 1997. Originally for enterprises like Palm, Hewlett-Packard (HP), and T-Mobile, HTC produced handsets for Microsoft powered phones. The company changed its product market strategy in 2006 from being a contractual original equipment manufacturer (OEM) company to marketing its own branded HTC smartphones via various distribution channels to the public and operators of wireless networks. HTC has been outstanding many times and has won numerous prizes for its numerous technological innovations in the smartphone product market.

Despite this, HTC has maintained its concentration on hardware design and developing new products. HTC is in the business of selling large razors, but not razor blades; the company's business model allows it to only take advantage of, but not of the usage, the selling of its advanced and innovative smartphones and tablets. Amit and Zott (2012) verifies that business model innovation in the absence of new products. Comparing HTC and Apple inventories over the last few years shows that innovation has not always provided enough competitive advantage in the rapidly evolving technological space (refer to Figure 2.3).

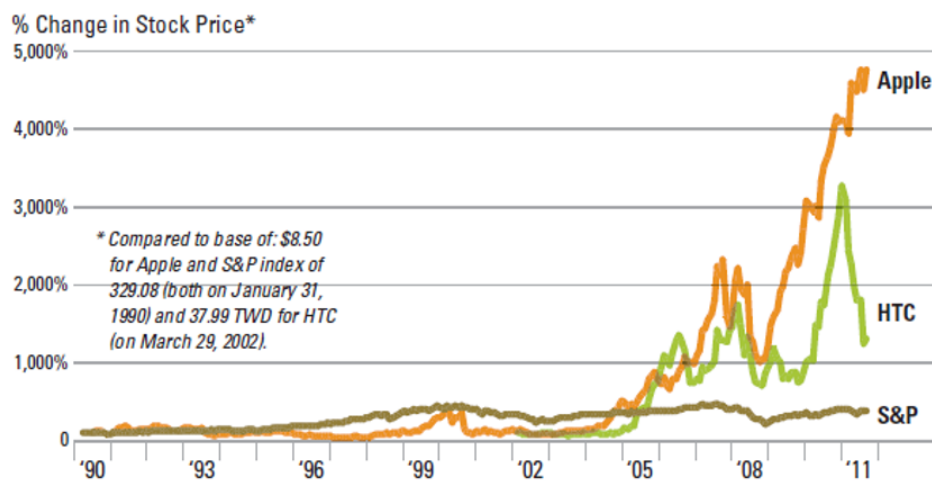


Figure 2.3: The Stock Price of HTC versus Apple
(Amit & Zott, 2012)

Amit and Zott (2012) mentioned unlike Apple, because HTC is not involved in the production or distribution of mobile content and because its devices are based on operating systems developed by third parties such as Google, the only source of revenue for HTC is the sale of hardware. Apple has saved money thanks to the interoperability of its software platform (iOS, iTunes, App Store, and iCloud), which enables the company to offer a wide range of computer products, including the iMac, iPad, phone (iPhone), and MP3 player (iPod). Retail networks are also wholly owned by Apple (the App Store online, brick-and-mortar retail stores of Apple).

In addition, the business model of Apple enables the company to generate revenue from the sales of the App Store of non-partisan apps, iTunes songs and American Telephone and Telegraph (AT&T) to use its voice and data iPhone. A new business model can enable or create new opportunities for an enterprise to exploit in existing markets, as verified by (Amit & Zott, 2012). For example, Brynjolfsson and Hitt (2004) advances in implementing a built-in business model, customer-driven supply, replacing the traditional built-in computer model through retail stores. Changes to the business model, on the other hand, can be subtle; they can still produce significant benefits, even if they have no potential to disrupt the industry.

Take into account Taco Bell, Inc. (2001), a fast-food Mexican-style restaurant chain that decided in the late 1980s to convert the restaurant's kitchens into heating and assembling units. The company headquarters were responsible for most chopping, cooked and cleaning activities. The food was sent to restaurants, heated, assembled and served in plastic bags. Santos, et al. (2009) stated that the innovative incremental business model for the quick-food industry was not changing games but that Taco Bell was able to save money, improve efficiency and monitoring quality, and increase the customer space in the restaurants. To achieve competitive parity, other companies may have to change their business models or adopt an innovative business model from their industry Amit and Zott (2012) postulated by adding a new activity, for example, through further or backwards integration; linking activities in new ways; referring to innovation as a new business model as the "content" of the new business system.

The three design aspects of a company's business model are content, structure, and governance (Amit & Zott, 2001). Modify the model by altering one or more of these factors. With the following in mind, the activity system's contents are the activities that are selected to be done. Bancolombia, Colombia's largest bank, is just one example of a bank that has branched out from retail banking. More than 60% of Colombians don't have access to banking services, so these activities seemed needed to meet their microcredit needs. Banerjea, et al. (2006) stated that it is essential to train the company's senior executives, hire and train new employees, and integrate these new activities with the existing system to implement these new activities, which represent innovation in the business model's content as a "whole" (platforms, applications, and channels).

According to Chesbrough (2006), International Business Machine (IBM) is another example of an innovative business model emphasising content. A financial crisis in the early 1990s forced the corporation to refocus on providing services rather than hardware. By putting to use its decades of expertise in areas like consulting, IT product maintenance, and other services, IBM has expanded its offerings significantly. By 2009, IBM's revenue was more than half of what it was just 15 years earlier, thanks to a major shift in strategy.

Gray and Rumpe (2015) convinces many fields will greatly benefit from digitalization: even if stolen, destroyed or simply not accessible, cultural artefacts and assets (e.g. artworks, historical relics, and documents) can be digitalized and thus preserved and shown to the masses. Scientists can now digitalize their experiments to allow for further analysis and analysis to repeat their experimental setup and results far more simply. Digitalization appears to focus on data, such as the trend towards big data, where large amounts of data are available and analyzed through the Internet. Such digital information itself is a model of the world it describes. The majority of collected data describes real-world artefacts, often in a raw and unstructured format. However, besides mere observation, to derive information and knowledge from such data, we have to aggregate relevant features and summarise irrelevant details to address general issues. These aggregated abstractions also describe the common and generalizable phenomena of artefacts, mechanisms and situations and their unique individual features allowing scientists and the general public to understand specific aspects of the world.

2.3.1 Digital Disruption in the Oil and Gas Industry

As pointed out by Weill and Woerner (2015) and Westerman, et al. (2014), digitalization and big data analysis challenge the organization's business models in existing conventional businesses. As a result, they failed to take advantage of these challenges and turn them into growth opportunities, which resulted in a lack of innovation in their business models. When the right technology is implemented, it can help the company dismantle information silos and reimagine itself in a troubled world. In fact, the oil and gas industry has taken on sensors, real-time surveillance equipment, automation and data analysis relatively quick.

Onajite E. (2013) states that they are the world's biggest consumers of various sensor systems, including smart gas meters. N. Hyne (2014) says that oil and gas extraction, processing, and transportation systems are often used in four-component (4C) sensors for oil and gas seismic exploration and four-dimensional (4D) sensors for oil and gas seismic exploration. For example, the amount of data collected during seismic field exploration could be tens of terabytes.

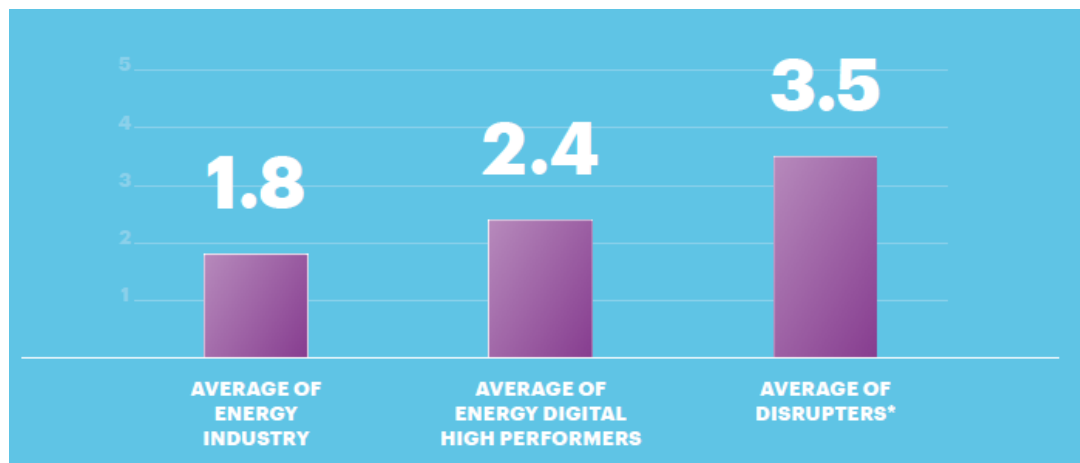
In the oil and gas business, the transition to digital is already seen as a done deal. But most oil and gas companies still find it hard to use digital efficiency to improve their financial performance and grow their business. Despite its publicity, the digital industry still has the potential to ensure better financial performance for oil and gas enterprises. In contrast, Kamal S. Z.; Williams J.; Liddle J. (2014) advance that in other industries, digitalization has become a disruptive force that unlocks greater value in core companies and value chains and introduces new business models within and across industries.

It's time to leverage them further and invest in the "Fresh". Kamal S. Z.; Williams J.; Liddle J. (2014) convinces that the worlds of oil and gas organizations are constantly changing. They are experiencing shifts in demographics (the millennial generation), shifts in the expectations of their customers (economically shared growth), shifts in social and cultural trends (the changing climate), and, of course, shifts in new technology (digital, quantum computing, solar, and so on). When these powers collide, companies will cause major discontinuities, disruption and enormous opportunities for organizations. New business models emerge as a result of the changing environments.

A recent report by Accenture; World Economic Forum (2017) shows that the sector of oil and gas has not exploited the many possibilities that arise from more meaningful use of data and technology. The revolution of oil and gas has not yet included digital technology. Digital is a significant component in the oil and gas industry's efforts to reduce costs, make quicker and better choices, and increase efficiency. In spite of this, it remains challenging for the majority of oil and gas firms to transform digital efficiency into increased financial performance and commercial expansion. The sector is still achieving new record times for its tests. As the oil price stabilized, the investment and growth intention returned to the industry, although its focus and scale remain uneven.

Indeed, according to a recent Accenture; Microsoft (2016) survey, only 19% of companies focus their investment priorities on digital with digital new technologies that are currently disrupting instead of promoting investment plans and priorities rather than supporting digital refining. In addition, the energy sector is changing. Many nations are moving toward stricter regulations regarding climate change, and oil companies are beginning to adjust their strategies and business models to become less dependent on fossil fuels due to this trend.

Smart, A. (2017) mentioned in his report that adaptation signs such as the creation by some oil majors of new energy and renewable energy divisions and investments in cleaner energy infrastructures could be seen. In this context, there is an increasing interest in digital technology. Despite the intention to invest, the industry's changing economics will restrict absolute levels of investment. That means that oil companies need to understand, believe and invest in "New" to manage this transition better, and believe in digital advantage. Three hundred forty-three (343) global companies, including over 40 petrol and gas companies worldwide, have been assessed by Accenture Consulting (2016), where the results show that the digital disruptors benefit from the energy companies in the sample (see Figure 2.4).



**Figure 2.4: Digital Performance Score: Energy Companies versus Disrupters
(Accenture Consulting, 2016)**

Research conducted by Accenture Consulting has evaluated the level of digital investment and progress across multiple dimensions, including planning, manufacturing, selling, and managing. Each of the four broad functions supported by forty-two (42) activities and one hundred seventeen (117) metrics was evaluated for corporate performance. Overall, in the first two dimensions: oil and gas companies scored well: in planning and manufacturing. Sales of integrated oil and gas organizations were more critical than pure exploration and production and petroleum field companies. Accenture Consulting (2016) postulates that it makes sense to find close links to wholesale and retail customers due to the more substantial downstream presence. All oil and gas companies were relatively weak in managing the digital applications for their businesses (see Figure 2.5).

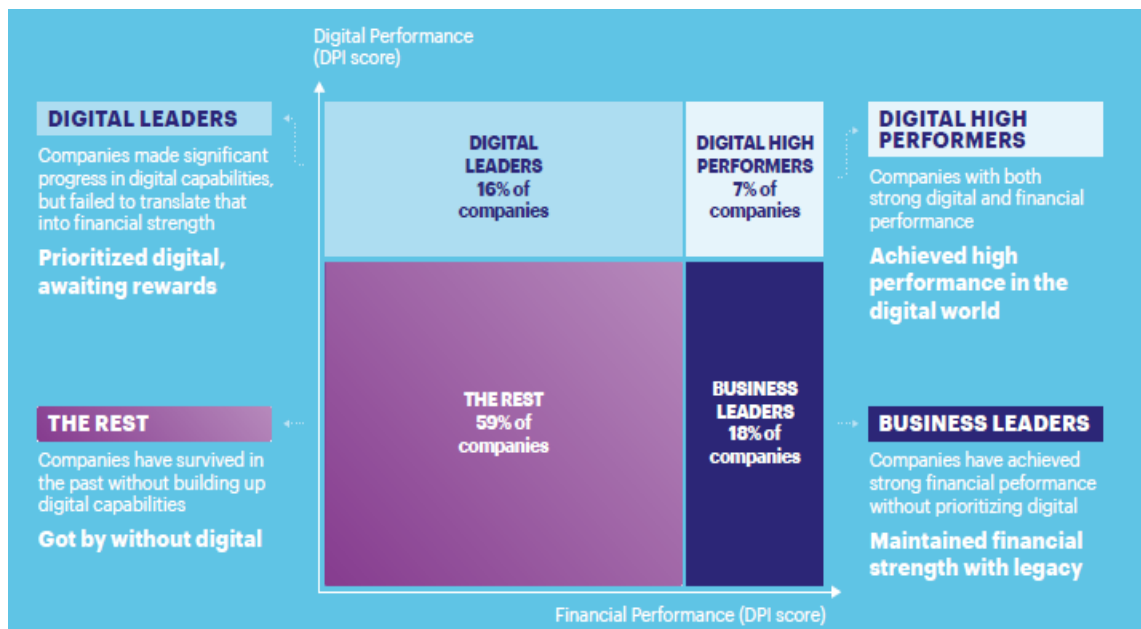
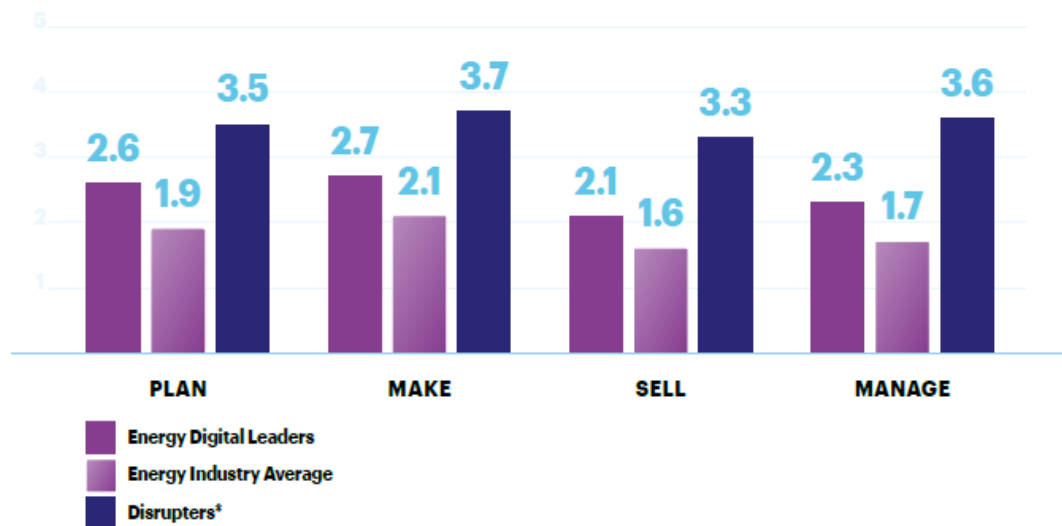


Figure 2.5: Categorising the Performance of Oil and Gas Companies
(Accenture Consulting, 2016)

Smart, A. (2017) states in his report that the value of asset-light and easily scalable business models have been acknowledged in recent years by digital disrupters or innovators. They revolutionized every aspect of the traditional business model of their respective industries, including their interactions with customers, management of assets, timing, operation and price core services.

Accenture Consulting (2016) mentions a significant performance gap between companies. The term "Digital Disruptors" is being used, and those in the energy sector are apparent when looking at the average scores of the two across the 4D (see Figure 2.6). In most high technology companies, retail and transportation, the disrupters are found. These industries are at the forefront of digital trends and make significant investments to advance their agendas.



**Figure 2.6: Digital Disrupters Excel across Four Dimensions
(Accenture Consulting, 2016)**

Smart, A. (2017) discusses how digital progress, by increasing efficiency, can assist oil companies to overcome short to medium-term cost challenges — driven mainly by lower oil prices. Despite the industry's prevailing conditions, they could go further, dismantle traditional models of operation, alter the customer experience and the value of the "new," and secure alternative revenue growth strategies. Digital disruptors concentrate on enhanced data access, process delivery, and cost reductions. Digital disruptors create and adapt companies around the convenience, collaboration, openness and connectivity of customers that allow interaction and safety. Smart, A. (2017) also states if the organization get the timing of these changes; they are excellent at the time and scaling whether they enhance or advance the core business, or set-up new businesses.

A comparison of Digital Disrupters to oil and gas companies with heavy assets may appear unfair state (Smart, A., 2017). Nonetheless, it is critical to evaluate how successful disruptive organizations have embraced new, less asset-intensive business models. It's also a good idea to think about how the oil and gas business might be affected and what they can do to avoid being caught off guard.

Smart, A. (2017) postulates many companies lack growth potential while investing in new digital assets, as key business models are not changed. As a direct consequence of this, new competitors from both within and outside the industry have the potential to outcompete oil and gas companies. Companies operating in other sectors have been dealing with competitive pressures for a considerable amount of time. As a result, they have experimented with various business models that make use of digital technology, information technology, and outsourcing. It is essential for oil and gas companies to transform their business models into one that is increasingly technologically-enabled as they search for new ways to increase their efficiency and decrease their costs.

The oil and gas industry can exploit many new technologies and platforms to lead the digital industrial revolution. Today as reported by Accenture; World Economic Forum (2017), the emphasis is placed on predictive analytics (to reduce the amount of time that assets are offline and increase operational efficacy), automation (to reduce the costs of labour), mobility (wearable technology, sensors, robots, and drones), or other advanced forms of operations, innovation, and retail technologies. To make the most of new investments and devise innovative strategies for expansion, the primary focus of tomorrow needs to be on effecting a genuine digital transformation in the business model of an organization.

It is not only about the change itself but also about when the change will take effect. It will be too soon, and there is a risk of too much disruption. Organizations that have been carefully focused on delivery under the existing rules can miss significant ecosystem shifts. The changes may initially appear immaterial. These can, however, rapidly escalate to the extent that industry leaders can hardly meet. Smart, A. (2017) questions how a company can manage its investments and capital allocation over time in its core business and its new business and make sure everything is in the right place.

Smart, A. (2017) verifies that the latest digital technologies, such as the cloud and analytics and platform technology, combined with unconventional business processes, such as open innovation, are being used by oil and gas companies to boost their core businesses while simultaneously generating value from new investments. Examples include renewable energy, where they may lack expertise or need to accelerate expansion.

Due to increasing digital disruption in Malaysia, the International Development Corporation (IDC) believes local organizations must be digitally identified, as reported by Digital News Asia (2019). Regional firms must use a digital tool to establish a road map that includes a common corporate strategy, a long-term risk plan based on the idea that digital is fundamentally useful to businesses, and a single digital innovation platform for technological scaling. Changes in organizational structures and mindsets are essential for future success. Changes in organizational structures and mentalities are key to success in the coming years.

It is evident that oil and gas companies are maintaining high-performance standards with a renewed emphasis on safety and development. The next wave, according to Smart, A. (2017), will be digital, which will lead to a gradual shift in security efficiency, growth, and added value. There is a growing awareness that even the top oil and gas companies are not immune to digital disruption and must continue to invest in their core business while freeing up resources for innovative projects.

Digital will also make oil and gas companies more adaptable and flexible and use a more integrated business model. With this strategy, manufacturing units are chosen not only for their geological and technical competence but also for their ability to quickly adjust to changes in price and efficiency (Smart, A., 2017). The majority of oil and gas companies continue to invest in systems for the quick, secure, and adaptable management of enormous data volumes, as well as the use of cloud computing and mobility to create more cost-effective, productive, and safe operating conditions.

The oil and gas industry must now comprehend the "rotation" to a new energy system and the technologies that make it possible. Developing a digitally enabled strategy is complex and risky, and it is even more challenging to transform an operating model into a technological integration. They offer oil companies the opportunity not only to remain competitive but also to become leaders in the energy landscape of the future. According to a study by Accenture Resources (2017) (see Figure 2.7), most asset-intensive companies are still aware of the importance of digital technologies. However, putting together and executing a digital strategy can be difficult.

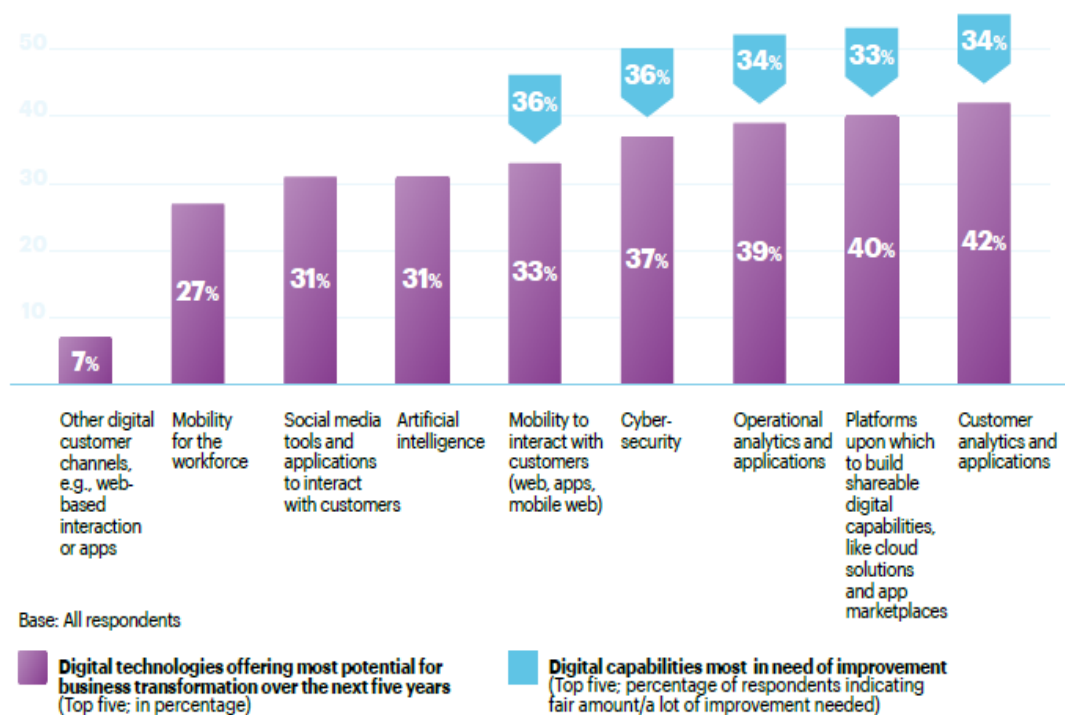


Figure 2.7: Top five most promising digital technologies in need of improvement
(Accenture Resources, 2017)

Digital is undoubtedly disrupting the landscape (Smart, A., 2017). The energy market drives demand concerns, the pace of technology development changes the behaviour of consumers, and a successful transition is underway for many oil and gas owners.

2.4 Business Strategy plays a role on Business Performance

Zott and Amit (2008) mentioned that strategic management research aims at understanding the contingent roles of the strategy on the performance of companies as a central objective. Meanwhile, according to contingency theory, no organization has a perfect strategy, and the best strategy is determined by a variety of variables known as contingency factors (Donaldson, 1996). According to Miller (1988), strategic management researchers examined and analyzed a wide range of factors relating to contingency, including environmental aspects and structure of the organization, technology (Dowling & McGee, 1994) and marketing choices (Claycomb, et al., 2000).

Chandler (1962) made the first significant contribution by considering the company's strategy and its internal administrative structure as a potential contingency (causality) (particularly it's divisional versus functional form). However, while Amburgey and Dacin (1994) fully addressed this particular strategy and structural variables as postulates, Yin and Zajac (2004) suggest that little attention appears to have been paid to broadening the issue of strategy and structure fit for other structural structures for the organization in the received literature.

Smart, A. (2017) states companies must take decisive action by identifying digital growth and value leverage through proactive planning and investment engagement strategies. Transforming core operations to make them more efficient is a common strategy employed by oil and gas companies and service providers alike. Businesses that integrate digital and technology into their strategy beyond efficiency find that digital systems generate synergies, reduce investment duplications, and open new business opportunities. Above all, the new with outdated thought and technology is avoided.

According to Hess et al. (2016), organizations face a variety of difficulties as a result of digital transformation. Among them are the pressures to maintain market share and innovate in order to survive, and the necessity to prepare for the changes that will inevitably occur. Many businesses have shown a consistent pattern of failing to adjust to the new digital world.

The bankruptcy of Blockbuster, the movie rental company founded by Jeff Bezos of Amazon, is a prominent example of how new digitally-based business models cannot be quickly developed and implemented. Sometimes, leadership changes or additional leadership skills are required for an excellent digital strategy; new skills and talent are probably needed (Smart, A., 2017). A large number of oil and gas companies undertake digital processing programs for core business efficiency. A majority of the digital technologies are analytics, cloud, big data and mobility. For example, field-based billing, travel management, and environmental health and safety have all been successfully automated using mobile technology. Mobility has been improved. Improved mobility can lead to cost reductions on a broader scale through changing business model processes and systems. Digital technologies with the most potential for investment are those that have capabilities, according to companies.

Bharadwaj, et al. (2013) mentions the aim of digital transformation is to enable the enterprise, using cost-saving and revenue increase to improve productivity and innovation, to bring all the benefits of digital technologies. Digital strategy is argued to be part of and implemented from the IT perspective of a business IT strategy. Several academicians have disputed the merits of a hybrid IT/Business Strategy for the modern, digitally-driven enterprise (Bharadwaj, et al., 2013).

2.5 Innovation Culture and Technology Adoption

It is suggested by Schein (1988) that a culture's strength and degree of integration are influenced by several factors. These factors include the group's stability and continuity over time, the intensity of its learning experiences, the mechanisms by which that learning occurred, and the group's founders and leaders articulated their assumptions. As a further point of reference, it is important to note that the learning takes place in both the context of external survival and internal integration.

Culture is strong and widespread because a lot of what was learned in groups is "overlearned," which means it often slips people's minds until they are reminded of it. This is especially true because much of what had been learned in groups is "overlearned." Because of this, the patterns of assumptions that people refer to as culture are primarily unconscious in day-to-day activity; however, they are capable of being brought to consciousness by posing the appropriate questions (Schein, 1988).

As soon as a group has learned some common assumptions, the subsequent habitual habits of perceiving, thinking, and behaving give purpose, stability, and comfort by reducing anxiety caused by an inability to comprehend or anticipate events occurring around one (Hebb, 1954). The ability of culture to alleviate anxiety is one factor that contributes to its power and durability. Certain aspects of culture can be viewed as serving the same purpose for groups of people as individual defensive mechanisms do (Menzies, 1960); (Kets de Vries & Miller, 1984); (Schein, 1985b); (Hirschhorn, 1987).

Bingham, et al. (2011) highlighted in their essay that evaluating the relationship of the resources are the key to developing the correct strategic framework. Some resources are inextricably linked to one another. Wal-low-cost Mart's approach in the US, for example, is based on physical resources (typically in rural regions), modern information technology (such as optimizing storage and refilling stock quickly), and efficient transportation (such as cross-docking). Google's resources, on the other hand, are only weakly linked.

A broad range of iterative loops, including multiple relationships with several constituencies, comprise the strategic communication framework in research states Argenti, et al. (2005). Textron was a highly diversified conglomerate of "growth by acquisition." There have been many acquisitions and mergers by Textron over the years. Textron Fastening Systems, Bell Helicopter, Cessna Aircraft, and Textron Financial are the company's most prominent divisions. The absence of common corporate systems, procedures and culture was one of the effects of such frantic purchases and sales. Despite these internal barriers, Textron ran the booming market in the 1990s only when the bubble burst into the stocks and saw it fall by 80%.

The most profound macroeconomic change since Industrial Revolution could be fueled by new platform-based business models (Smart, A., 2017). According to Smart, A. (2017), companies can create value for themselves and their partners, communities, and customers by utilizing cloud computing, IoT, open and reusable software, and mobile app development platforms. With oil prices flat and sharp margins, the focus on growth and business development has become harder for oil companies. There will be little to no change in the amount invested in R&D and innovation, even though oil companies have started reinvesting. It's now central to the oil and gas industry to collect, manage and use data, and digital platforms are essential. Most companies use the mobility and Internet over Things (IoT) to help them make decisions through their IT infrastructure migrated to the cloud. However, for many, integrating such technologies throughout the business and cooperation to increase value remains a challenge. Crowdsourcing and open innovation have been used by some oil companies to solve technical problems more quickly and cost-effectively.

Smart, A. (2017) discusses to develop and industrialise new capabilities, digital needs methodical approaches too. This includes decisions on the construction or purchase of capacities and a program management approach for expanding digital platforms and technology. When it comes to innovation and technology adoption, businesses must cultivate a two-speed Operational Technology (OT) and IT culture. Any sector, including the oil industry, faces the challenge of shifting the energy balance. A more customer-centric world affects every industry today. Personalization and seamless interfaces that enhance comfort, options, and costs are desired by these consumers. They learn to put customer experience first throughout their business, including their supply chain and delivery.

Additionally, the use of digital technology in global supply chains is becoming increasingly important, allowing companies to tap into a new market and player ecosystem, as well as creating more efficient processes. Robotic Process Automation (RPA), Artificial Intelligence (AI), and virtual agents are being developed and used in the oil and gas industry. These technologies are likely to be future value-adders (Smart, A., 2017). For example, many oil companies are now using machine learning to improve efficiency, reduce downtime, and avoid costly shutdowns in many assets and plants by providing operators with quick access to data and analysis from hundreds of years rather than relying on individual employees' experiences.

Customer service is the primary use case for virtual assistants. Many of them are specialized in informal talk and can help you search and provide support. AI will be used to improve RPA efficiency by freeing workers to work in insight-oriented analytics to make operations more efficient.

2.6 Health, Safety and Environment (HSE)

Health and safety concerns, such as minimizing risks to people, facilities, and the environment, are essential in the oil and gas industry. Environmental and occupational safety were treated as separate concerns in the 1970s and early 1980s. The offshore oil and gas industry's key concerns in this region were technological and safety. A number of major work accidents and disasters occurred during this period.

The Alexander L. Kielland failure in 1980, which resulted in the death of 123 persons, and the Bravo explosion in 1977 were the most tragic (Ryggvik, et al., 1997). An emphasis on health and safety in offshore oil and gas operations was increased in the 1980s and 1990s. Ergonomics and human factors, as well as chemical dangers and stress, were among the issues that were discussed. Early on, health checks, treatment, and prevention were secured for the offshore population through an occupational health program.

Health, safety, and the environment became increasingly intertwined in the 1990s, as evidenced by government regulations. Offshore and onshore working conditions in the global oil and gas industry rose to prominence during this period. These services are absolutely essential for workers in the oil and gas industry (Høivik, 2009). The majority of businesses employ people who are knowledgeable about the effects of workplace conditions on employee health, safety, and productivity, including those who specialise in physical, chemical, ergonomic, and organizational factors. A medical examination is required of all offshore workers. Employees are offered regular programs to assess their health in relation to pertinent work-related dangers. Managers and those in charge of health and safety at work must work together to develop and implement plans in the event that occupational diseases and disorders or the potential for them arise (Høivik, 2009).

Many of these businesses place a high value on preventive health care and wellness programmes in the workplace. Establishing high standards for the working environment means taking health risks and potential solutions into account when starting new projects (Høivik, 2009). For the oil and gas sector, contamination of the air and possible climate change is environmental issues of concern today. These pollutants may be released into the environment during drilling operations and during the generation of contaminated water from the extraction of oil from the ground. A significant amount of energy is required for production, and gas or diesel generators that emit greenhouse gases as well as gases that, when they reach land, may contribute to the formation of ground-level ozone or cause acidification can be used to provide this energy (Høivik, 2009). The ships that are used to transport oil and gas are not only harmful to the environment, but they also have the potential to be harmful to wildlife, including various types of birds and mammals (Høivik, 2009).

HSE on the Continental Shelf was the subject of a white paper published by the Norwegian government in 2001 (Stortingsmelding, 2002). Authorities expressed worry about safety performance in this study, as was previously indicated. Reporters nominated "HSE culture" as a topic of focus in this report. For the time being, the Norwegian Petroleum Safety Authority is placing emphasis on this issue.

"The party responsible shall encourage and promote a sound health, environment, and safety culture that encompasses all activity areas and that contributes to achieving that everyone who participates in petroleum activities takes on responsibility in relation to health and safety," stated in Chapter 3, section 11 of the Norwegian Petroleum Industries Framework Regulation for Health, Safety, and Environmental Protection from January 1, 2002 (Høivik, 2009). A correlation between health and leadership in the workplace has been shown. Organizational health studies conducted over the past decade have found that the well-being of employees is strongly influenced by the organization (Cotton & Hart, 2003) and (Mearns, et al., 2003).

Good health and safety management has been linked to lower accident rates (Mearns, et al., 2003). An investigation into this relationship by Mearns and Hope (2005) indicated that the perception of an organization's commitment to health was strongly linked to safety outcomes. It is widely accepted that workplace safety and health must be enhanced on a regular basis in order to avoid workplace accidents and illnesses (Frick, et al., 2000). Services of this kind have traditionally targeted the prevention of occupational illnesses and the lessening of their potentially devastating effects on workers' health and safety. Preventing illness and injury has been the primary goal.

As a result, the World Health Organization (1994) stated that occupational health practices should also pay attention to employees' psychological and social well-being. It is critical for socially responsible organizations to ensure that their employees' health and safety are protected. The frequency and duration of employee absences due to work-related sickness or injury are indicators of an organization's health, safety, and welfare (HSE) culture. Workplace conditions and organizational elements including management practices, workload, and stress may all contribute to increased absenteeism (Michie & Williams, 2003); (Nielsen, et al., 2006).

The majority of work-related illnesses develop slowly over time and are only discovered after the employee has left the company. Occupational accidents are more dramatic than occupational diseases because they are immediate and visible in the workplace. One possible reason for emphasizing safety culture and climate as a prelude to preventing accidents and injuries is the difference between injuries and diseases. HSE encompasses much more than just safety. This has repercussions for the company's health and safety efforts. In the oil and gas business, there has been a long heritage of upgrading engineering solutions and the safety management system. As in other high-risk/high-reliability companies, the focus on improving safety performance in the oil and gas industry has been solely on safety issues for many years now (Mearns & Reader, 2008). The integrated HSE approach has not been adopted by international safety researchers. Many studies have been published concentrating primarily on safety and accidents, with a few outliers using the HSE culture and HSE climate idea (Parker, et al., 2006); (Hudson, 2007). The introduction of the safety culture notion as a component in explaining the significant accidents may be a possible explanation.

In an effort to improve HSE, they created a five-step culture ladder. People, systems, culture/work environment, and facilities/equipment were cited as the essential variables in the study. Several other writers have made similar observations. Many companies have departments for health, safety, and environmental quality (HSEQ), but the literature on safety culture is proliferating. Mearns and Hope (2005) makes little or no mention of the concept of health or environmental protection. Hearing loss, skin diseases caused by chemical compounds, and musculoskeletal disorders resulting from repetitive motions, heavy lifting, or psychological stress are common occurrences among oil and gas industry employees (Morken, et al., 2005); (Morken, et al., 2007).

Health impacts from suspected chemical exposure in the oil and gas industries have been a topic of discussion recently (Høivik, 2009) in the industry and the media. For the most part, occupational diseases are less noticeable than occupational accidents. As a result of this disparity between injuries and diseases, the focus on safety and safety culture and climate as predecessors to preventing catastrophic accidents and injuries could be one explanation for the emphasis on occupational health issues as those that most affect employees.

There must be a consistent approach to health and safety throughout the organization. There is a recommendation that managers should take the lead in the company's systematic HSE efforts. When it comes to safety in the UK's offshore oil and gas business, it may be difficult to encourage workers since there is a dearth of both positive and negative feedback on their performance in this area. Mearns and Reader (2008) based on their research results, supervisors should be more supportive of the health and well-being of the workforce in order to improve health and safety performance, according to these authors.

Furthermore, Friend and Khon (2007) described occupational safety as working in an environment with an acceptable low chance of risks to people, equipment, facilities, and the business itself (Friend & Khon, 2007). Buffet, et al. (2013) mentioned that workers' perceptions of their work and workplace, as well as their level of happiness with the organization they work for, are all regarded to be part of workplace well-being by the International Labor Organization (ILO, 2009). At work, workers should feel safe, healthy, happy, and engaged.

When considering environmental factors, occupational safety, health, and the environment BHPbilliton (2005) are also defined as promoting the health of employees and the host communities of the company, ensuring that the workplace is safe so that no one gets hurt while working, utilizing resources efficiently, preventing pollution, and enhancing biodiversity conservation. Ethical business, economic progress, and fundamental human rights are included in this notion of community as the fourth dimension. According to Friend and Khon (2007), the goal of occupational safety and health is to prevent serious injuries and damages by safeguarding human and facility resources and identifying, evaluating, regulating, and eliminating workplace hazards. They argued that maintaining a safe and healthy workplace can easily outweigh the costs of paying for accident-related expenses, so both moral and economic considerations must be factored into workplace safety and health policies.

It is a management discipline that aims to protect the health, safety, and well-being of the company's employees, customers, suppliers, and anyone else it may impact (Chaturvedi, 2007). The International Occupational Hygiene Association (IOHA) defines occupational hygiene as a scientific approach to worker safety and health that considers not only the influence on employees' health and safety but also the possible environmental repercussions of potential workplace hazards (ILO, 2009). When it comes to occupational safety and health, Amponsah-Tawiah (2013) feels that it encompasses more than just physical safety; it encompasses mental well being and psycho-social welfare as well.

When it comes to keeping businesses viable in today's competitive global marketplaces, employee's safety and health is a significant problems, according to Leman (2013). The term "healthy workplace" has also been used by the World Health Organization (1994) as a place where both the employee community and the employer community work together to improve workplace safety, health, and well-being. It is necessary to address issues such as worker safety and well-being in terms of both the physical and mental working environment, access to workplace resources for personal health, and methods to get involved in the community to benefit everyone. To remain competitive in today's business world, employers must now acknowledge that their competitive advantage is derived from attracting, retaining, and cultivating employees who are not only physically fit but also mentally and spiritually strong.

Human capital has surpassed monetary capital as the most important economic resource in the twenty-first century, thus many businesses are emphasizing holistic approaches to employee wellness in order to boost their bottom lines (Naisbitt & Aburdene, 1985). Innovative, flexible work rules and opportunities for personal growth are being implemented in light of the proven success of workplace health promotion programmes in promoting long-term mental and emotional health (Chenoweth, 1987). Duijm, et al. (2008) indicated that HSE management in several EU countries is examined, emphasizing the integration of health, safety and environmental management into a unified management system in the EU member states studied. The study sheds light on the industry's norms and paradigms and identifies trends and areas for improvement. According to most sectors, goal-based HSE management systems are a success, contributing to the industry's success.

Duijm, et al. (2008) indicated that management efforts are primarily focused on maximising the net benefit of core processes, which is the primary goal of any industry's competition. An alternative viewpoint is a safety and environmental management, rather than primary goals, in this context. While maintaining a reasonable level of environmental impact and safety, the primary process should be maximised. These accepted values are primarily determined by social acceptance and consensus in the current society. There is no fundamental conflict between safety and profitability when enhancing availability and preventing accidents (which avoids production and human or capital resource losses). Optimal returns may be achieved by weighing the present value of the predicted future losses from accidents and lost availability throughout the lifespan of the system against the cost of making safety and availability expenditures.

2.7 The Gaps and unresolved questions in the literature

A variety of inferences may be taken from the empirical investigations discussed above. Among these are Business models that are becoming increasingly prominent as a topic of discussion. However, no thorough examination of contemporary business model research has been carried out to our knowledge. Several carefully chosen journal papers were reviewed in order to identify business model research gaps and relevant prospective research opportunities for further investigation.

Sustainable business strategies are becoming more popular as a means for companies to be more socially and environmentally responsible without sacrificing financial success. Business models that are focused on profit are a significant barrier to advancement in the field of sustainability for many organizations. There has been widespread adoption of a standardized ontology—also called a "model definition"—for profit-driven business models for some time now.

Ecological economics has been verified and borrowed from natural and social sciences, no corresponding ontology exists in study or practice that allows the definition of highly sustainable business models (Wirtz, et al., 2016). The business model concept is becoming increasingly important to authors (Chesbrough, 2010); (McGrath, 2010); (Morris, et al., 2005) and (Teece, 2010). Specifically, according to Chesbrough (2010), "a mediocre technology pursued within a great business model may be more valuable than a great technology exploited via a fantastic business strategy." Businesses that want to profit from innovation must first develop a successful business plan (Chesbrough, 2010); (Teece, 2010).

According to Morris, et al. (2005), business model theory creation has gotten little attention from scholars (Teece, 2010) and there is no universal agreement on what elements constitute a business model or how one ought to be organised (Zott & Amit, 2008) and (Morris, et al., 2005). Despite this, no recent study has analyzed Information System-related business model research and established definitions, components employed, gaps, and future research objectives in an organised manner. While the findings of this study would be beneficial in guiding future research, it is likely to have practical implications for managers and entrepreneurs as well.

In many cases, case studies are used to illustrate how the business model concept is applied in the real world (Amit & Zott, 2001); (Baden-Fuller & Morgan, 2010); (Casadesus-Masanell & Ricart, 2010); (Chesbrough, 2010); (Demil & Lecocq, 2010); (Gambardella & McGahan, 2010); (Itami & Nishino, 2010); (Johnson, et al., 2008). While many writers examine the use of business models in reality, Pateli and Giaglis (2004) and Teece (2010) point out that there is a severe lack of theoretical considerations in the existing body of work on business models.

IoT (Internet of Things), cloud platforms, big data, and data analysis, all part of the so-called IR4.0, have been the focus of a growing number of articles in operations and supply chain management literature over the past decade (Frank, et al., 2019); (Schmidt & Wagner, 2019); (Gunasekaran, et al., 2019). As defined by Frank, et al. (2019), IR4.0 is "the new industrial maturity stage of product firms, based on the connectivity provided by the industrial Internet of things," in which "the company's products and processes are interconnected and integrated to achieve higher value for both customers and the company's internal processes". With IR4.0, companies may remotely monitor, optimize, and automate product operations, which is changing the face of commercial markets worldwide (Liao, et al., 2017). With the advent of these innovations, the manufacturing industry is undergoing a dramatic shift, with processes and business models being overhauled to take advantage of new service innovation possibilities (Martín-Peña, et al., 2018); (Kohtamäki, et al., 2019); (Bustinza, et al., 2019).

To put it another way, servitization, or "the process where organizations seek out to generate higher value by enhancing the services they provide," is bolstered by the proliferation of IR4.0 technology (Vendrell-Herrero, et al., 2017). In particular, it initiates an IR4.0-based servitization, a strategy for differentiating in the market and boosting a company's competitiveness via the use of cutting-edge technology (Coreynen, et al., 2017); (Sklyar, et al., 2019). This strategy, which may be implemented via a blend of servitization and digitalization (Frank et al., 2019), has significant effects on both the financial results and the business models of manufacturing companies (Paiola & Gebauer, 2020). In addition, the business environment, its supplier chains, and business connections are all subject to change as a result of digitalization, as seen in the publishing sector, according to the aforementioned literature (Sklyar, et al., 2019); (Vendrell-Herrero, et al., 2017). Therefore, in IR4.0-based digitalization, the supplier's capacity to guide its customer to success by providing value-added services via a range of digital and customer-oriented business models is crucial to the supplier's value creation (Rymaszewska, et al., 2017); (Martín-Peña, et al., 2018); (Kohtamäkia, et al., 2019); (Paiola & Gebauer, 2020).

Even with all of these signs, researchers in this field have only rarely looked at how digitalization changes collaboration in industrial servitization ecosystems, as Kohtamäkia et al. (2019) point out in one of their suggested research directions. In particular, the quality of the relationship between the supplier and the customer, a well-known and established idea in industrial marketing literature (Ulaga & Eggert, 2006), is an important but often overlooked point that deserves attention (Athanasopoulou, 2009). Today, good relationships between a supplier and a customer are one of the most important factors in a company's ability to compete. Internet and digital technologies can be used to help and take advantage of these relationships (Gaiardelli, et al., 2014). But it's still not clear if the mechanisms that lead to high-quality collaboration between industrial manufacturing firms change as digitalization takes on different shapes, business models, and uses. (Kohtamäkia, et al., 2019); (Frank, et al., 2019).

Business models are viewed differently by different people. Some people have the opinion that a component of the business model is the competitive strategy, but others disagree (Casadesus-Masanell & Ricart, 2010); (McGrath, 2010); (Zott & Amit, 2008). Amit and Zott (2001) pay particular attention to the origins of value generation. According to Itami and Nishino (2010), a business model is a conceptual framework built on the foundation of two underlying ideas: a company system and a profit model. Profit models are models of strategic intent, and the business systems that support them are meant to help those models become a reality.

As a result of the gaps in the previously published literature, it has been determined that additional research needs to be conducted into the design, validation, and implementation of business models, in addition to the dynamics that surround them. This conclusion was reached in light of the fact that such research is currently in need of being carried out. And in the case of PETRONAS, to have a unified business model of its own for its own references by the business streams within its group as direction to the organization in structuring its enterprises in guaranteeing sustainability and being competitive within the sector they embarked in and in the future.

2.8 Summary

This chapter reviews the definition and empirical research in organizational performance, relationship factor on the organizational performance, roles of digitalization and organization culture towards the organizational performance and the literature gaps. Theory used in this study was also discussed. In the upcoming chapter, the methodologies being employed to carry out this study will be talk in detail.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter details the strategies and techniques that will be used to complete the aforementioned study. It includes research design and study participants. Procedures for gathering data, cleaning it, and analyzing it are also covered in this study.

3.2 Research Design

Design Research provides a comprehensive research structure and strategy. This study employed a qualitative approach and concentrates on cases. Creswell (1994) defined qualitative research as a way to learn about a social or human problem by putting together a complex, whole picture from words, detailed views from informants, and research done in natural settings. Creswell (2005), Guba and Lincoln (1981) and Merriam (1988) explain that qualitative research is approached from a holistic perspective with a focus on discovery and understanding meaning, assuming that the meaning or reality of individuals in relation to their natural world and experiences is socially built up and interpreted. Qualitative approaches recognise other ways of understanding social phenomena and explaining them, offering ample models to meet a special demand (Berg, 1989). This research strategy focuses on the actual context of the collected data. It aims to provide a more comprehensive overview of the problems associated with the research questions (Rubin & Rubin, 1995). It primarily consists of non-numerical data, including the opinions of research participants (Darlington & Scott, 2002).

Topics are initially tentative in qualitative research and redefined during the study (Babbie, 1998). As the study progresses, research questions were been developed. Various forms of data are used to collect. These methods included interviews, direct comments and analyzes of documents. Patton (2002) argued that the methods allow for a detailed and thorough investigation, which contributes to openness and qualitative investigation details. It makes it possible to analyze more data relating to a particular subject or problem.

In addition, Warr (2004) described qualitative research where that researchers can hear people tell their lives, and the method produces rich and complex data. The thorough nature of qualitative research allows scientists to transmit their own experiences and feelings. In situations where quantified research is unreasonable, impossible or inappropriate in nature, qualitative research is used for pragmatic reasons (Patton, 2002).

Moreover, at different stages of the research process, qualitative approaches with different goals may be appropriate. The qualitative method generates usually an abundance of detailed information on fewer individuals and cases. This improves knowledge of the cases and the situation studied (Grix, 2004). As the researcher, this study was based on qualitative research design, which takes into consideration the interest of the researcher in obtaining a holistic perspective on the progressive roles of digitalization on the business models as well as the business performance of an oil and gas organization, PETRONAS. Due to its preponderance of axiology assumptions, the research questions were interpretive and qualitative in nature.

Several steps had been undertaken to perform this exploratory research from a selection of techniques, defining problems, and research methods to sampling and data analysis in order to produce the final findings. The iterative research process flow as per Figure 3.1 below:

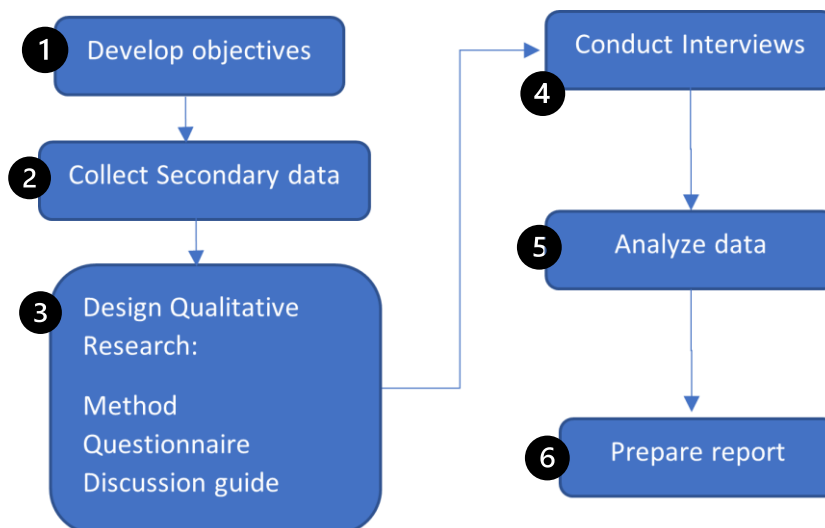


Figure 3.1: The Research Process adapted from (Cresswell, 1994)

The study method was derived from Creswell (1998), where it has its roots in social science and focuses mostly on determining why individuals act as they do. It focuses on individuals' knowledge, attitudes, beliefs, anxieties, etc. Creswell (1998) notes that the objective of qualitative research is to gain, to the greatest extent possible, comprehension - what he refers to as an in-depth understanding of any social environment or occurrence. Extensive time must be spent in the field in order to pursue comprehension (Creswell, 1998).

The following are some of the hallmarks of qualitative studies, as defined by Creswell, (2003): i) fieldwork is essential to the success of qualitative studies, ii) qualitative research employs a wide range of approaches that are both participatory and humanistic. The qualitative researcher often travels to the location (home, workplace) of participants to conduct the study. iii) Qualitative research is emergent rather than rigorously prefigured, data collecting techniques are expanding, and they increasingly entail active engagement by participants and sensitivity to the participants in the study. A qualitative investigation reveals several facets. As the researcher gains insight into the best questions to ask and the people to ask them, the research questions may evolve and be modified, iv) the nature of qualitative research makes it inherently interpretative. This implies that the researcher interprets the facts and applies a filter based on his or her own values and beliefs as they relate to a particular historical and political context (Creswell, 2003).

All aspects of social phenomena are considered by the qualitative researcher. This explains why qualitative research studies give the impression of being too general and lacking in specifics. The quality of a qualitative research increases with the degree to which the story is involved, dynamic, and comprehensive. When doing qualitative research, the researcher makes use of sophisticated reasoning that is multidimensional, iterative, and concurrent. In a qualitative study, the researcher follows a predetermined set of steps that are informed by one or more specific techniques of inquiry. Therefore, in order to get the necessary data while maintaining a high degree of trustworthiness, this study used the triangulation and peer and expert review procedure. Observation, in-depth interviews, and document analysis were the three methods that were used for triangulation. The purpose of this study was to determine the roles and importance that digitalization has had on PETRONAS's business model and financial performance. In the meanwhile, validation of the study purpose, research questions, and interview questionnaires was accomplished via the use of peer and expert review.

3.3 Case Study

Scientists in a variety of disciplines have typically employed the case study method for decades. In their investigations of the actual state of the art, social scientists made extensive use of this method, which provided the foundation for the implementation of ideas and extensions of methods (Kitay & Callus, 1998), (Hartley, 2004), (Patton & Appelbaum, 2003) and (Gall, et al., 2007). The study of the case seeks to answer questions on how and why, using the point of reference of the participating actors rather than the predetermined researcher solutions (Howorth & Ali, 2001) and (Irving, et al., 2007).

While the boundaries between phenomena and context are not clearly defined, multiple sources of evidence are used in this research to examine a current phenomenon in its real-world context (Yin, 2003). The research was guided by these definitions. The phenomenon of the business model and the business performance of the selected oil and gas company has been examined using multiple sources of evidence in the context of digitalization in the organization.

Yin (2003) suggests three case study criteria. It explored current events in real life. Second, phenomenon-context boundaries were unclear. Third, the case study employed many sources. Case studies usually contain documentation, historical documents, interviews, and observations (Yin, 2003). These results validate research. This research employed most case design aspects. Thus, the qualitative research using case study technique is suggested to contribute to the dynamic character of this phenomena led by the research questions to produce more accurate findings.

3.3.1 Types of Case Study

According to Yin (2003) and Winston (1997), there are several case study types. These include case studies for exploration, explanation and description. First of all, fieldwork and data collection can be carried out before the research question is defined in exploratory case studies.

This study can be considered the beginning of an extensive study of social science (Yin, 2003). The study must, however, have some organizational framework designed before the research begins. Second, case studies in causal trials are useful to explain. Merriam (1988) proposed that cases could be classified by the purpose and nature of the final report in accordance with the type of case study. In a case study, the phenomenon under investigation is described in great detail. In addition, an interpretive case study includes detailed descriptive material but is more abstract and conceptual. This can encompass anything from potential and developing relationships, categories, and typologies, all the way up to the construction of a formalised theoretical framework.

While descriptive and interpretive case studies include description and explanation, evaluating case studies also include judgement. In the complex study of organizations or communities in particular, one may wish to use multivariate cases to investigate a plurality of influences. Descriptive case studies mandate that the researcher provide a descriptive theory, which lays out the overarching path for the researcher to take throughout the entirety of the study (Berg, 2001).

There are many different ways to conduct an empirical study, and they should not be approached in the same way. Due to the fact that each tactic excels under certain conditions, it stands to reason that they would be chosen above the others in such instances. Exploratory, descriptive, and explanatory goals can all be met with any of these approaches. In spite of case studies' ability to cover both a current phenomenon and the context in which it occurs, they come with a unique challenge: once the context is included, the number of variables of interest will always outnumber the number of data points (i.e. the number of cases).

As was to be predicted, the difficulty of evaluating the data from case studies reveals itself, and scholars are working to overcome this obstacle (Campbell, 1975); (McClintock, et al., 1979). Case studies are a complete research technique that may be used at any stage of a scientific enquiry (from the exploratory phase to the explanatory phase) (Yin, 2003). In the course of this research inquiry, an exploratory case study is being used with the purpose of identifying the research questions and determining the practicability of the aforementioned research.

3.3.2 Designs of Case Study

According to Yin (2003), when: (a) the study should focus on "how" and "why" questions; (b) researchers are unable to manipulate the behaviour because the researchers believe they are relevant to the study phenomenon; or (c) the borders between the phenomena are not clear, the design of a case study should be considered.

Case studies subdivided into single, multiple, or embedded case studies with a holistic analysis unit (Yin, 2003). The matrix first reveals the ability to evaluate contextual conditions while responding to the situation. There are no clear boundaries between the situation and the background. The four design for the case study are (Type1) holistic single case design, (Type2) embedded single case designs, (Type3) holistic multiple-case designs and (Type4) several cases embedded designs (see Figure 3.2). The four case designs are integrated.

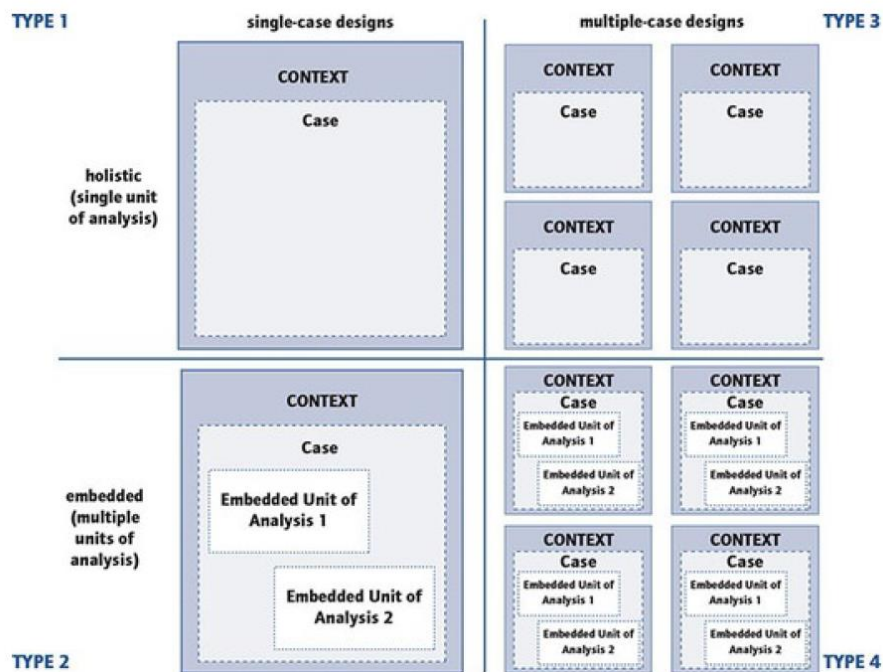


Figure 3.2: Yin's Case Study Design Types

Two (2) basic types of designs can be used for exploratory purposes using case studies. The first one is the design of a single case. These designs may be used to test theory, particularly in a disturbing role (e.g., (Neale & Liebert, 1980). One (1) prominent example of this study in the field of education is Gross, et al. (1971), who chose one school as the subject of the case study. The case study revealed that a new innovation that was implemented at the school has not been successful, despite the fact that the institution had a long history of previous innovations.

The case was used to remove, among other conclusions, the popular idea of barriers to innovation at the time; the failure was due to the absence of these obstacles. This particular case was one of the first to show that implementing an innovative experience can have a significant roles on its success. So to summarise, single-case designs can provide valid tests in the same way that critical tests can be considered (Stouffer, 1941).

For the successful use of case studies, individual studies must also be developed explicitly, whether they form part of a multiple case design or not. Ideally, this plan will specify the primary areas of study, the types of people (or roles) who will be interviewed, and the analysis unit to be used both in general and in each specific instance (Yin, 2003).

In contrast, the in-case designs were similar in both the current studies on the use of knowledge and were articulated initially. In order to test two competing theories of how knowledge is used, this was necessary. There were three main issues to address in the interim design: the nature of the knowledge-producing unit (inter-organizational arrangement vs. research project); document the types of knowledge uses produced, but not the extent of the use surveyed; and compare alternative explanations (Yin, 2003).

Yin (2003) described that it would be possible for researchers who are interested in a particular issue but are now intrigued by the various decisions made by a particular business unit within an organization to conduct a holistic case study with embedded units to do so. As long as the researcher considers that data can be analyzed in different ways within, between, and across sub-units, it's possible to look at sub-units that are part of a more significant case (cross-case analysis).

Such an extensive investigation only enhances the case. It is common for novice researchers to focus only on the sub-units of a more significant problem rather than returning to the larger issue they had originally intended to address (Yin, 2003). This research study uses Yin's Type2 single-case case study design for its case study with embedded design. In this study context, PETROLIAM NASIONAL BERHAD (PETRONAS) is taken as the single-case case study where the embedded unit of analysis are the identified companies representing each of the business streams within PETRONAS Group of Companies. The identification of sub-units permits a deeper degree of investigation. The embedded case study design is an empirical method of research suitable for descriptive investigations in which the objective is to characterise the characteristics, context, and process of the phenomena under investigation.

Apparently, because of comparison ability and contrast the embedded single-case design studies, investigating a small number of specific cases can be incredibly fruitful (Kitay & Callus, 1998). Because it is an exploratory mode of the research, it is purposeful in nature where the researcher has the experience to select the cases appropriate with the intention to generalise or contrast results (theoretical replication) but for predictable reasons.

3.4 The Population and Sample

For this research study, PETRONAS consensus have been obtained. PETRONAS and its Group of Companies employees are the target population for this research. Morse (1991) stated that one (1) who has the knowledge and experiences is a good informant who can also reflect, has time to participate and is willing to do so, in this context would be PETRONAS (Morse, 1991).

The reason for this, as the researcher, interested in doing an investigation into a corporation that is now undergoing digital transformation with the intention of enhancing the company's overall business performance. This is the primary justification for why it was decided to choose PETRONAS as the case study for this particular piece of research.

In addition to this, PETRONAS has the whole supply chain of the oil and gas sector, from upstream to downstream business, as well as an International Oil Company and the National Oil Company (IONC) of Malaysia. As a result, PETRONAS has the potential to be regarded in its whole as a reliable case study that represents businesses operating in the oil and gas sector. In spite of the small size of the qualitative research sample, participants' comments provide a wealth of information (Maxwell, 1992). The description provides details for those concerned about the context and meaning of events and situations (Geertz, 1983). Instead of focusing on a limited number of organizations like this one in terms of quantitative research methods, this kind of research generates a great deal of information about a small number of organizations.

Researchers have a better chance of limiting the scope of their study if they include specific proposals in their case studies. It's easier to stay within the parameters of a study if it has more detailed recommendations. Recommendations could be derived from empirical data literature, personal/professional experiences, theories and generalizations. The data collection plan would have been influenced by the proposals, which would have set the analytical priorities. The samples will likely be deliberately selected in this study, known as a deliberate sample. Strategic purposive sampling is a method of population selection that seeks to maximise the quality and quantity of research data collection (Yin, 2011). This is because, as opposed to quantitative methods that are dependent on larger samples, qualitative research is typically focused closely on relatively small samples specifically chosen for certain features (Patton, 2002). In this study, samples are the leaders (CEO/Department Head) of PETRONAS and its Group of Companies relevant to the research objectives. Creswell (1998) recommended five (5) to twenty-five (25) participants. Meanwhile, Morse (1994) suggested the participants to a minimum of six (6) people. Hence, in this research study, eight (8) key participants from the respective PETRONAS group of companies from each business streams within PETRONAS, namely, Upstream, Downstream, Project Delivery and Technology, Gas and New Energy, Retail and Marketing, and Corporate were interviewed. These key participants are the respective PETRONAS and its group of companies' leadership teams who have relevant experiences in strategic planning and organizational transformation. The aim is to obtain the views and information from each of the business stream's representatives within PETRONAS, perspectives on the field of study and establish a single unified business model for PETRONAS Group of Companies.

3.4.1 Criteria for selection of cases

A selection of cases has involved a number of criteria. These criteria are primarily concerned with the breadth of the research, in addition to access to organizations and the available funds for research. In this research, the main criteria are the roles of digitalization on PETRONAS' business model towards business performance. The rationale for using PETRONAS and its subsidiaries as a case study in this investigation. In addition to being both Malaysia's IOC and its NOC, PETRONAS operates along the whole oil and gas value chain. Therefore, PETRONAS is an excellent case study that is representative of businesses operating in the oil and gas sector.

Lansbury and Macdonald (1992), Kelly (1999) and Baird (2004) argued that the success of the studies were based frequently on employers' and staff's readiness to cooperate with the research study. Participants from the various PETRONAS group of enterprises representing each business stream within PETRONAS, including Upstream, Downstream, Project Delivery and Technology, Gas and New Energy, Retail and Marketing, and Corporate, consented to participate in this research. They are the leadership teams inside PETRONAS, and they possess the necessary expertise in strategic planning and organizational development. The objective is to collect the most relevant information from each of PETRONAS's business streams, to gather viewpoints on the subject of research, and to develop a single unified business model for the PETRONAS Group of Companies.

3.5 Data Collection

A design based on case studies gives the researcher the opportunity to identify the critical aspects of the business model that have plays a role on the performance of the organization. This study collects data through a combination of semi-structured interviews, direct observations, and document reviews, with the researcher serving as the primary data collection instrument (Merriam, 2009). The key participants and secondary data will be focusing on six (6) business streams within PETRONAS which will take part and participate in this study representing the business areas and streams within PETRONAS.

The six (6) business streams and the companies are as listed in Table 3.1. These six (6) business streams represent the breadth of PETRONAS' business nature within the Oil and Gas Supply Chain, from exploration and production of hydrocarbon to go-to-market by refining the hydrocarbon and retailing it to other companies in various industries, such as manufacturing, via Business to Business (B2B) and Business to Customer (B2C) channels. Data was collected from December 2020 to April 2021.

Table 3.1: Participating PETRONAS companies in the research study.

No.	COMPANY NAME	BUSINESS STREAM
1.	Petroliaam Nasional Berhad (PETRONAS)	Corporate
2.	PETRONAS Carigali Sdn Bhd (PCSB)	Upstream
3.	PETRONAS Refinery and Petrochemical Corporation Sdn. Bhd. (PRPC)	Downstream
4.	PETRONAS Gas Berhad (PGB)	Gas and New Energy (GNE)
5.	Group Digital (GD)	Project Delivery and Technology
6.	PETRONAS Dagangan Berhad (PDB)	Retail and Marketing

The study employed a number of types of data for case studies to build the event in detail or context (Creswell, 2013). For data collection, eight (8) individual and semi-structured interviews were conducted. These discussions took place in PETRONAS's Kuala Lumpur headquarters and were held in English.

The interview sessions were recorded using the Microsoft Teams M365 solution in order to make the documents of the data independent (Flick, 1998). The planned interview sessions took an approximately one (1) hour for data collection purposes. There were several interviews adapted and self - developed from Amit and Zott (2012), and Weill and Woerner (2018) guidelines. These were open - ended questions. In an interview with open question participants, they are expected to understand the importance of their lives, experience and cognitive processes in their own terms (Brenner, 2006).

For self - developed questions, the results of the analysis of related literature and consulting experts in the field were generated from a variety of sources Priest, et al. (1995) and Bowling (1997) questions included: (i) Strategic Planning experts, (ii) Digital and IT experts, (iii) Health, Safety and Environment expert, (iv) Finance expert and (v) Oil and Gas industries experts.

Moreover, a core self - developed strategy involves frequently re-examining research issues and ensuring that issues remain relevant (Oppenheim, 1992), (Bowling, 1997). To carry out this research, it is better to use face- to- face interviews, as it is the best way of obtaining information detailed and rich (Frey & Oishi, 1995) in order for the researcher and the subject to have confidence (Fowler, 1993) and understanding the information providers as postulates by Patton and Appelbaum (2003) and Fontana and Frey (1994). This interview is semi-structured in nature.

Furthermore, interviews are the collection of multi-method data, including observations, visual information and self-serving sections (Fowler, 1993). Last but not least, in-person interviews may yield a higher response rate than survey results suggest (Fink & Kosecoff, 1985). Next, observation that is one of the strategies used to collect data in the case study. Effective qualitative researchers have to be good observers and listeners, according to Merriam (1998).

However, although the researcher could make a note of an observation during the interview, as quality researchers Merriam (1988) suggested, complete notes are written and dictated immediately following the interview to verify that the observation has been accurately captured, interpreted and used together with the interview replies. The direct observation used in this study is intended to collect the information by monitoring the behavior, events and physical conditions of the organization and its employees in their natural environment. Direct observation allows the collection and accuracy of information that could not be collected through questions and interviews states (Ghauri & Gronhaug, 2005). Driven comments shall be through the use of an observation guide (Yin, 2009).

Direct observations shall be made during the interviews. The direct observations in this study will be limited to discussions, workstations, work environments and enterprise facilities. Also included as a data collection tool is the document analysis. The aim of the analysis of documents is to have a good fortune in examining several specific organization's information (Yin, 2011). This helps the researcher and stops talking by asking a participant how, for example, to write a name or title. It can thus alleviate reflexivity problems and challenges (Yin, 2003). The use of the analysis for supplementary interviews is a widely accepted way to enhance trustworthiness, accordingly (Kirk & Miller, 1986).

The analysis of documents used in the report include corporate profile, advertising for handouts, board advertising, organization structure of the book of companies and annual reports. As the researcher in this study, will be referring to the latest issue of the PETRONAS annual reports as source of information and reference.

3.6 Case Study Protocol

A case study tells the story of a unique or interesting aspect of a person, group, organization, process, programme, locale, institution, or even an event (Yin, 2003). Case studies are generally the preferred method when questions of "how" and "why" are posed, (ii) the examiner controls little of events and (iii) focuses on a contemporary phenomenon in the context of reality (Yin, 2009). The objective of the Case Study Protocol is to provide guidance so as not just to minimize interviewers' bias but also to ensure data collection, submission, analysis, and use are repeatable and reliable.

The protocol guides the researcher in research. As the researcher, it is incumbent upon the researcher to adhere to this procedure and pursue this path of inquiry. This protocol is the standardized program for the researchers to pursue the stated goals. The uniformity of the case analysis process between researchers and cases is thus ensured by adhering to the case study procedure.

The case study protocol will consist of Section A where an introduction to the case study with some background information (objectives, case study issues, and relevant literature on the subject of investigation); Section B, which contains the procedures for collecting the data (human subjects protection protocols; identifying potential data sources; presenting credentials to field contacts; and other logistical considerations); Section C, which contains the findings and conclusions of the study. Section C, containing the questions regarding the protocol (the particular questions that the researcher conducting the case study needs to keep in mind while collecting data as well as the potential sources of evidence for answering each question) and the case study report includes Section D, which is a preliminary outline (e.g., formatting and display of data as well as additional documentation and bibliographic data).

3.6.1 Case Selection Procedure

The selection process is based on the following criteria:

- a) For each case, the selection is as follows: as the researcher is responsible for the eight (8) participants. The selection of the oil and gas supplies covers Upstream to Downstream companies. The contact person is the top management (CEO/Department Head) of PETRONAS and its Group of Companies as an analysis team in this study.
- b) For appointment, as the researcher to contact the leaders or their secretaries and informed the date and timing of the appointment.
- c) Informed Consent Form has been requested and signed by participants.

3.6.2 Documentation

PETRONAS and its group of companies will vary in the number of documents made available. In general, management information, organizational structures and any documentation relating to management processes, such as vision, mission, performance reports, management reports and enterprise comprehensive briefings, shall also be included. Where the organization's data can not be removed, as the researcher of this research study, the supporting information had been examined, where possible, and had followed a brief description in the report. Once the documents are collected, they should be safely filed to ensure the confidentiality of businesses is kept.

3.6.3 Site Visit

The site visits provide a better understanding of the operations of the companies and the researcher should make some observations on following points: (i) how things seem to work in an organised and smooth way; (ii) what the environment is like, especially if the researcher can talk with people as they go about it; Observations will allow data to be collected for a while in the original social environment and questions, and from their conversations, they will provide insight into the culture and the social group. This enables employees' actions to be directly monitored and analyzed as states by Patton (2002) and Robson (2002). The primary benefit of observation is that information can not be collected by questionnaires or interviews in order to enable a more accurate and understanding interpretation (Ghuri & Gronhaug, 2005).

3.6.4 Arranging Interviews

Interviews are the primary source of data, and they offer enlightening and instructive insights (Yin, 2003). There are two types of personal interviews: face-to-face interviews and phone interviews, which are conducted by telephone. Two-way interviews between a participant and an interviewer are versatile and adaptable (Zikmund, 2003).

The following points will be useful to the researcher in organising the interviews (Phondej, et al., 2011) (i) three (3) to four (4) interviews per day are a helpful guide if they last an hour; (ii) try to allow a little chat time, by allocating around 1.5 hours per interview, (iii) when the researcher need for more time, may necessitate an additional interview with the participant; if it is possible, leave a gap between each interview to allow for preparation time.

3.6.5 Conducting Interviews

Interviews were conducted as planned, and all interviews recorded with the M365 Microsoft Teams recording application must be ensured. As the researcher, the preferred format, such as structured English, cognitive mapping, mental mapping or another method the researcher selects were chosen to be used. The research diary is essential in order to facilitate the registration of all relevant observations; in order to ensure trustworthiness and repetitiveness, the researcher must submit electronic registration files, notes, and research diaries for the researcher.

3.6.6 Verbatim

Word-for-word reproduction of verbal data refers to verbal transcript, where the written words are exact replicas of the audio recordings they are based on (Poland, 1995). The transcript also refers to the way spoken words, for example in an audiotaped interview, are reproduced in written text. In this study, the original data transcript from interviews was produced with verbatim. The researchers explained their underlying reasons to utilize verbally quotes in the following constructs (Corden & Sainsbury, 2005): as evidence, an illustration, an enhanced understanding, a voice for the participants and improved readability, with regard to the objectives of the study. In order to facilitate the analysis of the data by getting researchers closer to their data and to draw a fruitful endpoint from their past studies (Dale, 1993), the benefits of doing a verbatim transcript are the availability of ready-made data.

3.7 Data Analysis

One of the important aspects of qualitative study is the method of analysis. The analysis of qualitative data is based on many different techniques, such as thematic analysis, narrative analysis, speech analysis, theory analysis, cross-cultural analysis and content analysis (Bernard, 2000). The researchers continuously interpret the words of these texts to understand the meanings and the guidance in thematic or interpretative analysis. The narrative analysis focuses on finding repeated similarities in the stories of people. The analysis of discourses involves examining closely the interactions between people. Fundamental theory analysis is a series of techniques for the identification of categories and concepts that blend text with conceptual and formal theories. The application of codes is underlined in cross-cultural analysis. Content analysis presents a more approach to the analysis of data through the creation of codes, the use of text codes and the creation of a variable parameter or table of analysis units.

In this study, the analysis of content and reflexive thematic were chosen for the analysis of the data. As the researcher, social communication objects of content analysis were examined. These are typically written documents or recorded oral transcripts (Strauss, 1987). Holsti (1969) defined content analysis as a method for inferencing by identifying the specific characteristics of messages in a systemic and objective manner. Content analysis is a powerful empirical method for analyzing text and a method for the research used by technical communicators (Thayer, et al., 2007). It also can reveal hidden links between concepts, reveal connections between ideas that initially seem unconnected and inform decisions related to many communication practices.

Reflexive thematic analysis is a method for analysing qualitative data to address broad or specific research questions on people's experiences, perspectives and perceptions, and representations of a particular phenomenon. It is conceptually adaptable: it may be directed by notions from a range of disciplines and utilised in a variety of research methodologies. The outcome of the analysis is a theme that explains people's experiences, perceptions, perspectives, or representations of a certain issue (Braun & Clarke, 2021).

Qualitative data is appropriate for this form of inquiry and research methodology. It may include diaries, interviews, surveys, data from participatory design, visual approaches such as drawings and storyboards, and secondary sources like "internet forums, blogs, websites, magazines, newspaper stories, and police records." It may also be used across datasets as relevant for analysis across several data sources (Braun & Clarke, 2021).

As the researcher, chooses to analyze data are determined by a combination of factors, including the research questions, the theoretical basis of the study and the adequacy of the data technology. The case study consists of a detailed description of the environment or persons followed by analysis of the data on topics or issue (Stake, 1995). As researcher, started with a general classification of cases called open coding in a specific class. Content analysis is carried out with coding frames in the context of case study. After open codes have been completed (Strauss, 1987), the coding frame consists in a single category of intensive coding. After open coding has been completed, the coding frames are used to structure the data and identify results.

The first coding framework is frequently a multilevel process, requiring several successive trials of all examined cases. The next level of analysis is that of inferences, models development or theory generation (Merriam, 1998). As the researcher, the need to go back and forth between the details and the concepts that are described at this phase of analysis (Miles & Huberman, 1994).

Interview data are analyzed with the software program Atlas.ti. Atlas.ti helps in the quality analysis process by means of unstructured and semi-structured data collection methods. The software closely monitors the data to allow intensive and rich exploration and finding. Open data, accounts, photographs, videos, audio files or GoogleEarth images are the software applications. It needs to describe and understand the points of view or perception of participants. The data collection system also requires different methods such as detailed interviews, semi-structured interviews, field notes, open question surveys and multimedia analysis. Atlas.ti highlights qualitative rather than quantitative analyzes like the determination and interpretation of the elements that make up the primary data source. A related term is knowledge administration, which stresses the conversion of data into useful knowledge (Friese, 2013).

3.8 Trustworthiness

The results of the research concern trustworthiness. The trustworthiness criterion may not have so much status or interpreted in any other way according to a phenomenological paradigm (Hussy & Hussy, 1997). The aim of the trustworthiness test is to ensure a consistent and reasonably stable study process over time and across researchers and methods (Miles & Huberman, 1994). Qualitative trustworthiness, according to Gibbs (2007), shows that the approach of the researcher is consistent in research. The researcher shall inspect transcripts to ensure that they do not have apparent errors made during transcription; and ensure that the definition of codes does not have a drift, a change in the meaning of the codes during the coding process. This can be done through the constant comparison of data with code and the writing of memoranda concerning codes and their definitions.

In addition, trustworthiness can be seen as fitting between what is recorded as data by a researcher and what is in the natural context being investigated. The case-study protocol is a sound guide for this study and typically contains field procedures, case studies and a case-study report guide (Yin, 1984/1994).

3.9 Reflexivity

Case study research technique focuses on numerous sources of evidence to offer breadth and depth to data collecting, to aid in bringing a wealth of facts together at the pinnacle of knowledge via triangulation, and to lend trustworthiness to the research (Yin, 2003). This method's distinctive strength is its capacity to mix a number of information sources, such as documents, interviews, and artefacts (e.g., technology or tools). The significance of a research is to define the precision of the equipment employed and what they should measure. This study's relevance is confirmed to be correct (Creswell, 2005). Authors Merriam (1998) and Robson (2002) explained that the quality and richness of descriptions are a matter of trustworthiness in qualitative research, with or without the findings. A research plan was initially drawn up during the fieldwork. The research proposal has been used primarily to guide the fieldwork and to more efficiently collect data.

In qualitative research, "data saturation" refers to the point at which the addition of additional participants no longer generates new discoveries. When saturation is reached, enough data has been collected to reproduce the research, and no more coding is required. Saturation helps establish the reliability of a study by proving that the researcher has extensively examined a phenomena within the parameters of the investigation (Glaser & Strauss, 1967). Failure to attain saturation might damage the legitimacy of the material. Saturation is directly proportional to sample size and data depth.

Significant information was collected to give a clear view of the cases. This study was supported by a number of academics in the case studies approach (Merriam, 1998); (Patton, 2002) and (Yin, 2009). These contributed to the trustworthiness, confidence and reflexivity of the study by using single-case studies (Creswell & Miller, 2000). The study was also based on peer assessment, data saturation and triangulation to make the results more trustworthy.

3.9 Ethical Consideration

There are times when using specific data collection methods in qualitative research surveys, such as interviews, observations, and surveys, can present ethical conundrums (Merriam, 1988). To act in an ethical manner, one of the most important things to do is to make sure that research participants are safe. The following measures were taken to ensure that the rights of each participant were protected, referring to Gradwell (2004): (i) all of the participants on the sample list will receive a comprehensive briefing regarding the purpose of the study, the rationale behind the application of the research study, and the results of their participation in the research study.

The participation of participants in the research study will not be subject to any influence, either from within or from without (Beauchamp, 2008): (ii) the participant was given written consent to continue the study as an article, and the participants were notified of all data collection. Mutual respect and fairness will be ensured to each participant in the sample list, and (iii) the participants were notified of all data collection. The information that will be gathered from the participants will be kept strictly confidential, as the data will only be used for the research study (Beauchamp, 2008).

Any data that has not been made public and that belongs to the participants is and will continue to be treated as confidential and is protected by their intellectual property rights. According to the research methodology that was developed for the research study, participants in the study are free to withdraw their participation at any point throughout the duration of the research study. Participants in the research study have the option of withdrawing from the study if they feel unable or unwilling to provide the information necessary for its completion. The objective of the research project is to contribute valuable insights to the sector while maintaining the lowest possible risk (Beauchamp, 2008).

3.10 Summary

The research design methodology, population and samples, data collection, analytical data and ethic consideration will be presented in this study. This Chapter justifies that the research questions must be replied to in qualitative cases. In nutshell, the findings of the research study will, in the future, be able to be implemented within the Oil and Gas industry companies in order to remain competitive, achieving its strategic intent particularly in the current era of the Industrial Revolution 4.0 and in a state of agility for the subsequent phases of industry revolution.

The preliminary research study of navigating the roles of digitalization on the organization business models of PETRONAS will further enrich and enhance the original contribution to the digitalization, business model and business performance. As the subject matter is still relatively new and uncharted territory for the majority of industry players, the implementation of the research study will add to the existing knowledge and understanding on business model used by oil and gas industry players and their digital transformation journey.

CHAPTER FOUR RESEARCH FINDINGS

4.1 Introduction

Using the research questions and research objectives as a guide, this chapter presents and discusses the findings of data analysis. A total of eight (8) semi-structured face-to-face interviews with leaders of PETRONAS and its group of companies were conducted as part of the field research for this study. Before being analyzed, the collected information was subjected to a transcription interview process. In this case, as researcher that in charge of the interviews. The findings are then presented in this chapter in accordance with the study's research objectives. The conclusions of the findings are summarised at the end of this chapter.

In order to ensure consistency and accuracy, this process begins with transcription, followed by thematic coding, and finally content analysis, before concluding with thematic coding. Coding was required in order to conduct a more efficient analysis, and it was also used to shorten several lengthy responses. A total of eight (8) participants whom are the leaders and top executives within PETRONAS group of companies' business streams covering from Upstream, Downstream, GNE, Retail and Corporate where they are involved in the organization strategy planning and digitalization initiatives were selected to participate in this study. In order to provide answers to the research objectives, the case study has been carefully constructed.

Invitation e-mails were sent to thirteen (13) leaders across PETRONAS and its Group of Companies as of September 2021 as part of this study. The invitation e-mails were sent directly to the leaders themselves. Four weeks was given to each of the thirteen (13) participants to provide their response. Periodic follow-ups with each of the respective leaders and their secretaries were done primarily to those who had yet to respond during the specified timeframe. The follow-ups was done via calls and e-mails. A total of eight (8) leaders agreed to participate in this study and be interviewed.

4.2 Description of Interviewed Participants

The diverse backgrounds of the participants have been highly beneficial to the study because they have brought more experience to the table and have been able to provide the researchers with a variety of opposing viewpoints on the phenomenon under investigation (Rubin & Rubin, 2005). There were eight (8) leaders who took part in this study, and the participants' demographics segmentation are shown in table 4.2 below. Out of the eight (8), eighty seven point five (87.5%) per cent were men, and twelve point five (12.5%) per cent were women. Sixty-two point five per cent (62.5%) of them have more than twenty (20) years of working experience, while the balance has a total of fifteen to twenty (15 – 20) years of working experience. It's a balance composition of the total working experience in PETRONAS were in both categories, ten to fifteen (10 – 15) years and more than fifteen (15) years among the participants, making it fifty (50%) per cent each.

The majority of the participants who makes up eighty-seven point five (87.5%) per cent have more than ten (10) years of working experience in managerial roles, and the balance of twenty two point five (22.5%) per cent have less than ten (10) years working experience in managerial roles. Seventy-five (75%) per cent of the participants hold the position of General Manager/Head of Department. Meanwhile, the other twenty-five (25%) per cent hold the position of Senior General Manager and above.

Table 4.1: Participants' Demographics Segmentation

Details			
Gender	Male	7	87.5%
	Female	1	12.5%
Years of Working Experience	Fifteen (15) - Twenty (20)years	3	37.5%
	More than Twenty (20) years	5	62.5%
Years of Working Experience in PETRONAS	Ten (10) - Fifteen (15) years	4	50.0%
	More than fifteen (15) years	4	50.0%
Years of Experience in Managerial Role	Less than Ten (10) years	1	12.5%
	More than Ten (10) years	7	87.5%
Position within PETRONAS	Senior General Manager and above	2	25.0%
	General Manager/Head of Department	6	75.0%

4.2.1 Background Information of the Participants

In this sub-section, the participants' professional background, years of experience in leadership positions, and other pertinent facts are provided. All participants, however, are referred to only by pseudonyms in order to protect their true identities and protect their right to confidentiality.

Participant 1 (P1):

He has more than twenty three (23) years of experience in ICT for oil and gas industry and has been with PETRONAS for the past twelve (12) years. He has been holding managerial roles for more than ten (10) years. He is in charge of ICT and Digital strategic planning, implementation and service management for Project Delivery and Technology (PD&T) Division in PETRONAS as its General Manager. This division consists of several critical business functions - Group Technical Solutions (Engineering), Group Project Delivery (delivery of Upstream and Downstream capital projects), Group Research and Technology (R&D outfit), Group Procurement, Group Technical Data, and Group Technical Capability Management. He holds a bachelor's degree in Computer Science Mechanical Engineering from the University of Adelaide and Master in Business Administration (MBA) from the University of Southern Queensland.

Participant 2 (P2):

He has more than twenty (20) years of experience in the oil and gas industry, with a focus and expertise on downstream process technologies, particularly gas processing and LNG. He has been with PETRONAS for more than twenty (20) years since graduated. Possess a solid understanding of petrochemical technology based on his participation in projects to optimize the value of PETRONAS's facilities. He now holds the position as Head of Digital for Gas and New Energy (GNE) business of PETRONAS. Therefore, entrusted with shaping PETRONAS's technical talent capability management plan due to a fervour for people development. In order to facilitate PETRONAS' transition, digital is a new frontier that must be explored in light of the evolution of future skills and labour force. He has been in various managerial roles for more than ten (10) years. He holds a bachelor's degree in Chemical Engineering from the Swansea University and is a Professional Technologist registered with Malaysia Board of Technologist.

Participant 3 (P3):

He has eighteen (18) years of total experience in ICT industry and has been with PETRONAS for the past ten (10) years. He has been holding various managerial roles across his professional experience for more than ten (10) years. He is now in charge of ICT and Digital strategic planning, implementation and service management for Corporate Division of PETRONAS as its General Manager. His division house technical expertise for Agile ways of working, Cloud, Software Engineering, Product Management, fullsuite of SAP modules, Application Platforms such as OpenText, Sharepoint, Microsoft M365 suite and many more. In addition, his division also houses the IT infrastructure support such as servers, networks, communications infrastructure and devices. He holds a bachelor's degree in Information Management.

Participant 4 (P4):

He joined PETRONAS in 1999 as an executive in the Corporate Planning and Development Division. He then went on to hold various technology and leadership roles within the organization, including as a motorsport engineer seconded to PETRONAS motorsport team in South Africa and Switzerland in his earlier years. He was appointed Manager of Development, Powertrain, PETRONAS Research in 2007 where he led techno-commercial efforts in powertrain and unmanned technologies. His passion for motorsport and nation building led to a stint with Perusahaan Otomobil Nasional Berhad (PROTON) in 2011 as Manager of Engineering, PROTON Motorsports, before returning to PETRONAS in 2016 as Manager of System and Collaboration Technology, Integrated Operations, Upstream Operational Excellence. He is now in charge of the digitalization effort within the Upstream Business as its Senior General Manager. Currently, he is responsible for the deployment of digital oilfields, the optimization of the value chain, and the development of future fields. He also oversees the PETRONAS Digital Collaboration Centre located in the PETRONAS Twin Towers. His total stint in PETRONAS has been more than fifteen (15) years in total. He holds a bachelor's degree in Mechanical Engineering from the University of Dundee, Scotland and is a Professional Technologist registered with Malaysia Board of Technologist.

Participant 5 (P5):

He began his journey with PETRONAS when he joined PETRONAS Carigali Sdn. Bhd. (PCSB) in 1990 as a Petroleum Engineer and today, he has accumulated more than thirty (30) years of domestic and international experience in the industry. His significant contributions include the successful implementation of oil and gas development mega projects for Upstream and Downstream during his tenure as Chairman of PETRONAS Sabah and Labuan and Head of Sabah Operations from 2010 until 2013. He was President of Dar Petroleum Operating Company South Sudan from 2016 until 2018, where he successfully gained and maintained the trust between PETRONAS and the Ministry of Petroleum, among other stakeholders. He was also the driving force behind the successful resumption of oil production in 2013 for Block 3 and 7 of South Sudan Operations. Prior to the current appointment, he was Head of HSE (equivalent to Senior General Manager) for Upstream business since 2018, where he demonstrated strong drive to bring about organizational improvement through change, as well as being instrumental in leading Pandemic Preparedness Response Team (PPRT). He graduated from Universiti Teknologi Malaysia with a bachelor's degree in Petroleum Engineering (Hons.).

Participant 6 (P6):

She has a total of sixteen (16) years of professional experience from various companies and out of that, twelve (12) years with PETRONAS. She holds various positions from strategy and Planning, Performance Improvement, and C-level Reporting in Complex Multinational Companies (MNC) and has been entrusted to head the leadership roles for the past eight (8) years. Enthusiastic about connecting the dots, tackling difficult business issues, and gaining satisfaction from a job well done would be her working life motto. She is now the Head, Digital Strategy of PETRONAS. She holds a bachelor's degree in Multimedia from the Multimedia University and Master in Business Administration (MBA) from the University of Warwick.

Participant 7 (P7):

He has more than 25 years of professional experience in various organizations, ranging from prosperous start-up businesses to Fortune 100 firms which twenty one (21) years of it is with PETRONAS. He has matured into an assertive leader with great communications, negotiating, and people management skills accumulating more than ten (10) years managerial experience. With his diverse range of skills, he continuously on the lookout for chances across the business and the projects, and able to successfully convert such prospects into positive value. He is now in-charged with the responsibility of delivering the PETRONAS Refinery and Petrochemical Corporation (PRPC) Digitalization Project also known as RAPID ICT (Refinery and Petrochemical Integrated Development) project and ensuring the provision of effective information and communication technology (ICT) services to the mega project, which involves more than 70,000 personnel from a variety of fields located all over the world. RAPID is an integrated development project for a refinery and petrochemical complex, as well as other associated facilities, that is located in Pengerang, Southern Johor, Malaysia. The entire value of the project was more than RM100 billion (approximately USD 30 billion). He graduated from Universiti Teknologi Malaysia with a bachelor's degree in Petroleum Engineering (Hons.).

Participant 8 (P8):

From programme management through Head of Project Management Office (Astro Digital Transformation), and now the Chief Digital Officer (equivalent to General Manager) of PETRONAS Dagangan Berhad (PDB) bringing about change has been his life's work. He had eighteen (18) years of total working experience in the ICT industry. He had programme managed every major overhaul of Astro's video streaming service since its inception. He had led the Astro digital transformation practice to implement organizational, technological, and design thinking that meet measurable customer and commercial goals. He started the Management Trainee programme for Technologists and the Technology Internship programme at Astro. His work experience with PETRONAS has been ten (10) years now and has been holding management position for the past twelve (12) years. He graduated from University College London with a bachelor's degree in Electronic Engineering with Computer Science (Hons.).

4.3 Interview Themes and Findings in Answering the Research Questions

The qualitative analysis of the data collected during the interview sessions was carried out. Verbatim transcription of interviews was used in this study to produce the original data transcription. Atlas.ti version 22 was used to qualitatively analyze the interview data.

The findings are organised around the three research questions listed below:

- i. What are the importance of the business model on PETRONAS' business performance?
- ii. What are the roles of the digitalization infused to business model on PETRONAS' business performance?
- iii. How does the business model improve an organization's business performance that embraces digitalization as its competitive advantage?

As a result, the findings of the study, after they had been thoroughly examined, were reported in this chapter in order to provide answers to the research questions that had been posed in the study. Three (3) significant themes emerged after the data were analyzed in order to provide comprehensive answers to all of the questions. It is in this section that the themes that emerged from an analysis of interviews conducted with the eight (8) participants will be discussed. The study's sample of eight (8) business leaders was given a numerical label ranging from 1-to 8 in order to protect their privacy (e.g. Leader 1, Leader 8). These numbers appear repeatedly in the study's results and conclusions.

Each theme is subdivided into several sub-themes, each of which elaborates on the meaning and scope of the theme in greater detail. The following themes and subthemes are supported by excerpts from selected participants' statements and diagrams to illustrate each of the themes and subthemes. The following is a summary of the themes that emerged as a result of this research and their development:

4.3.1 Findings on Research Question (RQ) One

- i. This section discusses the findings of the research data in relation to the first research question: What are the importance of the business model on PETRONAS' business performance?

There was a theme that came up in this analysis to help answer the question. The theme was the outcome of the business model towards PETRONAS business performance. In order to answer the research question, three (3) sub-themes were discovered during the data analysis process: meet target, increase revenue and minimize impairment. All eight (8) of the participants claimed that business model plays an important role to the business performance of an organization and in this case, PETRONAS when they are being asked an opinion about the importance of the business model towards PETRONAS business performance. Below are the excerpt of the responses from each participants and the thematic map (refer Figure 4.1) with regards to the importance of business model towards PETRONAS's performance.

P1: Participation in Research Study - Interview Session with Leader1.docx – RQ1 (1:31)

“Yes, for example in Customer Relationship, you must have a proper and strategic plan to handle and manage the different customers and such plan and strategy may be different than the interaction with business entities.”

P2: Participation in Research Study - Interview Session with Leader2.docx – RQ1 (2:37)

“Yes, every single elements have influenced PETRONAS business model.”

**P3: Participation in Research Study - Interview Session with Leader3.docx – RQ1
(3:31)**

“Each of these elements have their own respective influence which can be negative or positive depending on which perspective we're looking at for example for finance, when looking at the revenue stream, from the upstream panel to the downstream, the influence can be either positive and negative.”

**P4: Participation in Research Study - Interview Session with Leader4.docx – RQ1
(4:40)**

“In short there is positive and negative influence to each of the element. But based on experience more, it's more positive influences actually to the external channel. The negative influence is more on the internal customer.”

**P5: Participation in Research Study_InterviewSession with Leader5.docx – RQ1
(5:30)**

“Yes, influence can be positive and negative. It depends on the due diligence by business and also to know the strength and weaknesses of partner before we partner with them to ensure the continuity of business.”

**P6: Participation in Research Study_InterviewSession with Leader6.docx – RQ1
(6:32)**

“Yes and I think it really depends on the investment appetite of PETRONAS. For example leveraging on digital technology to reduce carbon emission i.e. Stella which helps LNG plant to power up the plant and cool down the plant without carbon emission at low costs and recognized internationally.”

**P7: Participation in Research Study_InterviewSession with Leader7.docx – RQ1
(7:30)**

“I think whether they are negative or positive depends on the circumstances that we are in right now. If you have a poor value proposition, you will have a negative performance. Ultimately it's how you manage each of the fundamental elements.”

**P8: Participation in Research Study - Interview Session with Leader8.docx – RQ1
(8:32)**

“Yes the hypotheses is that making it easier for our customers to get our products and to use our PDB products, we do not lose our customers to competitors and it will help us increase our share relationship with the customers as well via customer experience. By having data on customers, we can understand our customers better.”

According to the participants' responses to Research Question one (1) of the study, business model unquestionably has played an important role on the business performance of PETRONAS. The unprecedented events that transpired in 2020 provided Upstream division, one of the core business stream within PETRONAS, with the ideal impetus to reinvent itself. Upstream division continued to achieve operational success by combining strategic and decisive actions. Despite the obstacles, this was made possible by the herculean efforts of Upstream frontline employees.

Upstream division bolstered their portfolio by encouraging more value-driven exploration and development of discovered resources to foster a thriving oil and gas industry as they implemented stringent measures to reduce costs and maintain liquidity. This was especially evident in Malaysia's operations. Upstream division made parallel efforts to support PETRONAS' Sustainability Agenda, including pioneering advances in CCS and emission reduction initiatives.

Upstream division is well on its way to becoming a safe, resilient, low-cost, and low-carbon exploration and production (E&P) business. Upstream division remains unwavering in their efforts to ensure that everyone returns home safely. This has proved that business model has helped PETRONAS in meeting its target business objectives where its year on year performance from financial year of 2019 to 2021 has improves despite the global low prices of crude oil and Covid-19 pandemic outbreak.

The achievement were contributed by PETRONAS continuous efforts and improvement within its operations by focusing on the fundamental elements within its business model to achieve efficiency via its resources, activities and partners. PETRONAS cost structure has been revisited in order to minimize its impairment especially on assets across the group which translated to an improved revenue for PETRONAS. PETRONAS and its group of companies managed to increase its revenue through diversification of products, services, channel and customer segments creating a unique value proposition hence strengthening the relationship with its customers.

Business models are relevant to all for-profit businesses since their existence and profitability depend on their capacity to both produce and capture value. Obviously, the strategic decision areas facing any corporation will differ depending on a variety of variables, such as the organization's age, industry, industry concentration, client type, government laws, etc. In addition, the process of making strategic decisions and evaluating business models should be continuous and iterative. While there are no certainties, the precision and formality with which a company examines its strategic choices using business models enhances the likelihood of long-term success as supported by Scott, et al. (2005).

All narratives are reimaginings of the fundamental themes that underlie the entirety of human experience. New business models also vary on the value chain that underpins all organizations. This chain is two-part. Part one covers designing, buying materials, production, and more. Part two covers locating clients, making a sale, distributing the goods, and providing the service. As with PETRONAS, a new business model may include creating a product to meet an unmet need. It might be a process innovation, a better method to make, market, or distribute an established product or service (Magretta, 2002).

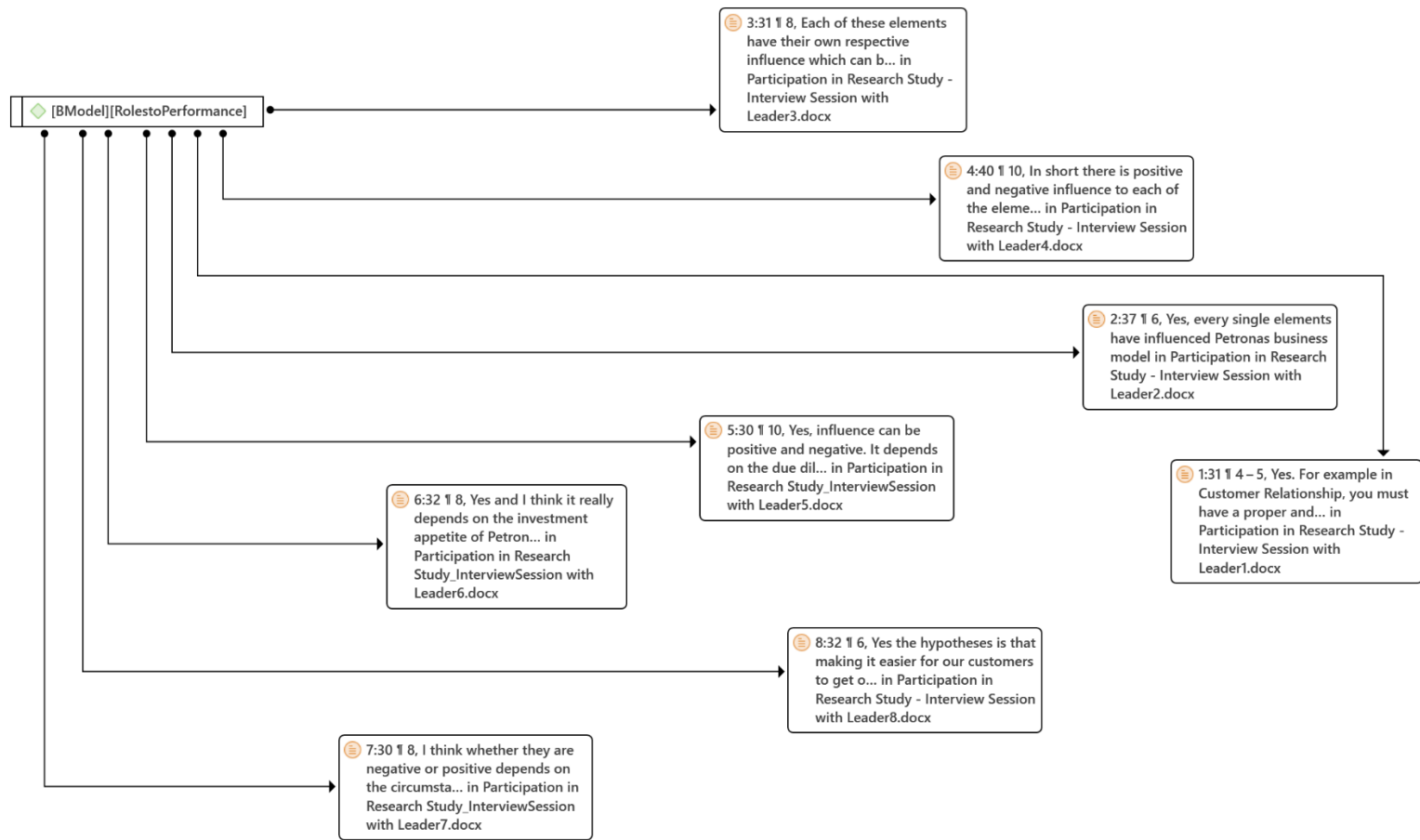


Figure 4.1: Thematic Map of Business Model Importance on PETRONAS Performance

The first subtheme was the **meet target**, where five (5) of the eight (8) participants indicated that meet target was a result of the business model outcome on PETRONAS business performance where business model helps the organization to focus on the “how” part in organising and operating the organization resources to meet the expectation of the shareholders. Business models “represent organizations' fundamental core logic and strategic decisions for producing and collecting value within a value network” (Shafer, et al., 2005). Business strategies include value creation and retention. Value network connects customers, suppliers, purveyors, contributors, and civic society (Shafer, et al., 2005). Business models serve as a "market mechanism" (Doganova & Eyquem-Renault, 2009) to mobilize internal (skills, knowledge, and financial resources) and external (access to financial capital) resources and encourage sustainable innovations (Chesbrough, 2010); (Vaughan, et al., 2016); (Long, et al., 2016).

Business models innovate new realities (Falloon, et al., 2013). Supporting ideation, development, and marketing of disruptive innovations—new services in new markets or new services that may change company dynamics—does this (Schilling, 2016). Business model innovation fosters an efficient, policy-oriented, and science-informed oil and gas services ecosystem. The excerpt of the interviews related to the meet target subtheme is shown below:

P1: Participation in Research Study - Interview Session with Leader1.docx – RQ1 (1:27)

“As for **key resources**, part of it is the **manpower** and **capabilities** and **credibility** within the organization which carries weight to **fulfill your business objective** lens. You must have the right amount of people not only in their capabilities but also the capacity in your organization to be **able to carry out the business activities** in the most optimal manner.”

**P3: Participation in Research Study - Interview Session with Leader3.docx – RQ1
(3:1)**

“From corporate perspective which covers finance, human capital and procurement- each site will have their business model on how to make each site better and **efficient to support the business** group”.

**P4: Participation in Research Study - Interview Session with Leader4.docx – RQ1
(4:32)**

“There is **efficiency** as it will always be done at the most optimized costs. It's always safe and secure, and sustainable. This leads to better performance as it will enable us to **hit the target**, improve revenue and minimize impairments.

**P5: Participation in Research Study_InterviewSession with Leader5.docx – RQ1
(5:31)**

“...having the **right key partner** i.e. China National Petroleum Corporation (CNPC) in Sudan is an example of how we leverage in **ensuring the business performance.**”

**P6: Participation in Research Study_InterviewSession with Leader6.docx – RQ1
(6:24)**

“.....business model is expansion from that business mission and vision based on component of inputs to market in terms of getting revenue. So business model canvas would consist things such as what are the cost drivers, the **partners**, the type of ecosystem business needs to work with to add value to your **cost drivers, market strategy** and **channel, revenue streams** in order to **arrive at your strategy in order to reach your destination.**”

Efficiency and **resources** were being mentioned as part of the **meet target** sub-theme where the business model helps the organization to be more efficient by optimizing and focusing on the right resources in order to meet the target set by the organization and its stakeholders. Business models are defined by Teece as "a hypothesis about what customers want, and how an enterprise can best meet those needs, and get paid for doing so" (Teece, 2007).

The second sub-theme was **increased revenue**, where six (6) out of the eight (8) participants claimed that the business model outcome would influence PETRONAS performance, which could result in an increase in its revenue. Business model innovation (BMI) involves improving a company's value generation, delivery, and capture processes to attract consumers and generate revenues (Teece, 2010). It helps huge multinational firms such as PETRONAS compete by creating new consumer products and income streams (Zott, et al., 2011); (Chesbrough, 2010).

The relevance of digitalization in sales and distribution was widely acknowledged. It gives information on a company's consumer groups as well as methods for tailoring material to recognized groups in order to influence customer behaviour. Digitalization's opportunities, such as social media platforms and personalization, were used to produce more money (e.g., by expanding the reach of the business's content). As a consequence of the pressure caused by shrinking profit margins, investments in digital technology were seen as desirable. Digital technologies can only be used if the benefits of digitalization in business operations are evident beforehand. In terms of the distribution of content, customer wants more freedom.

Digital technologies were used to address content needs. Digital media delivery was thought to benefit customers, advertising partners, and the corporation by increasing revenues (Rachinger, et al., 2019). The excerpt of the interviews related to the increased revenue sub-theme as shown below:

P1: Participation in Research Study - Interview Session with Leader1.docx – RQ1 (1:3) and (1:6)

“Yes, for example in Customer Relationship, you must have a proper and strategic plan to handle and manage the **different customers** and such plan and **strategy may be different** than the interaction with business entities.” “Petronas takes leverage on the availability of the natural resources entrusted to Petronas to manage by way of adding value to the original product to **diversify** and **create different revenue streams** to target different market segments from B2C to B2B. Business performance does not mean monetary but also **efficiency** of the business as well.”

P1 explained further with an example (1:28):

“Key **resources** also mean the product your company is producing for example for PDB it is the petroleum product i.e. Research Octane Number (RON) 95, RON 97, diesel and non petroleum product such as the retail shop (Kedai Mesra) as a way to **diversify** the different and non petroleum range of products to reach customers. For PETRONAS Trading Corporation Sendirian Berhad (PETCO), we sell crude oil to other business entities outside Malaysia by way of trading and key resources there is the crude oil and gas products to customer and business entities. For downstream there are many other products as it is a predominantly manufacturing business such as the lubricants and different type of products.”

P2: Participation in Research Study - Interview Session with Leader2.docx – RQ1 (2:28)

“One of the **value propositions** which makes us a significant player with substantial market share is our facilities and our security ie we never miss a single cargo to be delivered to our long standing customer due to the established customer relationship. Due to the value proposition which we tailor made to our long term customers, we are able to secure extension of the contract for the supply and this leads to LNG to be able to **contribute up to 30% of the PETRONAS’ revenue**, which is a **positive impact to the PETRONAS performance.**”

P4: Participation in Research Study - Interview Session with Leader4.docx – RQ1 (4:32)

“There is efficiency as it will always be done at the most optimized costs. It's always **safe and secure and sustainable**. This leads to a better performance as it will enable us to **hit target and improve revenue** and minimizing impairments...”

P6: Participation in Research Study_InterviewSession with Leader6.docx – RQ1 (6:7)

“Yes, based on the example above it shows a way how PETRONAS managed its **value proposition** and **improve on the business model** ie **improving performance** and it doesn't limited to only financial performance.

P7: Participation in Research Study_InterviewSession with Leader7.docx – RQ1 (7:25)

“We must understand the elements and **focus on resources, partners and costs structure** so that we can become **more competitive, reliable, quality** and so forth.”

P8: Participation in Research Study - Interview Session with Leader8.docx – RQ1 (8:4)

“Yes the hypotheses is that making it easier for our customers to get our products and to use our PDB products, we do not lose our customers to competitors and it will help us **increase our share** relationship with the customers as well **via customer experience.**”

Diversify and **value propositions** were mentioned as part of the **increase revenue** sub-theme. Diversifying the business model and a setting fit for purpose value-proposition influence the organization’s business performance. Amit and Zott (2012) mentioned that with a new business model, a company can discover new revenue and profit streams that can break the cycle of declining revenues and profit margin pressure caused by an ageing business model.

Quoted from PETRONAS media releases dated 1 March 2022 titled “PETRONAS Thrives On Strong Performance In FY2021”, PETRONAS President and Group Chief Executive Officer (GCEO), Datuk Tengku Muhammad Taufik in his statement mentioned that “PETRONAS workforce's commitment is reflected in PETRONAS' strong performance in 2021. PETRONAS will continue to prioritize delivering commercial and operational excellence in a safe and efficient manner. Even as we prudently manage our financial commitments and debt obligations, we remain committed to exercising discipline when reinvesting to both strengthen our core and **expand our portfolio** (PETRONAS, 2022).”

The third (3rd) sub-theme surfaced out was the **minimizing impairments**. Every business model should, by definition, aim to keep expenses as low as possible. However, some business models place a greater emphasis on low-cost structures than others (Osterwalder & Pigneur, 2010).

Digitalization affects companies and their business models in three ways: optimization (e.g. cost optimization), transformation (e.g. reconfiguration of existing models, extension of the established business), and development (squeezing out established market participants, new products/services). Rachinger, et al. (2019); Matzler, et al. (2016) and Berman (2012) identified these three phases as digitalizing goods and services, digitalizing processes and decision making using Industry 4.0, Big Data, or artificial intelligence, and transforming the value proposition and operating model.

P2: Participation in Research Study - Interview Session with Leader2.docx – RQ1 (2:28)

“One of the value propositions which makes us a significant player with substantial market share is our facilities and our security ie we **never miss** a single cargo to be delivered to our long standing customer due to the established customer relationship. Due to the value proposition which we tailor made to our long term customers, we are **able to secure extension of the contract** for the supply and this leads to LNG to be able to **contribute up to 30% of the PETRONAS’ revenue**, which is a **positive impact to the PETRONAS performance.**”

P4: Participation in Research Study - Interview Session with Leader4.docx – RQ1 (4:32)

“There is efficiency as it will always be done at the most **optimized costs**. It's always safe and secure and sustainable. This leads to a **better performance** as it will enable us to hit target and improve revenue and **minimizing impairments.**”

**P6: Participation in Research Study - Interview Session with Leader6.docx – RQ1
(6:7)**

“Yes, based on the example above it shows a way how PETRONAS **managed its value proposition and improve on the business model** ie improving performance and it **doesn’t limited to only financial performance.**”

As can be seen from all the quotations above, it can be summarized that each participants stated that business model does play a role in the PETRONAS business performance. Business models can be critical in elucidating organization performance. Afuah and Tucci (2001) propose the business model as an overarching concept for elucidating the relationship between organizational effectiveness and competitive advantage, defining it as "the process by which an organization develops and uses its resources in order to provide superior value to its customers and to profit from the process" (Afuah & Tucci, 2001).

As a testament, higher Earnings Before Interest, Taxes, Depreciation and Amortization (EBITDA) and lower asset impairment losses contributed to the Group's fourth quarter financial year 2020 profit of USD 13.4 billion, compared to USD 1.01 billion in the same period last year's results (PETRONAS, 2022).

Table 4.3 contains a detailed breakdown of the interview responses to this research question. A summary of the findings is presented in Figure 4.2 below to demonstrate the outcome of business model towards PETRONAS business performance in the context of this particular research question.

Table 4.2: Summary of Research Question One (1)

Theme	Sub-themes	Codes	Participants (Leaders)	Findings
Business Model Influence and Outcome to PETRONAS performance	Meet Target - Efficiency - Resources	[Bmodel][Outcome][MeetTarget] - [Bmodel][Outcome][MeetTarget][Efficiency] - [Bmodel][Outcome][MeetTarget][Resources]	P1 P3 P4 P5 P6	P1 - Meet Target (Resources) P3 - Meet Target (Efficiency) P4 - Meet Target (Efficiency) P5 - Meet Target (Resources) P6 - Meet Target (Resources)
	Increase Revenue - Diversify - Value Proposition	[BModel][Outcome][IncreaseRevenue] - [BModel][Outcome][IncreaseRevenue][Diversify] - [BModel][Outcome][IncreaseRevenue][ValueProposition]	P1 P2 P4 P6 P7 P8	P1 - Increase Revenue (Diversify) P2 - Increase Revenue (Value Proposition) P4 - Increase Revenue (Value Proposition) P6 - Increase Revenue (Value Proposition) P7 - Increase Revenue (Value Proposition) P8 - Increase Revenue (Value Proposition)
	Minimize Impairment - Improve Revenue	[BModel][Outcome][MinImpairment] - [BModel][Outcome][MinImpairment][ImproveRevenue]	P2 P4 P6	P2 - Minimize Impairment (Improve Revenue) P4 - Minimize Impairment (Improve Revenue) P6 - Minimize Impairment (Improve Revenue)

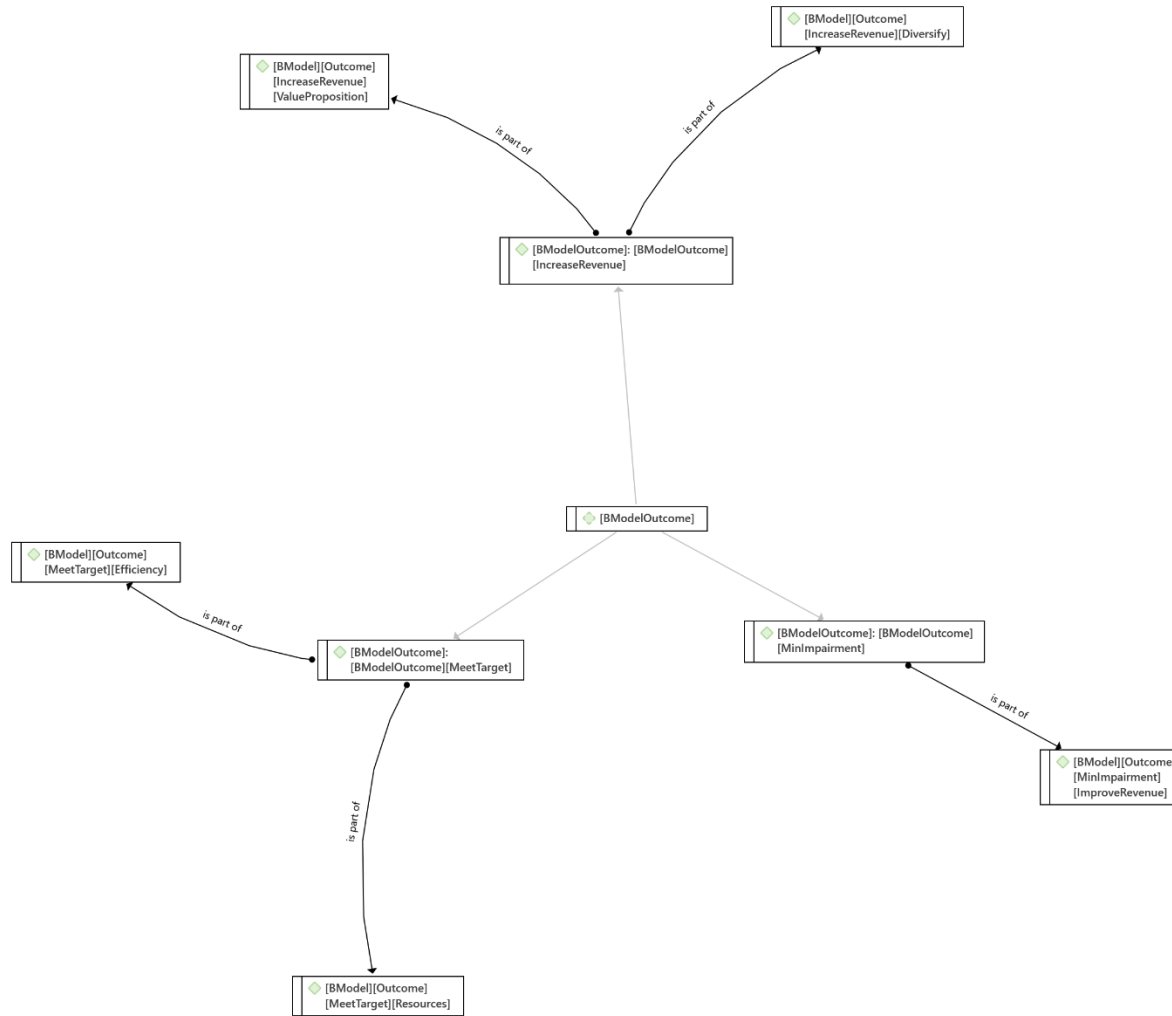


Figure 4.2: Thematic Map of Business Model Outcome towards PETRONAS Business Performance.

4.3.2 Findings on Research Question (RQ) Two (2)

- i. This section discusses the findings of the research data in relation to the second research question: What are the roles of the digitalization infused to business model on PETRONAS' business performance?

There was a theme that came up in this analysis to help answer the question. The theme was the digitalization benefits towards PETRONAS business performance. In order to answer the research question, three (3) sub-themes were discovered during the data analysis process: efficient, optimization and competitive.

All eight (8) participants indicated that **efficiency** was a result of the business model with digitalization infusion on PETRONAS business performance. Infusing digitalization into its business model helps the organization to be more efficient in managing its business **processes**, resources and technology by being able to make an **informed decisions** and the creation of **value-added** products and services, which leads to better **PETRONAS business performance**. **Process, value added**, and the **informed decision** were repeatedly mentioned in the efficient sub-theme.

The second set of findings came from an investigation into research question two (2); participants responded and indicated that digitalization brings benefits to business performance of PETRONAS and its group of companies by transforming the organization to be more efficient in its business processes, able to make an informed decision due to transparency and availability of data, restructuring its resources for more value-add tasks and activities within the organization and optimization on critical business processes and resources.

PETRONAS and its group of companies are adopting digitalization and technology in a determined manner in order to achieve business excellence. Having an optimized and efficient organization via the adoption of digitalization, made PETRONAS and its group of companies more competitive among its peers in the industry. Diversifying and value-adding its offerings to market pushed PETRONAS a notch ahead in its competitive environment.

The adoption of digital technology and the practice of disrupting established business models is a requirement of PETRONAS corporate strategy. In order to achieve this goal, new methods and technologies are providing PETRONAS with the ability to concentrate on unrealized potential and hone PETRONAS competitive edge in order to generate new value for the group. The implementation of new technology and digital infrastructure were also part of PETRONAS's strategy for coping with future uncertainty. PETRONAS people were empowered, and processes were reimaged as a result of these constant sources of inspiration. PETRONAS was able to take advantage of new possibilities, ensure long-term production, and do so in a safe manner.

PETRONAS continued to improve operational efficiency by implementing new technology, digitalization, and intelligent facilities which can reduce across the board in terms of costs and productivity and efficiency. Risks and challenges that could affect the industry are constantly being evaluated by PETRONAS. PETRONAS are using technology, digitalization, and data as its differentiators, accelerators, and assets to deliver strategy with speed, while being cost-effective and environmentally friendly.

PETRONAS is reducing its carbon footprint and improving offshore platform safety through digitalization efforts such as the Facilities of the Future (FoF) programme, which allows them to cut future OPEX by up to fifty per cent (50%). Data-driven production optimization resulted in an additional 2,100 barrels of oil equivalent per day (boed) of production from six (6) Malaysian fields.

RM756 million worth of value has been generated since its implementation in 2017 using a scaled-up version of Digital Fields' technological and digital solution. The use of off-the-shelf wells and sand management technologies in drilling operations resulted in cost savings of RM41 million, as well as an increase in production of 230,000 boe by the year 2020. SMARTbyGEP for Procurement, Digital Artificial Lift (DIAL) and Enhanced Single Trip Multizone (ESTMZ) were three (3) of the technologies piloted in four (4) fields before being replicated on other fields in Malaysia's operations. PETRONAS will keep investing in cutting-edge digital solutions and technologies to boost the profitability of its assets and the productivity of its growth engines.

Upstream division CAPEX was lower in 2020 than it was in 2019, primarily as a result of its cash flow being affected by volatile demand and fluctuating oil prices. To ensure PETRONAS' long-term viability and competitiveness, Upstream division began a significant CAPEX and OPEX cost-optimization effort in 2020. Technology and digital solutions have been implemented in an effort to reduce costs by streamlining projects. Maintaining its spending commitments on the domestic front, they remained resolute in their desire for Malaysia's economy to grow despite the ongoing crisis.

Downstream division made its first foray into the realm of electronic commerce by exhibiting its PETRONAS Sprinta lubricant range on Shopee, one of the most well-known online marketplaces in Southeast Asia and Taiwan. This is part of Downstream's more significant effort to capture a substantial customer base across the nation in response to rising online demand and to provide a more satisfying and convenient experience. Downstream division maintained the sustainability of Operational Excellence (OE) while allowing them to look into the future horizon of customer needs and identify high-potential growth areas.

This shift is made possible by Downstream's extensive digitalization efforts. In this regard, predictive output analysis, for example, is able to anticipate customer needs before they even arise. Even more efforts are being made to diversify the Downstream portfolio so that new offerings can be developed for customers who are not solely reliant on hydrocarbon resources.

In order to ensure the integrity of PETRONAS value chain, PETRONAS' Project Delivery and Technology (PD&T) Division under Corporate business stream, resorted to extreme measures. PD&T division was able to effectively turn things around for the PETRONAS which includes keeping project costs under control and protecting investments, as well as optimizing emerging technologies and drawing on innovation to speed up project completion.

By utilizing digital tools as accelerators, such as predictive and prescriptive analytics, PD&T division was able to increase the robustness of PETRONAS operational processes. Because of this, the total amount of operational uptime that was achieved as well as the amount of cost reduction achieved was maximised. Utilizing data as an asset, PD&T division made use of technology and digital solutions to proactively monitor the health of PETRONAS employees across a wide variety of places and settings. The efforts of PD&T division have resulted in cost savings to PETRONAS amounting to RM2.9 billion.

PETRONAS retail operation division continues to capitalize on the power offered by technology in order to sustain its current rate of expansion. The past year witnessed the launch of a next-generation cloud-based point-of-sale system as well as the installation of our brand new outdoor payment terminal, which features improved digital and secure touch points at petrol stations across the country.

PRYSM is the authorised merchandiser for PETRONAS, and it carries a variety of motorsport and lifestyle brands. These products may be purchased online and at specific Kedai Mesra locations located in the PETRONAS petrol stations. Since PRYSM's start in 2020, the company's online sales are anticipated to have brought in a total of RM8 million by the end of year.

This new integrated use of digital technology may help businesses succeed in many ways, including better use of resources, lower costs, more productivity and efficiency in the workplace, more efficient supply chains, and happier, more loyal customers (Rachinger, et al., 2019). Since digitalization affects business strategies and forces current business models to be rethought and changed, it can be safely assumed that it has a pervasive effect across all sectors (Linz, et al., 2017). The excerpt of the interviews related to the efficient subtheme as shown below:

P1: Participation in Research Study - Interview Session with Leader1.docx – RQ2 (1:8)

“Digitalization plays a role in **improving PETRONAS business performance** as it helps business to become more **efficient**.”

**P2: Participation in Research Study - Interview Session with Leader2.docx – RQ2
(2:10)**

“Another example is in LNG business, previously when we are making business planning we were dependent on the experienced people who have access to multiple information before and has developed that intrinsic knowledge. As a result when people are living and retiring, we face difficulty. Hence we leverage on digital technology and making the **data transparent** to look into relevant data and making alpha LNG to enable us to understand the dynamic of the business from the supply side to manufacturing and the sale. As a result of this, the **works that may have taken 3-4 months could easily be compressed into a week**. The digital technology and infusion of AI allows us to analyze huge volume of data hence we can **realise a significant value** from the condition of the market.”

P2 also added (2:29):

“Digitalization is the use of digital technology to digitize activities and processes ie conversion of physical or manual form into a digital format. Digitalization is the use of digital technology to infuse into our current processes in the business model ie distributed control system in the plant hence to **improvise the business processes**.”

**P3: Participation in Research Study - Interview Session with Leader3.docx – RQ2
(3:23)**

“Upon leveraging on digital, we know exactly at which point we are making money, at which point we are making losses, at which point we'll make money by our money is too small compared to what people are doing is making. So the use of digital assist us in the **making the decision based on the information for the business**.”

P3 added (3:24):

“Digital is new ways of working in providing the **value** by making use of a technology. With digitalization, what outcome do one need which **bring value to organization** back in making use of certain technology.”

P4: Participation in Research Study - Interview Session with Leader4.docx – RQ2 (4:34)

“Yes, positive side, across the 9 elements, there is a derisk of **value proposition** as we have more data and information. With **better information data** and technology the **process becomes more efficient.**”

P4 also added (4:36):

“This is where digital plays a role where we can identify or **discover more data** to make business more accurate, more **efficient** and lower costs for **new areas and for revenues.**”

P5: Participation in Research Study_ InterviewSession with Leader5.docx – RQ2 (5:9)

“Digitalization should address the fundamental of **data capturing** to facilitate a **better decision making.**”

P5 also mentioned (5:27):

“Similarly, digitalizing some of our **processes** is part of our business strategy to have the **efficiency** for the business model.”

P5 added (5:32):

“Digitalization should address the fundamental of **data capturing** to facilitate a **better decision making**. With right data, you can make better analysis and better decision **leads to better performance.**”

P5 quoted an example below (5:33):

“In HSE, with digitalization it enables us to pin point what are the blind spots for improvement. For the UAUC analytics which the **right data captured** and analyzed we would able to predict the future activities in anticipation incidents for readiness and put proper plan to mitigate such accident to **avoid lose of revenue** due to lose of reputation due to HSE issue.”

P6: Participation in Research Study_InterviewSession with Leader6.docx – RQ2 (6:25)

“...**leveraging on digital technology to reduce carbon emission** ie Stella which helps LNG plant to power up the plant and cool down the plant without carbon emission at low costs and recognized internationally.”

P6 added (6:26):

“Digitilisation is how we use digital technology to change how business and people function ie not just **revenues and cost drivers** but **the way we work** ie procurement activities and knowledge it is embedded in AI and thus moving to a more democratized way of doing things without heavy reliance on tacit knowledge or certain people. The way of working changes from reactive to a more proactive way. **Higher valued added services** can be gained from the people.”

**P7: Participation in Research Study_InterviewSession with Leader7.docx – RQ2
(7:27)**

“It is the act of leverage leveraging ICT and digital technologies to gear and make it work for our business that will result in quantum benefits- making it **efficient**, safe, active, reliable and **provide visibility** in a much better way.”

P7 quoted an example below (7:28):

“For example, on the channel customers where you need to know their needs, their requirements so that you can fit to it. You need the data by digitalization and you can **visualize data right** and then to **make an informed decision** and reacting to it where it's also important in our plan operations. Thus you need to know your plant is constantly running and in in order to do that right you need data across all levels of the organization and it's all connected across value chain . Ultimately, getting the product to the customer involves a very long value chain so that you can make an informed decision.”

**P8: Participation in Research Study - Interview Session with Leader8.docx – RQ2
(8:5)**

“**By having data** on customers, we can **understand our customers better.**”

P8 also added the below (8:10):

“It is a tool to allow us to gather data in all 9 elements. By digitalizing processes **data gathering easier** and more **efficient** to allows us a better **value proposition.**”

P8 mentioned (8:27):

“By having digital and **data** that is how Petronas leverage on those fundamental elements in order to **improve the business performance.**”

The second sub-theme was **optimization**, where seven (7) out of the eight (8) participants agreed that digitalization benefits the organization where it leads to an optimization of **processes** and **resources**, which later benefits the PETRONAS performance. Process and resource are being mentioned within the optimization sub-theme by the participants. These results demonstrate why it is crucial for businesses to use the sensing capabilities discussed in Mezger (2014). Further, possibilities in areas like process improvement were cited as internal triggers by the participants. The oil and gas sector exemplifies a key component of the "add-on" market (Fleisch, et al., 2014). These findings are consistent with those of Coupette (2015), who found that the impact of digitalization manifests itself in either a reorganization or an expansion of the current business models.

The participants, as recounted by, also understood the potential of digitalization to enhance their business models (Coupette, 2015). Yet the findings also show that the potential for optimization, and hence the impact of digitalization on business model aspects, is very sector-specific. The excerpt of the interviews related to the optimization sub-theme as shown below:

P2: Participation in Research Study - Interview Session with Leader2.docx – RQ2 (2:7)

“Digitalization is the use of digital technology to **digitize activities and processes** ie conversion of physical or manual form into a digital format. Digitalization is the use of digital technology to infuse into our current processes in the business model ie distributed control system in the plant hence to **improvise the business processes.**”

P2 added (2:12)

“From **value chain**, it can be for **optimization** of **process** from supply or demand side to realize revenue stream and key activities.”

P2 cited an example (2:9):

“In traditional procurement **process** it will involve many **manpower** but with infusion for digital procurement, everything is programmed in RPA which allows manpower to be assigned or allocated to a more **value added** job.”

P2 further added (2:31):

“Yes, impact is positive. From **resources** perspective as works which are repetitive or requires number of employees are cut down and move them to another position of a **higher value**.”

P3: Participation in Research Study - Interview Session with Leader3.docx – RQ2 (3:25)

“Yes – without digitalization, we in the business are all **doing works separately** without understanding the end to end game of PETRONAS and its end objective.”

P4: Participation in Research Study - Interview Session with Leader4.docx – RQ2 (4:10)

“New improved ways of working for people using different and improved **resources** to give us competency, efficiency and process.”

P4 in an opinion (4:33):

“Business performance within the company is based on the business internal model and whether it is **optimized** there yet as it is very **resource** incentive and I think there's an opportunity for digital to improve.”

P4 added (4:35):

“The negative aspect if the process is not changed then we are not getting the maximum value from the digitalization. In short it can be positive as there will be improvement in performance but this will not be sustained and you will end up with a plateau if the changes are not made to the **processes**.”

**P5: Participation in Research Study_InterviewSession with Leader5.docx – RQ2
(5:17)**

“Digitalization is a vehicle to get a better **clarity** to enable you to **shape your business model** coexisting together.”

P5 cited (5:29):

“On customer relationship and its relation to sustainability. Our customers may go us not because we are cheaper but also due to the way we interact with them and that we have also in place sustainable development to which they are also agree to. Choosing the **right key partners** are important for the reputation of the company and as a reflection of our business and to **maximise the value** of the certain asset.”

**P6: Participation in Research Study_InterviewSession with Leader6.docx – RQ2
(6:10)**

“Impact depends on how we use the digitalization. It can be partial, full, positive and negative. Not all values can be enhanced by use of digitalization if the **processes** or governance are already lengthy and overzealous.”

P6 added (6:27):

“The digitalization tools will help to shift the **people** to a higher value added or complex tasks and to a **more strategic role**.”

**P8: Participation in Research Study - Interview Session with Leader8.docx – RQ2
(8:11)**

“Yes positive impact because it makes us understand the customer and internally it can change the mindset of **people** within us and also the **process** to suit the to the change.”

P8 added (8:28):

“Digitalization is taking what traditionally is an offline process and like turning it into a more online process that allows us to track performance of that **process** at scale ie like the data and analytics available to digital companies like Amazon, Google and then it's so easy for them to measure any customer interaction that they have. Everything is digital and from there they get intimate knowledge of like the how the customer behaves and with that data allows them to **optimize their business better.**”

Using predictive and prescriptive analytics as accelerators, PETRONAS was able to increase the resiliency of its operations, according to its 2020 Integrated Report. This resulted in an increase in operational uptime and a reduction in operating costs for the entire Group. To ensure that PETRONAS employees' health and safety is constantly monitored, the company implemented a variety of tech-digital solutions. PETRONAS was able to save RM2.9 billion as a result of group efforts. In addition, the Kasawari Integrated Offshore High Contaminant Project was completed ahead of schedule, resulting in 1 million safe man-hours and zero cases of Coronavirus Disease Year 2019 (COVID-19) due to strict Standard Operating Procedures (SOPs) (PETRONAS, 2021).

Porter (1985) describes the value chain of organization-internal activities in order to illustrate the various types of capabilities available to a company. Briefly stated, a company's ability to digitalize can be relevant for all of the company's operational capabilities. For example, Lai, et al. (2008) demonstrate how digitalization plays a positive roles on the performance of logistics operations. Sales practices are discussed in detail by Syam and Sharma (2018), who looks at the effects of machine learning and artificial intelligence. It now appears that it is not possible to have strong capabilities in many businesses and industries without relying on digitalization (Gandhi, et al., 2018). The use of data for capability optimization is driven from within the organization and is for the most part, inaccessible to end customers. Cao, et al. (2019) and Germann, et al. (2013) have found that marketing analytics capabilities have an advantageous on managerial decision-making, such as resource allocation within a company's internal operations.

The third sub-theme was **competitive**, where four (4) out of the eight (8) participants agree that infusion of digitalization in the business model leads to transforming the organization to be more competitive and resilient to ensure its sustainability and future growth. Value-add and diversify were being mentioned within the competitive sub-theme by the participants.

The business model itself has emerged as a key driver of creativity and differentiation in recent years (Hossain, 2017). Schweizer (2005) defined "dynamic capability" as the "ability to seize new opportunities and to change the existing business model by reconfiguring the value chain constellation and protecting knowledge assets, competences and (the access to) complementary assets and technologies in order to achieve sustainable competitive advantage." That's why it's important for businesses to be able to adapt their business model so they can stay competitive (Teece, et al., 1997); (Rachinger, et al., 2019).

Businesses see digitalization as a way to better meet client expectations, evolve with the market, and gain an edge in the marketplace. Companies began engaging in digitization efforts because of pressures to respond quickly to changing market conditions and shorten the time it takes to produce new products and services (Rachinger, et al., 2019). The excerpt of the interviews related to the competitive sub-theme as shown below:

P1: Participation in Research Study - Interview Session with Leader1.docx – RQ2 (1:7)

“Digitalization is an effort to exploit the digital technology and digital capabilities to make sure that you can execute your business and fulfill your business model at large and to make the business to become more **competitive** by creating superior product and becomes more **efficient** on selling the product turning to be a top notch organization by exploiting the digitalization.”

P1 cited an example (1:9):

“Digitalization also enables certain parts of business which could not actually be achieved without digital ie exploiting data. In the downstream organization, especially in PETCO where we do trading, data analytics is used to **predict the future market trends**. Thus without digitalization capabilities, you would be unable to do that kind of prediction and utilizing technology and data to its highest extent. Should we remain as a traditional player, we will not be able to compete with the rest of the players out there. Thus digitalization definitely to **boost up the performance** and **bring more value** of the organization.

P1 added (1:10):

“As mentioned earlier on key resources and customer relationship , through digitalization we create **new revenue streams**. In the case of PDB, how do we manage loyalty program to we need to have in order to retain and maintain our customer base.

P1 cited another example (1:11):

“Without technology, you will not be able to retain your customers and when we retain our customer we are able to expand your revenue streams. For example, in our petrol outlets (Kedai Mesra), in addition to customers buying the petrol product, we are making use of their presence in our petrol station, to market for other things in the petrol station. For example, we are opening up a new Petronas branding cafe in our petrol outlets. We are continuing to explore **new revenue streams** outside our core business to leverage on the presence of customer in our petrol outlets. The data through the digitalization is not only when they come, but how often they come, where there are planning to go so that we can support them throughout the journey. For example, if we know the pattern of movement the customer have on any given time we can actually push certain information that might actually attract them to, you know, consume the products that are relevant to them from time to time.”

P1 mentioned (1:12):

“The detail analytics are used to understand the customer behavior pattern to tackle which products meant for them hence creating **revenue streams** brings **positive impact** to **PETRONAS business performance.**”

P2: Participation in Research Study - Interview Session with Leader2.docx – RQ2 (2:29)

“Digitalization is the use of digital technology to digitize **activities** and **processes** ie conversion of physical or manual form into a digital format. Digitalization is the use of digital technology to infuse into our current processes in the business model i.e. distributed control system in the plant hence to **improvise the business processes.**”

P2 added (2:30):

“Yes ,digitalization **improves the business performance** for example in procurement.”

P6: Participation in Research Study_InterviewSession with Leader6.docx – RQ2 (6:12)

“Digitalization is like a catalyst and an enabler. It is a vehicle to move things from one to another and depends on how one uses it to have a different permutation on what is the goal or the **value proposition** that you want to reach.”

P6 added (6:29):

“Yes it does. Ideally, as an organization, we invest in products we need to invest in products that will move the needle. So if I look at the digital products and solutions that we need to invest in the products are to move the product in **value creation** i.e. **cost savings** or **revenues.**”

P8: Participation in Research Study - Interview Session with Leader8.docx – RQ2 (8:27)

“By having digital and data that is how PETRONAS leverage on those fundamental elements in order to **improve the business performance.**”

For years, the industry had been grappling with an increasingly cleaner energy mix as the industry moved away from a reliance on fossil fuels in favour of more efficient alternatives. The importance of sustainability is being emphasized by an increasing number of governments and other stakeholders around the world, and this shift toward low-carbon priorities is intensifying (PETRONAS, 2021).

PETRONAS President and Group CEO quoted saying “making us a more cost-efficient producer, de-risking our investments by pursuing opportunities that provide faster cash returns and are less volatile, and pursuing more innovative solutions while pivoting our portfolio are the primary goals of our organization. A stronger, more customer-centric workforce will continue to drive these efforts, which will be directed toward the achievement of our Three-Pronged Growth Strategy. Despite the challenges we faced, the PETRONAS Group has performed admirably in attempting to mitigate the negative effects of a turbulent year. Having this overview of our operational and financial performance is a testament to the tenacity of our people, as well as their desire to innovate and their commitment to working together to overcome all obstacles and move forward with conviction” (PETRONAS, 2021).

As a result of technological advancements, digitalization, and intelligent facilities, PETRONAS has been able to reduce costs and increase productivity and efficiency in its global Upstream operations. New and innovative solutions are constantly being sought out by PETRONAS in order to mitigate any potential risks or challenges that may arise in the business environment. PETRONAS is committed to implementing its strategy in a time- and cost-effective manner. For this, PETRONAS relies on digitalization and data as a differentiator, accelerator, and asset of the company's technological advancements. Because of PETRONAS digitalization efforts, specifically the Facilities of the Future (FOF) programme, PETRONAS is able to reduce its carbon footprint and improve safety on offshore platforms by as much as 50 percent.

The Resak platform off the coast of Terengganu is just one example of how PETRONAS' focus on intelligent facilities will spread across all of the company's divisions. With its efforts to reduce greenhouse gas emissions, PETRONAS is trying to eliminate all hydrocarbon flaring and venting, aiming to reduce Green House Gas (GHG) emissions by approximately 2 million tonnes of carbon dioxide equivalent (tCO₂e) per year and potentially recover 33 million standard cubic feet of gas per day for the purpose of selling gas to customers. PETRONAS is also experimenting with Carbon Capture and Storage (CCS) in its high-carbon dioxide (CO₂) fields, and PETRONAS is considering Renewable Energy (RE) as a preferred source of power for its platform and other facilities. CCS innovation by PETRONAS is aimed at reducing carbon emissions even further while also expanding the company's technology portfolio to generate value (PETRONAS, 2021).

In order to cut expenses, PETRONAS scaled back on the amount of projects and activities it undertook, shifted its attention to operations that were more sensible and effective, and applied technological and digital solutions. PETRONAS remained steadfast in its commitment to supporting Malaysia's oil and gas industry and promoting economic growth despite the prolonged economic downturn (PETRONAS, 2021).

When it comes to business model innovation, top executives across a wide range of industries are actively looking for guidance, as evidenced by IBM's "Global CEO Study" from 2006 and 2008, respectively. Advances in information and communication technologies have recently sparked a renewed interest in new business model development (Casadesus-Masanell & Ricart, 2009).

Table 4.4 contains a detailed breakdown of the interview responses to this research question. A summary of the findings is presented in Figure 4.3 below to demonstrate the digitalization benefits towards PETRONAS business performance in the context of this particular research question.

Theme	Sub-themes	Codes	Participants (Leaders)	Findings
Business Model Influence and Outcome to PETRONAS performance	Meet Target - Efficiency - Resources	[Bmodel][Outcome][MeetTarget] - [Bmodel][Outcome][MeetTarget][Efficiency] - [Bmodel][Outcome][MeetTarget][Resources]	P1 P3 P4 P5 P6	P1 - Meet Target (Resources) P3 - Meet Target (Efficiency) P4 - Meet Target (Efficiency) P5 - Meet Target (Resources) P6 - Meet Target (Resources)
	Increase Revenue - Diversify - Value Proposition	[BModel][Outcome][IncreaseRevenue] - [BModel][Outcome][IncreaseRevenue][Diversify] - [BModel][Outcome][IncreaseRevenue][ValueProposition]	P1 P2 P4 P6 P7 P8	P1 - Increase Revenue (Diversify) P2 - Increase Revenue (Value Proposition) P4 - Increase Revenue (Value Proposition) P6 - Increase Revenue (Value Proposition) P7 - Increase Revenue (Value Proposition) P8 - Increase Revenue (Value Proposition)
	Minimize Impairment - Improve Revenue	[BModel][Outcome][MinImpairment] - [BModel][Outcome][MinImpairment][ImproveRevenue]	P2 P4 P6	P2 - Minimize Impairment (Improve Revenue) P4 - Minimize Impairment (Improve Revenue) P6 - Minimize Impairment (Improve Revenue)

Table 4.1: Summary of Research Question Two (2)

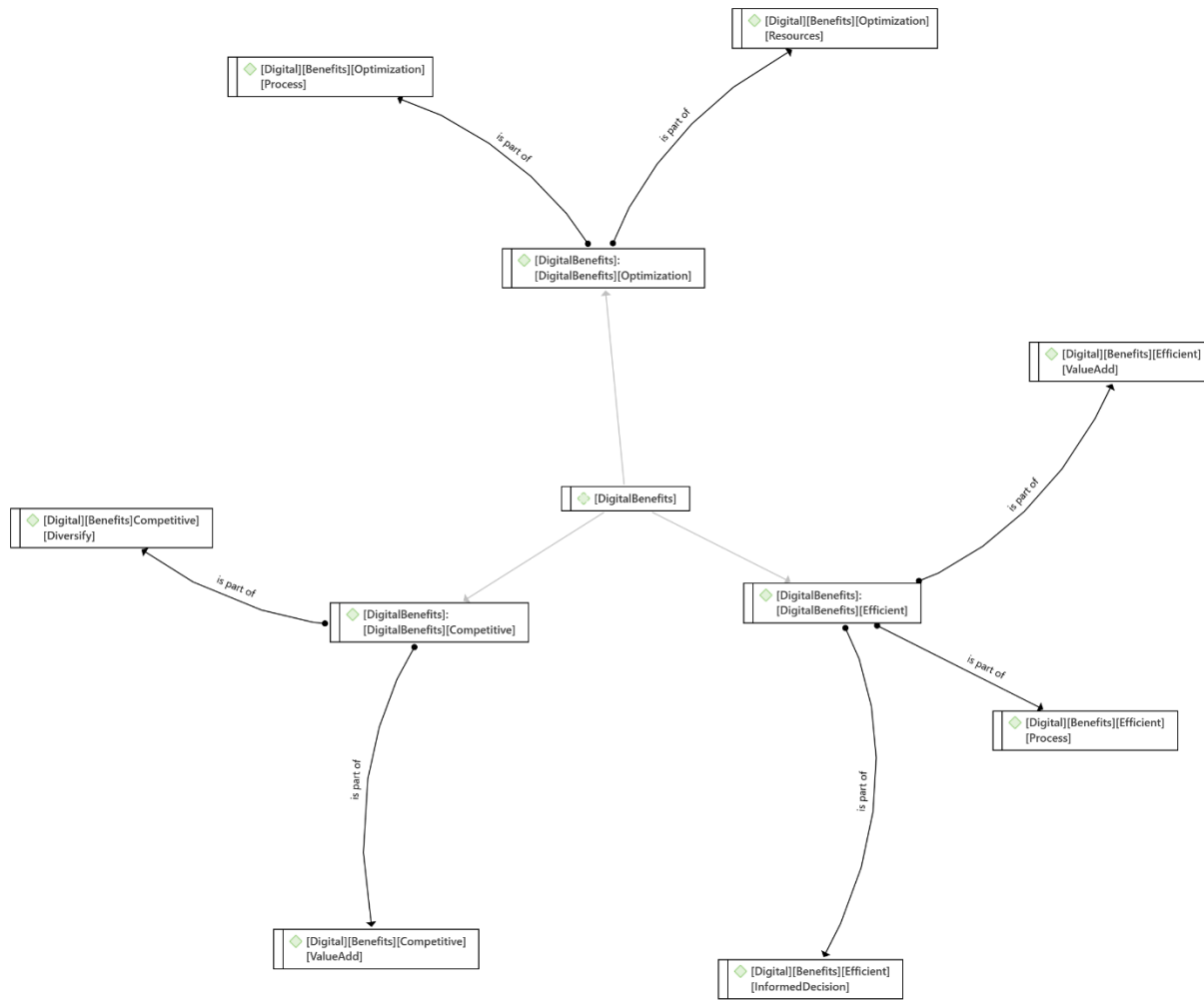


Figure 4.3: Thematic Map of Digital Benefits towards PETRONAS Business Performance.

4.3.3 Findings on Research Question (RQ) Three (3)

This section discusses the findings of the research data in relation to the third research question: How does the business model improve the business performance of an organization that embraces digitalization as its competitive advantage?

There was a theme that came up in this analysis to help answer the question. The theme was improving the business model canvas which will benefit PETRONAS business performance. In order to answer the research question, three (3) sub-themes were discovered during the data analysis process: health and safety, environment and socio-economy.

All eight (8) participants indicated that **health and safety** are key in its business operation in order to ensure its sustainability and future growth. **License to operate** and **reputation** were repeatedly mentioned in the health and safety sub-theme. The excerpt of the interviews related to the efficient subtheme as shown below:

P1: Participation in Research Study - Interview Session with Leader1.docx – RQ3 (1:19)

“The fundamental operating philosophy in any oil and gas player is to make sure that we can adhere to **health and safety**. If we are not able to adhere to the strict requirements of HSSE, you are not going to be allowed **to operate** the oil and gas company whether in upstream, downstream. It is actually part and parcel of the Deoxyribonucleic acid (DNA), within any oil and gas operating company including PETRONAS.

**P2: Participation in Research Study - Interview Session with Leader2.docx – RQ3
(2:33)**

“...people that we touch when we do business and it has become one of our consideration and impact our **licence to operate.**”

**P3: Participation in Research Study - Interview Session with Leader3.docx – RQ3
(3:27)**

“Yes and it is **one of the key items** we look out for in any of our key discussion in PETRONAS.”

**P4: Participation in Research Study - Interview Session with Leader4.docx – RQ3
(4:38)**

“**Health and Safety** at work is categorized as hygiene issue and requires for **license to operate.** They should not be an option.”

**P5: Participation in Research Study_InterviewSession with Leader5.docx – RQ3
(5:20)**

“Yes, it is the **license for the company to operate.**”

P5 added (5:33):

“In HSE, with digitalization it enables us to pin point what are the blind spots for improvement. For the “You Act You See (UAUC)” analytics which the right data captured and analyzed we would able to predict the future activities in anticipation incidents for readiness and put proper plan to mitigate such accident to avoid lose of revenue due to **lose of reputation** due to HSE issue.”

**P6: Participation in Research Study_InterviewSession with Leader6.docx – RQ3
(6:30)**

“Yes, one loss of life impacts the company **not in just loss time injury but on monetary**. It is an embedded culture to ensure **health and safety** are paramount.”

P6 quoted (6:31):

“**Health Safety** is already part of our **value proposition** as embedded in our culture and thus part of a business model already.”

**P7: Participation in Research Study_InterviewSession with Leader7.docx – RQ3
(7:18)**

“Yes, **health and safety** is a driver.”

**P8: Participation in Research Study - Interview Session with Leader8.docx – RQ3
(8:29)**

“Yes, very important role and and when it does not go well, it becomes very noticeable and plays a significant role in **influencing the customer decision to do business with us**.”

In order to ensure effective management of PETRONAS value creation efforts over the short, medium, and long-term, PETRONAS identify stakeholder-relevant topics by employing a structured methodology to determine what is most important to PETRONAS. In accordance with the International Petroleum Industry Environmental Conservation Association (IPIECA)/American Petroleum Institute (API)/International Oil and Gas Producers (IOGP) Sustainability reporting guidance for the oil and gas industry and the Global Reporting Standards Initiatives (GRI), PETRONAS conducted a periodic Materiality Assessment to identify Environment, Social, and Governance issues that are important to PETRONAS stakeholders (PETRONAS, 2021).

When the COVID-19 pandemic and the movement limitations that followed struck PETRONAS at the beginning of 2020, PETRONAS quickly responded by making the health and safety of its personnel their utmost priority. The Pandemic Preparedness and Response Team (PPRT) at PETRONAS were established with its roots stretching deep into its day-to-day operations worldwide. The coordinated efforts across the Group as well as rolled out robust SOPs and ensured that they were adhered to. PETRONAS personnel were able to remain safe, and its activities were able to continue, thanks in large part to the prompt and proactive measures that were taken by the PPRT in order to manage and reduce the transmission of the virus throughout all of PETRONAS operations (PETRONAS, 2021).

PETRONAS expect all of its employees and representatives to conduct themselves in accordance with PETRONAS' HSE Policy as PETRONAS strive to build safe working environments as well as efficient and effective processes. In conjunction with this, an HSE Management System is in place to govern all aspects of PETRONAS's business that are connected to HSE. In turn, the Health, Safety, and Environmental Management System was established within the context of the Plan-Do-Check-Act (PDCA) continuous improvement loop and in accordance with the criteria established by the International Organization for Standardization (ISO) 14001:2015 and ISO 45001:2018. All of these actions are in accordance with the pledge that PETRONAS has made to uphold seven of the seventeen United Nations Sustainable Development Goals (UNSDGs) as well as the PETRONAS four Sustainability Lenses (PETRONAS, 2021).

According to Helmreich and Merrit (1998), there is little doubt that people will react negatively if their family members, friends, or coworkers are injured while they are performing their jobs. Safety is considered a "universal value" that every culture should strive to achieve. Every accident has a human cost, but the regulations surrounding risk and safety, as well as the approaches organizations, take to manage risk and safety, can vary significantly from nation to nation and organization to organization.

At the level of the individual, the so-called "value of life" is impossible to quantify; however, the so-called "value of life" in society may be open to debate. It is possible that the political regime in some countries views labour as being low-cost and expendable. A solid moral and ethical commitment to safeguard workers from injury at work should be enough to motivate Western companies operating in these countries to build comprehensive safety management systems that go beyond the requirements of local legislation (Mearns & Yule, 2009).

Upon learning of the COVID-19 pandemic and subsequent movement restrictions, PETRONAS acted swiftly, prioritizing the health and safety of its employees above all else in early 2020. The PETRONAS Pandemic Preparedness and Response Team (PPRT) was established with its roots organization planted in the company's day-to-day operations throughout the world. PETRONAS collaborated across the organization to coordinate activities, as well as to roll out and ensure adherence to stringent standard operating procedures. All of PETRONAS operations were kept running smoothly thanks to the timely and proactive measures that the PPRT took to manage and curb the spread of the virus throughout the organization (PETRONAS, 2021).

The second sub-theme was an **environment**, where all eight (8) participants agreed that it should be one of the fundamental elements and building blocks of the PETRONAS business model. **Sustainability** was being indicated within the environment sub-theme by the participants, where the environment element is required to be looked at by PETRONAS to ensure its sustainability for future growth. The excerpt of the interviews related to the environment sub-theme as shown below:

**P1: Participation in Research Study - Interview Session with Leader1.docx – RQ3
(1:17)**

“**Environment** plays big role in determining even our future and which PETRONAS needs to answer to ensure of its continuous existence in the future especially when there is a pressure of ensuring **carbon free** in the next 20-30 years. PETRONAS needs to react to this for the betterment of the world and to **ensure its sustainability.**”

P1 added (1:20):

“Yes, I think this is another fundamental layer that cuts across everything just like strategy and **environment** and social economy. I think it falls under the horizontal layer which needs **to be considered in all the elements** that you are focusing.”

**P2: Participation in Research Study - Interview Session with Leader2.docx – RQ3
(2:32)**

“Based on PETRONAS’s business statement of purpose, it is a testament that PETRONAS revolves around **people, planet** and profit and UN’s **sustainable** development goals.”

**P3: Participation in Research Study - Interview Session with Leader3.docx – RQ3
(3:26)**

“An oil and gas business is very volatile and do have a lot of **environmental** issues and challenges to face. Similarly for the social economy across Malaysia as well as other parts of the region that we participate in. So **environment** and socio economy does play a very significant role in our industry and **shaping our business performance.**”

**P4: Participation in Research Study - Interview Session with Leader4.docx - RQ3
(4:20)**

“Yes. On **environment** the value proposition has changed in terms of the competition and for socio economy it is well documented on how PETRONAS is giving back. The environment and social economy demand will keep on increasing and if we do not diversify our revenue streams, we will face a **sustainability** challenge.

**P5: Participation in Research Study_InterviewSession with Leader5.docx – RQ3
(5:33)**

“In Health, Safety and **Environment** (HSE), with digitalization it enables us to pin point what are the blind spots for improvement. For the UAUC analytics which the right data captured and analyzed we would able to **predict the future activities** in anticipation incidents for readiness and put proper plan to mitigate such accident to avoid lose of revenue due to lose of reputation due to HSE issue.”

**P6: Participation in Research Study_InterviewSession with Leader6.docx – RQ3
(6:28)**

“All 9 will be enhanced by digitalization. Value preposition of the **net zero carbon** where each one of it will have changes infused by digitalization ie customer relationship and internal channels where you do pilot testing.”

**P7: Participation in Research Study_InterviewSession with Leader7.docx – RQ3
(7:17)**

“It is definitely a consideration to take into account in order for you to form or influence or determine the type of business model you have. Thus if your business model stipulates you need to be **environmentally conscious** and you have a target to achieve certain environmental, then you will need to carve your business model strategy based on data. Thus for oil and gas is should be considered **fundamental**.”

**P8: Participation in Research Study - Interview Session with Leader8.docx – RQ3
(8:17)**

“Yes for example Covid has essentially significantly modified the behavior of our customers and it's resulting impact. Our business, people and the mobility of our customers is being severely limited in the last two years, and the resulting in the lower demand and need for fuels. There are also longer terms trends that impact patterns business **environment** i.e. the **sustainable** energy sources.

P8 added (8:18):

“Yes. **Environment** and **Sustainability** Goals are one of the biggest things that investors in our businesses are starting to look into, and it's undoubtedly one of the things that we **need to operate in our business model**.

PETRONAS continue to expedite this by utilizing digital applications like myHSSE. The PETRONAS HSSE digital solutions and system training materials can be found in a centralised location on the myHSSE digital platform. By adopting a single information platform that houses all sixteen (16) of PETRONAS HSSE's digital solutions, each of which addresses unique business pain points, the company will be able to streamline its operations. PETRONAS is making access and usage more convenient for users and is catering to their specific requirements.

In addition, PETRONAS is providing its users with the tools necessary to harness the power of HSSE data in order to derive insights on HSSE performance, trends, emerging risks, and other crucial factors in order to facilitate the implementation of proactive interventions. PETRONAS's goal is to achieve predictive and even prescriptive health, safety, security and environmental (HSSE) analytics, and as they get closer to that goal, they intend for the Group's HSSE efforts to increase significantly (PETRONAS, 2021).

Denchev, et al. (2015) quoted, "Resolving societal and environmental problems is the primary focus of sustainable business models," as stated in the aforementioned quote. The natural environment and society are the two most important stakeholders, and sustainable business models require a system that can maintain sustainable value flows between all of these different groups. A value network with a new purpose, design, and governance structure is required for business models with a long-term perspective.

The "Jom Patuh dan Tegur" or "Let's Comply and Intervene" initiative is one of the flagship programmes examples within the Generative HSSE Culture of PETRONAS. It focuses on creating a safe environment in which peers can intervene when they observe an unsafe act or behaviour. At PETRONAS, they strive to cultivate a culture of care not only for themselves but also for those around them. This culture sees coworkers constantly reminding one another to be safe and being vigilant for one another's well-being because PETRONAS value human life.

In addition, PETRONAS is looking to invest in low-carbon businesses in order to ensure the continued pooling of future value. It is anticipated that the Net Zero Carbon Emission (NZCE) 2050 mandate will serve as a catalyst for PETRONAS in the company's efforts to develop new sources of differentiation. It is anticipated that the mandate will provide PETRONAS with an operational advantage and competitive returns through more sustainable, long-lasting, and resilient businesses that will benefit stakeholders, the environment, and society in general.

As part of PETRONAS's commitment to lowering the impact of its carbon footprint and, ultimately, strengthening its license to operate, the long-term goal of reducing that impact keeps PETRONAS steadfast, while the short-term goals keep PETRONAS on track to achieve that goal (PETRONAS, 2021).

The third sub-theme was **socio-economy**. Five (5) out of the eight (8) participants agreed that socio-economy be included as another fundamental element and building block in the PETRONAS business model. **Sustainability** and **business ethics** were being mentioned within the socio-economy sub-theme by the participants. The excerpt of the interviews related to the socio-economy sub-theme as shown below:

**P1: Participation in Research Study - Interview Session with Leader1.docx – RQ3
(1:29)**

“Economy is also an important factor as it is the **way we conduct our business** and how the company is impacted by the **socio-economic** situation from time to time to ensure we **conduct the business profitably**. This is, for example, the key element and the date we consider and use to forecast and indicator for the direction of our business.

P1 added (1:30)

“Environment and **socioeconomic** cuts across all those elements in the business model. Both do not have to stand on its own and it's actually the the fundamental layer that you have to take into consideration in any of the elements.”

**P2: Participation in Research Study - Interview Session with Leader2.docx – RQ3
(2:34)**

“Yes they do have bearing on how we get to the **most value for our shareholders** and environment and **socio economy** is placed as an importance to our shareholder for which we cannot deny.”

**P3: Participation in Research Study - Interview Session with Leader3.docx – RQ3
(3:26)**

“An oil and gas business is very volatile and do have a lot of environmental issues and challenges to face. Similarly for the **social economy** across Malaysia as well as other parts of the region that we participate in. So environment and socio economy does play a **very significant role in our industry and shaping our business performance.**”

**P4: Participation in Research Study - Interview Session with Leader4.docx – RQ3
(4:37)**

“.....**social economy** demand will keep on increasing and if we do not diversify our revenue streams, we will face a **sustainability** challenge.”

**P5: Participation in Research Study_InterviewSession with Leader5.docx – RQ3
(5:34)**

“**Socio economy** is part of PETRONAS’ **sustainability**. The social performance is a key element in sustainability development where we have to be sensitive and aware of the social impact of where we are operating.”

After reaching a peak of USD 147 per barrel in 2008, oil prices fell to USD 40 per barrel by the end of 2015, primarily because of a slowing economy and lower demand (Lior, 2010); (British Petroleum (BP), 2015). Sustainability initiatives have been called into question in the wake of the global financial and economic crisis (Halldórsson, et al., 2009).

Risks to financial stability can arise when the economy is unsteady, especially when it comes to liquidity and solvency. As well as contractual responsibilities and commercial agreements with suppliers and customers, there can also be risks involved (REPSOL, 2011). As a result of the volatility of global oil and gas prices, currency exchange rates, and interest rates, these market risks could have a long-term impact on the profitability of operations (REPSOL, 2011); (PETROBRAS, 2011).

Investments in certain areas, such as field development, could be reduced due to the impact on the company's ability to implement its planned capital investment programmes (Lukoil, 2011). Companies are also expected to make a positive impact on the communities in which they operate from a socioeconomic standpoint. Because of this, the oil and gas industry faces a significant challenge in achieving economic objectives while also meeting its responsibilities to stakeholders due to financial instability. An organization's costs, quality, and success can all be influenced by the relationships between the various stakeholders in its external micro-environment, which includes suppliers, customers, employees, and competitors (Gillespie, 2011).

One of the most frequently mentioned factors in the sustainable supply chain management (SSCM) literature as a factor in the development of SSCM implementation strategies is adapting to stakeholder pressure (Seuring & Müller, 2008). Macroeconomic and market conditions, as well as social and environmental risk management, may be influenced by the quality of the company's relationship with stakeholders (Gazprom-Neft, 2010). When it comes to establishing long-term and mutually beneficial relationships with stakeholders, businesses must overcome one of the biggest hurdles: understanding the expectations of those stakeholders.

PETRONAS is cognizant of the potential consequences of its business and operations on the environment. PETRONAS Social Performance Framework governs how PETRONAS manage the consequences of their actions in the following five (5) domains: Environment, health, safety, security, socio-economics, and culture are all critical considerations. The Just Transition initiative, which supports the Sustainable Development Agenda and the goal of NZCE 2050, is another way in which PETRONAS is driving an outcome-based approach. Through the creation of new and inclusive opportunities grounded in human rights and inclusion principles, it hopes to have an impactful social roles in PETRONAS operations (PETRONAS, 2021).

As a consequence of the pandemic, low-income communities and small businesses have seen the precariousness of their means of subsistence increase. This has resulted in a simultaneous deterioration in their health and their financial situation. As a result of this, Yayasan PETRONAS announced Program MEKAR in August 2020. This programme has the objective of enhancing the socio-economic capacity of 3,400 families with low incomes (also known as B40 families) over the course of the next two (2) years by transforming ideas into sustainable businesses. This will result in a reduction in income disparities and a contribution to a more equitable society. It is anticipated that the MEKAR programme, which will provide these families from eight (8) different states in Malaysia with specialised mentoring and training, will be beneficial to these families (PETRONAS, 2021).

Since PETRONAS began implementing these initiatives in 1975, education has been a critical component of the Group's Human Capital Investment Programs. Yayasan PETRONAS collaborated with the Ministry of Education (MOE) in 2019 through PETRONAS Education initiatives to reach out to deserving students in particular. PETRONAS contributes to the closing of the socioeconomic gap by improving opportunities for both teachers and students in underserved areas, which benefits everyone (PETRONAS, 2021).

Table 4.5 contains a detailed breakdown of the interview responses to this research question. A summary of the findings is presented in Figure 4.4 below to demonstrate the digitalization benefits towards PETRONAS business performance in the context of this particular research question.

Theme	Sub-themes	Codes	Participants (Leaders)	Findings
Improvise Business Model	Health and Safety - License to Operate - Reputation	[ImproviseBmodel][Health&Safety] - [ImproviseBmodel][Health&Safety][LicenseToOperate] - [ImproviseBmodel][Health&Safety][Reputation]	P1 P2 P3 P4 P5 P6 P7 P8	P1 - Health & Safety (License to Operate) P2 - Health & Safety (License to Operate) P3 - Health & Safety (License to Operate) P4 - Health & Safety (License to Operate) P5 - Health & Safety (License to Operate) - Health & Safety (Reputation) P6 - Health & Safety (Reputation) P7 - Health & Safety (License to Operate) P8 - Health & Safety (Reputation)
	Environment - Sustainability	[ImproviseBmodel][Environment] - [ImproviseBmodel][Environment][Sustainability]	P1 P2 P3 P4 P5 P6 P7 P8	P1 - Environment (Sustainability) P2 - Environment (Sustainability) P3 - Environment (Sustainability) P4 - Environment (Sustainability) P5 - Environment (Sustainability) P6 - Environment P7 - Environment P8 - Environment (Sustainability)
	Socio-economy - Business Ethics - Sustainability	[ImproviseBmodel][SocioEconomy] - [ImproviseBmodel][SocioEconomy][BusinessEthics] - [ImproviseBmodel][SocioEconomy][Sustainability]	P1 P2 P3 P4 P5	P1 - Socio-economy (Sustainability) - Socio-economy (Business Ethics) P2 - Socio-economy P3 - Socio-economy (Business Ethics) P4 - Socio-economy (Sustainability) P5 - Socio-economy (Sustainability)

Table 4.2: Summary of Research Question Three (3)

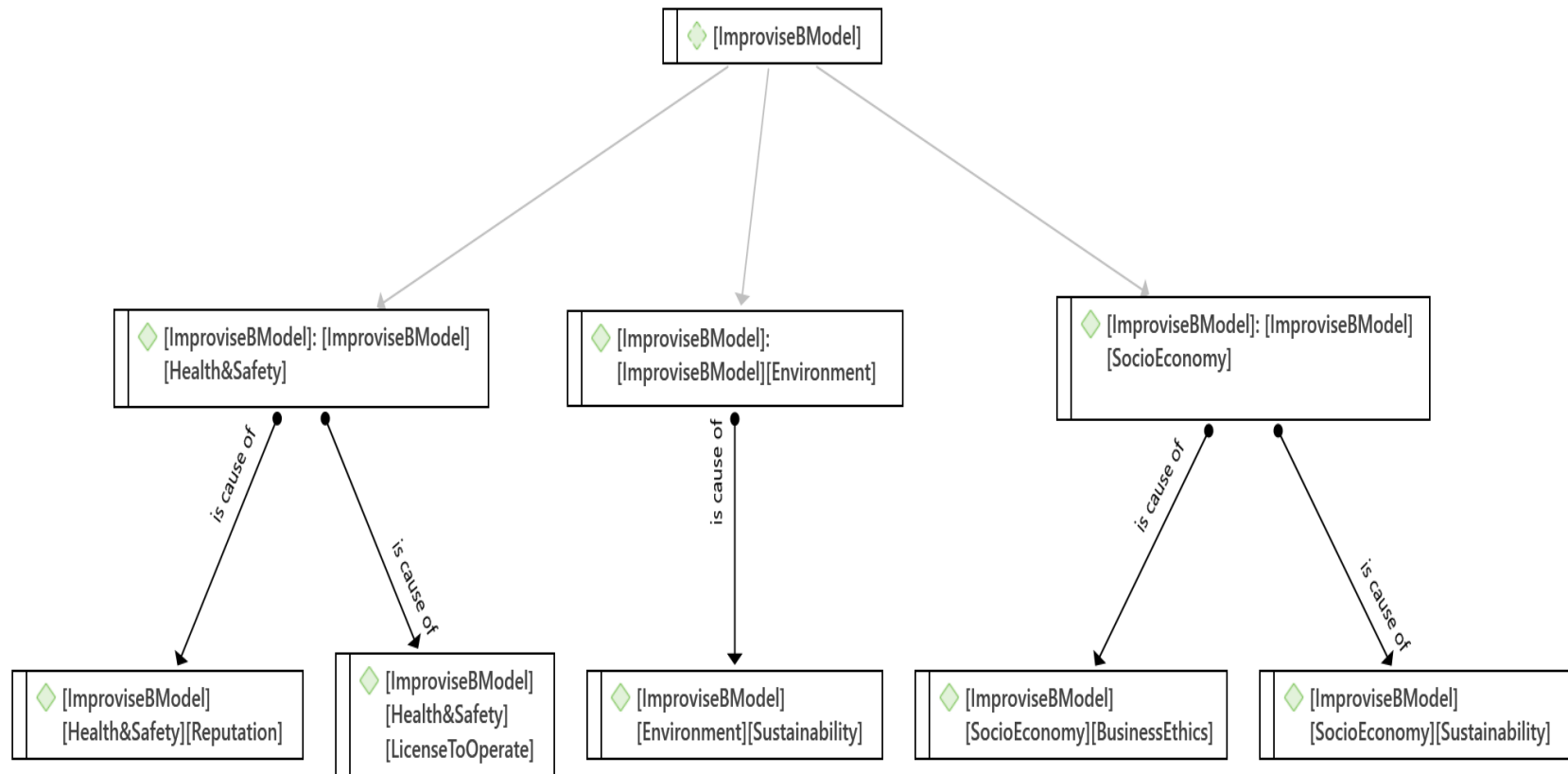


Figure 4.4: Thematic Map of the Improvise Business Model Canvas Proposal for PETRONAS

4.4 SUMMARY

In a nutshell, this study discovered that with the infusion of digitalization into PETRONAS business model, it will transform the organization becoming more efficient in its business processes creating value added product and services, optimize its supply chain resources and processes enabling it to be competitive in its business ventures. This in return has played a role in PETRONAS business performance in ensuring sustainability and future growth of the organization. Health and Safety, Environment and Socio-Economy were considered to be the additional fundamental elements to be considered in improvising the business model canvas building blocks. As a result of this study, a conceptual model to serve as a single unified business model for PETRONAS and its group of companies was established, which is shown in Figure 5.1. The findings, limitations, and recommendations of this study will be discussed in greater detail in the following chapter.

Research Objective(s)	Findings
To understand the importance of the business model on PETRONAS business performance.	Business model plays an important role to the business performance of an organization
To explore and investigate the roles of the digitalization infused at business model on PETRONAS business performance.	<ul style="list-style-type: none"> a) Meet Target (Efficiency & Resources) b) Increase Revenue (Diversity & Value Proposition) c) Minimize Impairments (Improve Revenue)
To formulate a single unified business model infused with digitalization in improving PETRONAS business performance.	<ul style="list-style-type: none"> a) HSE (License to Operate & Reputation) b) Environment (Sustainability) c) Socio-Economy (Business Ethics & Sustainability)

Table 4.6: Summary of Research Objective and Findings

CHAPTER FIVE

DISCUSSION, RECOMMENDATIONS, AND CONCLUSION

5.1 Introduction

This study's final chapter includes a summary, discussion of the findings, and recommendations. It also discusses the study's implications, limitations, proposed simplified regulatory framework, and future research directions. The chapter is organised in the following order. First, a summary of the research is provided. Second, the findings are reported, followed by a discussion of the study's findings, implications, and limitations. Finally, future research directions are suggested.

5.2 Discussion of Findings and Results

The discussion of this research's findings and results have added to the body of knowledge in this field of study. The following discussion is organised around the study's research questions.

5.2.1 Discussion for Research Objective One

Scholars are realizing more and more that businesses don't run their business models in a world without competition (Hamel, 2000), and that businesses can compete through their business models. Some business model literature focuses on the things the company does with its network of partners, while other business model literature focuses on the things the company does with its own employees (Casadesus-Masanell & Ricart, 2010). Because of this, the business model could give the company an edge over its competitors (Markides & Charitou, 2004). Morris, et al. (2005) said that introducing new and efficient models can lead to more value creation, and that these models could one day replace the traditional way of doing things, making it harder for the next generation of business people to beat (Magretta, 2002).

Executives may examine and convey their strategic decisions more effectively using business models. There is a small possibility that businesses with poorly designed business models may flourish in the marketplace, but the likelihood is minimal since the logic behind the production and capture of value will not be well-thought-out. As the proverb says, blind squirrels do sometimes locate acorns, but until they do, a great deal of effort is spent in vain. Similar to businesses that deplete their working capital, the squirrels may run out of energy before achieving their objective (Scott, et al., 2005).

Every choice, every initiative, and every metric gives useful feedback when managers intentionally operate from a model of how the whole company system will function. Profits are critical for determining the efficacy of PETRONAS business strategy, but they are also valuable in and of themselves. If the organization don't get the outcomes they were hoping for, they need to switch gears. In this way, business modelling may be seen as the management analogue to the scientific approach, in which a hypothesis is developed, put into practice, and then revised if required. Whether a company is just starting out or is already well-established, a solid business model is crucial to its continued success (Magretta, 2002). As Magretta (2002) noted in her journal, understanding people's motives is the first step in building a successful company.

5.2.2 Discussion for Research Objective Two

The use of **technology** as a differentiator ensured that projects vital to PETRONAS' future growth, such as the Facilities of the Future (FOF) programme, Remote Autonomous Operations (RAO), and the commercialization of Hydrogen, maintained momentum. PETRONAS has seen improvements in **Process Cycle Efficiency (PCE)** of up to sixty seven (67) percent as a result of implementing the Integrated Pipeline Integrating Management System (I-PIMS), resulting in **cost savings** of up to Ringgit Malaysia (RM) 50 million (PETRONAS, 2022).

Asymmetric information and complexity, according to Williamson (1983), determine how transactions are organized into markets or hierarchies in a way that minimizes transaction costs while increasing performance (Poppo & Zenger, 1998). According to Poppo and Zenger (1998), the transaction cost perspective has explicit modelling implications for the performance of an organization. As well as this, Meyer, et al. (1992) have provided additional insight into the roles that both transaction costs (in the form of coordination) and motivation costs have on organization performance. According to the findings of these studies, the design of transactions has a substantial influence on the organization's success. Efficiency-centered design refers to the actions that businesses can take to improve the efficiency of their transactions through the design of their business models.

Efficiency-centred business models are characterized by the reduction of transaction costs as their central feature. As Williamson (1975) points out, this reduction can result from the removal of uncertainty, complexity, or information asymmetry, but it can also result from the reduction of coordination costs and transaction risk (Clemons & Row, 1992), (Milgram & Roberts, 1992).

Amazon's order-tracking feature, for example, aims to improve transaction transparency and is therefore considered an efficiency-focused design element. It's not uncommon for efficiency-focused design elements to focus on things like increasing transaction reliability and simplicity, reducing information asymmetry among participants, speeding up the transaction process, making it easier to aggregate demand, lowering inventories, facilitating scaling, or lowering the direct and indirect costs of transactions. Resources saved from data entry costs were redistributed to other projects so that the company could provide additional value-added services to its customers (Brynjolfsson & Hitt, 2000).

Consequently, the effects of digitalization on a company's capabilities follow a logic of extraction: using the information to optimize the company's existing business model. For a business, it is also critical to identify and specify the appropriate customers. The company's target market, in other words, is the customers, or groups of people, who have distinct needs and preferences that distinguish them from others in the market (Kotler & Armstrong, 2010). To develop successful business models, companies must first understand their customers' requirements.

5.2.3 Discussion for Research Objective Three

This study discovered that health and safety, environment and socio-economy are equally essential elements in PETRONAS business operations. These elements are being mentioned and agreed by the majority of the participants to be added to the PETRONAS business model, directly enhancing the business model canvas as its additional building blocks.

Health, Safety and Environment (HSE) as well as Socioeconomy are being deemed as important element for PETRONAS specifically and in the Oil and Gas industry generally. These elements are being regarded as “license to operate” and without it, the organization will not be able to do its business ventures and dealings within the industry.

HSE track record of an Oil and Gas companies could also plays an important role to the organization’s reputation where they could be chosen to operate or denied from operating the fields by the Oil and Gas regulators, ministries or agencies of the countries they wish or do business with. This in return will plays a role on the organization’s business performance. These elements will also be the key factors in determining the sustainability of the organization and its future growth by upholding its business ethics throughout the operations.

As the oil and gas sector is inherently dangerous, several well-publicized investigations into significant disasters, such as Piper Alpha (UK), Alexander Keilland (Norway), and Longford (Australia), have focused the attention of operating and contracting companies' management on safety issues. The various health and safety regulatory bodies in the US, Canada, UK, Norway, and other European countries, for example, all place a high value on health, safety, and environmental management, and they all support and monitor this effort (e.g., US Occupational Safety and Health Administration, UK Health and Safety Executive).

Energy companies are increasingly expanding into less developed regions of the world, where health and safety issues have traditionally received less attention, and employees are primarily concerned with finding work to meet basic needs like food, water, and housing. This is in line with Maslow's (1943) 'Hierarchy of Needs,' which states that employees must first attend to their physiological needs before addressing issues of safety and security (which are next in the hierarchy) (Maslow, 1943).

PETRONAS implemented procedures and guidelines that were in line with both international and industry best practices and standards in order to make it possible for decommissioning and abandonment activities to be carried out in a transparent manner. One of PETRONAS' top priorities is ensuring the health and safety of its employees and contractors as part of its efforts to effectively manage People, Planet, and Profits. PETRONAS enforces strict Health, Safety, Security, and Environmental (HSSE) policies throughout its extremely complex organization to ensure that its employees are healthy and working in the safest conditions possible. PETRONAS's HSE policy is proof of the company's commitment to improving its reputation as a reliable, responsible, and compassionate employer.

The PETRONAS Group continues to be committed to its mission of enhancing lives for a better future by delivering a positive impact that is sustainable and improving the overall quality of life as well as the socioeconomic well-being of the communities in which they conduct business. Yayasan PETRONAS, the philanthropic arm of PETRONAS, is responsible for extending the company's contributions to society (or PETRONAS Foundation). The initiatives of the group-wide corporate social responsibility (CSR) that have been going on since 1974 are supplemented by the Foundation, which is governed by a Board of Trustees and reports to that board. This makes it possible for PETRONAS to participate in and play a role on socioeconomic opportunities through the building of capacity and the stewardship of the environment (PETRONAS, 2021).

Businesses and industries alike are undergoing extensive transformations, resulting in the digitalization of business operations. This digital transformation poses significant challenges for businesses (Li, et al., 2018) when connected products, services, and operations transform businesses, necessitating the adoption of new strategies (Kallinikos, et al., 2013); (Yoo, 2012). Digitalization is compelling businesses to develop entirely new strategies (El Sawy, et al., 2016), and is mandating the digitalization of all company activities, from management to operations (Chuang & Lin, 2015); (Sia, et al., 2016).

This has led to an influx of research focusing on the components of a successful digital business strategy (Bharadwaj, et al., 2013); (Matt, et al., 2015); (Woodard, et al., 2012). Digital transformation is defined as "the use of new digital technologies (social media, mobile, analytics, or embedded devices) to enable significant business improvements (such as improving the customer experience, streamlining operations, or creating new business models)". It is increasingly regarded as crucial to the organization's competitiveness and as a key enabler for its operations and evolution (Fitzgerald, et al., 2013). It necessitates that businesses modify their business models and processes, rethink their strategies, and collaborate with the business ecosystem in order to provide more innovative products and services.

Traditional business models must be disrupted and digital technologies must be adopted as part of PETRONAS' business strategy. As a result, new methodologies and technologies enable PETRONAS to focus on unrealized opportunities and hone its competitive edge in order to generate new value for the Group. In order to keep employees motivated, it is important to clearly communicate the company's strategy, direction, and future plans. Employee morale and productivity remain high despite the unprecedented crisis, thanks in part to constant communication.

As a general rule, the most effective technologies have tended to be more expensive, but their operating costs are lower because their consumption is lower. The degree to which a household is ready or able to forego some of its present consumption in exchange for future gains is a crucial factor in determining whether or not the technology will be adopted (Simpson, 2020).

The preservation of the environment, on the other hand, is a significant challenge for the energy industry. As the world's population grows, so does its energy consumption, which results in significant environmental pollution. The challenge is to strike a balance between energy requirements and environmental protection. If consciousness appears to be a reality at this point, it will take a long time for the actions to manifest. Particularly given that responsibility is shared, as the rational use of energy affects a wide range of governments, producers, and consumers (Rogner & Popescu, 2000). According to a report by Sambo (2008), the energy demand projection, which was based on four different scenarios, showed that the total energy demand of the country would increase steadily and geometrically by the year 2030. According to the results of all of these scenarios, it has been determined that high economic growth is generally associated with an increase in energy demand or consumption. The use of renewable energy (RE) sources is one of the more feasible options available to us today.

PETRONAS remain guided by PETRONAS' Statement of Purpose: An innovative energy and solutions partner enriching lives for a sustainable future. The objective is to make PETRONAS an innovative and nimble organization. Long-term, PETRONAS aim to push previously unexplored boundaries and will continue to foster a culture of innovation. The four PETRONAS Sustainability Lenses guide PETRONAS' efforts to achieve "best-in-class" status in the midst of an accelerated energy transition: Continued Value Creation, Safeguard the Environment, Positive Social Influence, and Responsible Governance.

Rapid replenishment, for instance, necessitates flexible suppliers, adaptable organizations, and a demand-driven supply chain. In a similar vein, postponed fulfilment allows for the adoption of lean production principles up to the point of decoupling, and then transitions into agile capabilities (Harrison, et al., 1999). Nor should the cultural aspect be overlooked, as it may be the greatest obstacle to effective change.

For instance, during the transition to an agile structure in a pharmaceuticals company, the anticipated IT issues did not materialized. Instead, the real problems came from the fact that it was hard to get people to understand the new system and create a customer-centered culture (Belk & Steels, 1998). This is simply supporting evidence for Andraski (1994)'s previous statement about the ineffectiveness of the majority of actual supply chains. This is because "80% of problems are caused by people, not technology," he claims.

As previously stated, this study revealed that business model does play a role to the business performance of PETRONAS and infusion of digitalization to the business model have provided positive outcome for the performance of PETRONAS. This study also discovered that the business model canvas to be enhanced with additional building blocks incorporating the Health and Safety, Environment and Socio-Economy in ensuring it to be fitting the business purpose of PETRONAS and its group of companies. Depicted in Figure 5.1, this study developed a single unified business model for PETRONAS.

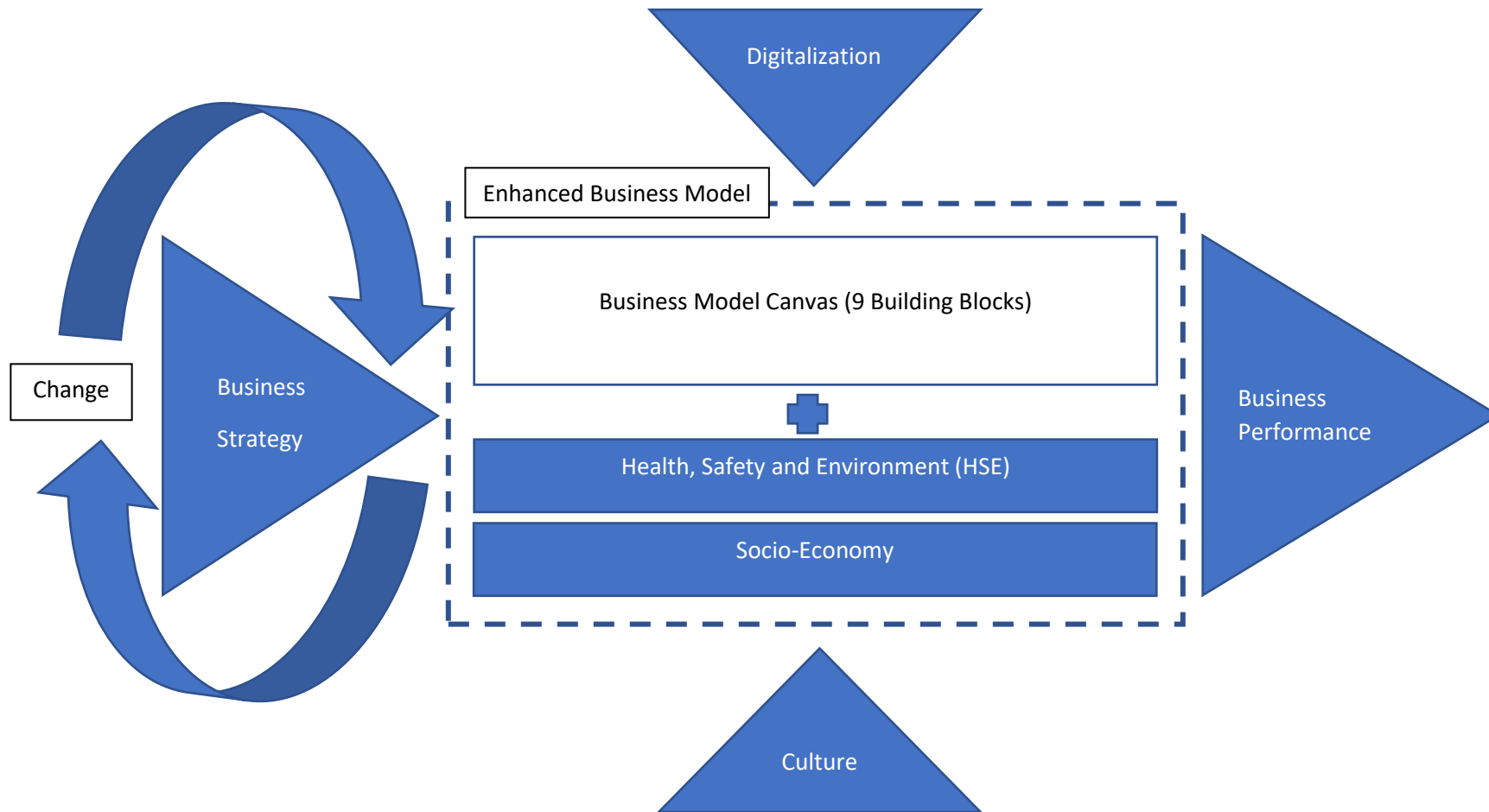


Figure 5.1: Conceptual Model of a Single Unified Business Model For PETRONAS Group of Companies

This study's conceptual framework was derived from prior empirical studies and identified theoretical gaps in the existing literature. The framework supported and explained the Oil and Gas industry's business model perspectives on the digitalization roles on PETRONAS business performance. Thus, based on the findings and discussions, this study made a number of theoretical contributions to the field of strategic management. This study builds a framework that contributes to the body of knowledge and necessitates a substantial leap. One of the most important theoretical ramifications of the present study is that it focuses primarily on a single organization where the organization can acknowledge digitalization in the IR4.0 era. This study bridges the theoretical gap by analyzing the important elements for Oil and Gas companies's business model. This is an essential addition to the existing body of knowledge.

5.3 Contributions of the Study

Referencing on the Business Model Canvas by Osterwalder and Pigneur (2010), this study investigates the relationship between business model building blocks infused by digitalization towards organization business performance. The main theoretical contribution of this study to the existing literature is provided by enhancing the business model canvas relevant to the Oil and Gas industry.

Given that the existing literature does not adequately analyze the effects of digitalization on oil and gas companies, it considers that there are gaps on the business model infused by digitalization towards business performance which warrants to be further explored. This knowledge contribution will lead to other oil and gas companies to embark on the path of successful digital transformation and innovation journey. Therefore, by embarking in this study will promote further research and contribute to different industries, not only to the oil and gas industry perspectives.

5.3.1 Theoretical Contributions

This study found that digitalization boosted company model innovation and performance. The main theoretical contribution of this work is improved business model canvas building blocks for the oil and gas sector. Digitalization and business model innovation help PETRONAS succeed. According to study, business model theory is similar to strategy, linking the two. In modest and viable situations, the business and strategic plan are intertwined, making it difficult to isolate both concepts. This model depicts the organization's strategy that both concepts vary due to imperative possibilities.

The newly proposed concept of digitainability, which combines digitalization and sustainability, defines sustainability management in business as an optimal balance between economic, environmental, and social objectives across all time scales. It focuses on products and services, the organization, and the supply chain. Sustainability may improve with product, service, process, and business model innovations. Digital business transformation involves using digital technology to change a company's model and generate new income and value.

The PETRONAS business models and digital transformation are clarified in this study, leading to a single unified business model. The study of PETRONAS sheds light on and provides a more profound knowledge of the business models and digital transformation for the Oil and Gas industry players.

5.3.2 Practical Contributions

Regardless of readiness, companies must transform their operations, innovate, and serve consumers to grow faster. Digital transformation can disrupt business if the plan fails to address change or if companies that have realized the value of transformation are unparalleled and forthcoming. Digitalization may increase company profits, but it harms the environment and divides society.

As the world becomes more digital, firms may need to focus on digital efficiency to reduce the power needed to run computers, smartphones, tablets, smart home gadgets, the Internet of Things, and AI programmes. Due to its increased options, digitalization may enhance sustainability. Not just digital change, it requires anticipating rivals. This encourages the company to improve its business processes. With training and a desire to change, the company will see its problem differently.

A value chain—a company's strategy—and numerous value configurations, such as digitalization and culture, make up the business model. Thus, a firm model allows strategic decisions to boost profits. Incorporating the IR 4.0 era's shifts in digitability, environment, health, safety, and culture into the company's business plan may boost performance and ensure its long-term viability.

Given that the existing literature does not adequately analyze the effects of digitalization on oil and gas companies, it considers that there are gaps on the business model infuse by digitalization towards business performance which warrants to be further explored. This knowledge contribution will lead to other oil and gas companies to embark on the path of successful digital transformation and innovation journey. Therefore, by embarking in this study will promote further research and contribute to different industries, not only to the oil and gas industry perspectives.

5.4 Limitation of the Study

The findings and implications of this study, on the other hand, should be interpreted with a few caveats in mind. There are several limitations to the current study, which may have change on how the results are interpreted in the future. PETRONAS and its group of companies representing the business streams within PETRONAS was examined, where the findings could not be applied to all other Oil and Gas companies in terms of the business model and digitalization, as they could not be generalized.

It was decided to limit the scope of this study to qualitative research, which allowed for a rich, contextual description and understanding of the experiences of the participants. A quantitative study, on the other hand, may yield results that are more generalizable. In this study, the sample was restricted to the top management of the PETRONAS and its group of companies. Only eight (8) of the leaders participated in the interview session whom are based in Malaysia. Perhaps, if other leaders within PETRONAS whom are in-charged of other international operations within PETRONAS and its group of companied are involved, much richer information will be obtained, which will be more appropriate for generalisations and inferences to be drawn from the information.

The participants to this study were restricted to the top management of PETRONAS and its group of companies whom are based in Malaysia. Consequently, the perceptions of business model and digitalization in the organization and Oil and Gas industry are limited to the context of the leaders of Malaysia only, and not the general public. The PETRONAS and its group of companies was the sole focus of this study in terms of targeted participants and information.

5.5 Future Research

The current study has opened the door to new avenues of investigation for future academic investigators. A comprehensive list of Oil and Gas operators in Malaysia should be included in future studies. The generalizability of findings will be improved as a result of having data from all Oil and Gas operators within the industry. In order to improve the results of future research, it is strongly recommended that mixed method study be conducted. Structured questions and tests, as well as correlation and regression analysis, could be used to gather the quantitative information. Future researchers may improve their knowledge of the business models and digitalization by conducting research into the Asia Oil and Gas industry. This would assist in determining and enhancing the elements of business models infuse by digitalization to formulate a single unified business model. Potential future researchers could apply these research variables to other industries, such as the energy industry, the mining industry, and the engineering services sector. It is suggested by the researcher that participant observations could be used in the future research project.

5.6 Conclusion

As a conclusion, the findings of this study has provided evidence that the fundamental theoretical framework are correct. All three of the research questions that were posed throughout the course of this study was addressed by the responses given by the participants.

The business model affects an organization's success, including PETRONAS. The continuous efforts and improvement within its operations by focusing on the fundamental elements of the business model to achieve efficiency via its resources, activities, and partners by revisiting its cost structure to minimize impairment, especially on assets across the group, which translated to improved revenue. Through diversification of goods, services, channels, and customer segments, PETRONAS increased revenue and strengthened customer relationships.

Digitalization in sales and delivery was widely recognised by PETRONAS. It provides information on PETRONAS's consumer groups and ways to tailor material to recognized groups to affect customer behaviour. By making informed decisions and creating value-added products and services, PETRONAS can improve its business success by incorporating digitalization into its business processes, resources, and technology.

Business model innovation creates a policy-driven, science-based oil and gas services ecology. Innovation optimizes and prioritizes resources to meet PETRONAS' goals. To grow sustainably, PETRONAS must consider the health, safety and environmental elements. PETRONAS provides its users with the tools to utilize the power of data to gain insights on HSE performance, trends, emerging risks, and other crucial factors to enable proactive interventions. PETRONAS promoted a set of culture behavior where the employees and its contractors to values human life and urge each other to be safe and vigilant. PETRONAS uses an outcome-based strategy to manage their actions in the environment, health, safety, security, socio-economics, and culture. It aims to impact PETRONAS' social roles by creating new and inclusive opportunities based on human rights and inclusion.

In addition, the findings of this study have revealed several important theoretical and practical consequences for PETRONAS and its group of companies, as well as for the other Oil and Gas players. In addition to that, various future research opportunities were suggested, and the limits of the study were discussed.

References

- Accenture Consulting, 2016. *Achieving Digital Performance: Accenture Digital Performance Index*, s.l.: s.n.
- Accenture Resources, 2017. *CIO Survey 2016*, s.l.: s.n.
- Accenture; Microsoft, 2016. *Oil and Gas Digital and Technology Trends Survey*, Chicago: Accenture.
- Accenture; World Economic Forum, 2017. *Digitalization: A New Era for Oil and Gas*, s.l.: World Economic Forum.
- Afuah, A. & Tucci, C. L., 2001. *Internet business models and strategies: Text and cases*. New York: McGraw-Hill.
- Agarwal, R., Gao, G. G., DesRoches, C. & Jha, A. K., 2010. The digital transformation of healthcare: Current status and the road ahead. *Information Systems Research*, 21(4), p. 796–809.
- Aksin-Sivrikaya, S. & Bhattacharya, C. B., 2017. Where Digitalization Meets Sustainability: Opportunities and Challenges.. In: T. O. & C. L. (Eds.), ed. *Sustainability in a Digital World*. Berlin: Springer, pp. 37-49.
- Alberti, F. G. & Varon Garrido, M. A., 2017. Can profit and sustainability goals co-exist? New business models for hybrid firms. *Journal of Business Strategy*, 38(1), p. 3–13..
- Aldrich, H. E., 1999. *Organizations Evolving*. Thousand Oaks, CA: Sage.
- Alvesson, M., 2002. *Understanding Organizational Culture*. London: Sage.
- Amburgey, T. & Dacin, T., 1994. As the left foot follows the right? The dynamics of strategic and structural change. *Academy of Management Journal*, Volume 37, pp. 1427-1452.
- Amit, R. & Zott, C., 2001. Value creation in e-business. *Strategic Management Journal*, Volume 22, pp. 493-520.
- Amit, R. & Zott, C., 2012. Top 10 Lessons On Strategy: Creating Value Through Business Model Innovation. *MIT SLOAN Management Review*, Summer 2015(Reprint 53310), pp. 36-44.
- Amponsah-Tawiah, K., 2013. Occupational health and safety and sustainable development in Ghana. *International Journal of Business Administration*, 4(2), p. 74–78.
- Andraski, J., 1994. Foundations for successful continuous replenishment programs.. *The International Journal of Logistics Management*.
- Applegate, L. M., 2000. E-business models: Making sense of the internet business landscape. In: G. D. & G. DeSanctis, ed. *Information technology and the future enterprise: New models for managers*. Englewood Cliffs, NJ: Prentice-Hall, pp. 49-101.
- Ardito, L., Raby, S., Albino, V. & Bertoldi, B., 2021. The duality of digital and environmental orientations in the context of SMEs: Implications for innovation performance.. *Journal of Business Research*, Volume 123, pp. 44-56.

- Argenti, P. A., Howell, R. A. & Beck, K. A., 2005. The Strategic Communication Imperative. *Top 10 Lesson on Strategy*, Summer 2015(Special Collection), pp. 61-67.
- Athanasopoulou, P., 2009. Relationship quality: a critical literature review and research agenda. *European Journal of Marketing*, 43(5-6), pp. 583-610.
- Babbie, E., 1998. *The practice of social research*. 6th ed. Belmont, CA: Wadsworth.
- Baden-Fuller, C. & Morgan, M. S., 2010. Business Models as Models. *Long Range Planning*, 43(2-3), pp. 156-171.
- Bai, C., Quayson, M. & Sarkis, J., 2021. COVID-19 Pandemic Digitization Lessons for Sustainable Development of Micro-and Small-Enterprises. *Sustainable Production and Consumption*, Volume 27, pp. 1989-2001.
- Baird, M., 2004. Comparing cases: studies of commitment system in Australia and the United States. *International of Human Resource Management*, 15(3), p. 433 – 440.
- Balsmeier, B. & Woerter, M., 2019. Is this time different? How digitalization influences job creation and destruction. *Research Policy*, 48(8).
- Banerjea, S., Kahn, R., Petit, C. & White, J., 2006. *Dare to be Different: Why Banking Innovation Matters Now - Executive Brief*, New York: IBM Institute for Business Value.
- Barber, A. et al., 2007. Optimizing production from reservoir to process plant. *Oilfield Review*, Volume Winter 2007/2008, pp. 12-19.
- Beauchamp, G., 2008. What is the magnitude of the group-size effect on vigilance?. *Behavioral Ecology*, 19(6), p. 1361–1368.
- Belk, K. & Steels, W., 1998. Case study: APS Berk-from arbitration to agility.. *Logistics Information Management*..
- Benetello, R., 2021. *MySay: Digitainability - combining digitalisation and sustainability*. *The Edge Malaysia*. [Online]. Available at: <https://www.theedgemarkets.com/article/mysay-digitainability-%E2%80%94-combining-digitalisation-and-sustainability>. [Accessed December 2022].
- Berg, B. L., 1989. *Qualitative research methods for the social sciences*. New York: Allyn and Bacon.
- Berg, B. L., 2001. *Qualitative research methods for the social sciences*. 4th ed. Long Beach: Allyn & Bacon.
- Berman, S., 2012. Digital transformation: opportunities to create new business models. *Strategy & Leadership*, 40(2), pp. 16-24.
- Bharadwaj, A., Sawy, O. A. E., Pavlou, P. A. & Venkatraman, N., 2013. Digital Business Strategy: Toward a Next Generation of Insights. *MIS Quarterly*, 37(2), pp. 471-482.
- Bhide, A., 2000. *The Origin and Evolution of New Businesses*. New York: Oxford University Press.

- BHPbilliton, 2005. *"Health, safety, environment and community management standards: BHP Billiton HSEC management standards"*, s.l.: BHPbilliton.
- Bingham, C. B., Eisenhardt, K. M. & Furr, N. R., 2011. Which Strategy When?. *Top 10 Lesson on Strategy*, Summer 2015(Special Collection), pp. 20-27.
- Boldosova, V. & Luoto, S., 2019. Storytelling, business analytics and big data interpretation: Literature review and theoretical propositions. *Management Research Review*, 43(2), p. 204–222.
- Bonnet, D., Ferraris, P., Westerman, G. & McAfee, A., 2012. Talking 'bout a Revolution. *Digital Transformation Review*, 2(1), pp. 17-33.
- Bosch, 2020. *Carbon neutrality by 2020*. [Online]
Available at: <https://www.bosch.com/company/sustainability/environment/>
[Accessed December 2022].
- Bourne, M. & Neely, A., 2003. Implementing performance measurement systems. *Int. J. Business Performance Management*.
- Bowling, A., 1997. *Research Methods in Health*. Buckingham: Open University Press.
- Bradley, K., 2007. Defining digital sustainability. *Library Trends*, 56(1), p. 148–163.
- Braun, V. & Clarke, V., 2021. One size fits all? What counts as quality practice in (reflexive) thematic analysis?. *Qualitative Research in Psychology*, 18(3), pp. 328-352.
- Bravo C. E.; L. Saputelli; F. Rivas; A. G. Perez, 2013. *State of the Art of Artificial Intelligence and Predictive Analytics in the E&P Industry: A Technology Survey*. [Online] Available at: <http://dx.doi.org/10.2118/150314-PA> [Accessed 22 July 2019].
- Brennen, J. S. & Kreiss, D., 2016. *Wiley Online Library*. [Online]
Available at: <https://onlinelibrary.wiley.com/doi/full/10.1002/9781118766804.wbiect111#citedby-section> [Accessed 18 June 2020].
- Brenner, M. E., 2006. Interviewing in educational research. In: *Handbook of complementary methods in education research*. Santa Barbara: University of California, pp. 357-370.
- Bresnahan, T., Brynjolfsson, E. & Hitt, L., 2002. Information technology, workplace organization, and the demand for skilled labor: Finn-level evidence. *Quarterly Journal of Economy*, Volume 117, pp. 339-376.
- British Petroleum (BP), 2015. *BP Strategic Report 2015*, London: British Petroleum (BP).
- Brynjolfsson, E. & Hitt, L., 2000. Beyond Computing: Information Technology, Organizational Transformation and Business Performance. *Journal of Economic Perspectives*, 14(4), pp. 23-28.
- Brynjolfsson, E. & Hitt, L., 2004. Intangible Assets and the Economic Impact of Computers. In: W. Dutton, B. Kahin, R. O'Callaghan & A. Wyckoff, eds. *Transforming Enterprise*. Cambridge, Massachusetts: MIT Press, pp. 27-48.
- Brynjolfsson, E. & McAfee, A., 2014. *The second machine age: Work, progress, and prosperity in a time of brilliant technologies*. New York: WW Norton & Company.

- Buffet, M. A., Gervais, R. L., Liddle, M. & Eeckelaert, L., 2013. "Well-being at work: creating a positive work environment," Luxembourg: European Agency for Safety and Health at Work .
- BusinessDictionary.com, 2020. *BusinessDictionary.com*. [Online] Available at: <http://www.businessdictionary.com/definition/digitalization.html> [Accessed 19 June 2020].
- Bustanza, O., Gomes, E., Vendrell-Herrero, F. & Baines, T., 2019. Product–service innovation and performance: the role of collaborative partnerships and R&D intensity. *R&D Management*, 49(1), pp. 33-45.
- Campbell, D. T., 1975. Degrees of freedom and the case study. *Comparative Political Studies*, 8(July), pp. 178-193.
- Cao, G., Duan, Y. & El Banna, A., 2019. A dynamic capability view of marketing analytics: Evidence from UK firms.. *Industrial Marketing Management*, Volume 76, pp. 72-83.
- Carlsson-Szlezak, P., Reeves, M. & Swartz, P., 2020. *Understanding the economic shock of coronavirus*. [Online] Available at: <https://hbr.org/2020/03/understanding-the-economic-shock-of-coronavirus> [Accessed December 2022].
- Carr, A. & Smeltzer, L., 1997. An empirically based operational definition of strategic purchasing. *European Journal of Purchasing & Supply Management*, 3(4), pp. 199-207.
- Carter, C. & Ellram, L., 2003. Thirty-five years of the Journal of Supply Chain Management: where have we been and where are we going?". *Journal of Supply Chain Management*, 39(2), pp. 27-39.
- Casadesus-Masanell, R. & Ricart, J. E., 2009. From Strategy to Business Models and to Tactics. *Harvard Business School*.
- Casadesus-Masanell, R. & Ricart, J. E., 2010. From strategy to business models and to tactics. *Long Range Planning*, Volume 43, pp. 195-215.
- Caves, R. E., 1984. Economic Analysis and the Quest for Competitive Advantage. *American Economic Review*, Volume 13, pp. 127-132.
- Chandler, A., 1962. *Strategy and Structure: Chapters in the History of American Industrial Enterprise*, Cambridge: MIT Press.
- Chaturvedi, P., 2007. *Occupational Safety, Health and Environment and Sustainable Economic Development*. s.l.:Concept Publishing Company.
- Chen, I. & Paulraj, A., 2004. Towards a theory of supply chain management: the constructs and measurements. *Journal of Operations Management*, 22(2), pp. 119-150.
- Chenoweth, D., 1987. *Planning health promotion at the worksite*. Indianapolis: Benchmark Press, Inc..
- Chesbrough, H., 2006. *Open Business Models*. Boston: Harvard Business Review Press.
- Chesbrough, H., 2010. Business Model Innovation: Opportunities and Barriers.. *Long Range*, Volume 43(Issues 2–3), pp. 354-363.

Chesbrough, H. W. & Rosenbloom, R. S., 2002. The role of the business model in capturing value from innovation: Evidence from Xerox Corporation's technology spinoff companies. *Industrial and Corporate Change*, Volume 11, pp. 533-534.

Christopher, M., 1992. *Logistics & Supply Chain Management*. London: Pitman Publishing..

Chuang, H. & Lin, S., 2015. Co-creating e-service innovations: theory, practice, and impact on firm performance. *Int. Journal of Information Management*, 35(3), pp. 277-291.

Claycomb, C., Germain, R. & Droege, C., 2000. The effects of formal strategic marketing planning on the industrial firm's configuration, structure, exchange patterns, and performance. *Industrial Marketing Management*, Volume 29, pp. 219-234.

Clemons, E. K. & Row, M., 1992. Information technology and industrial cooperation: the changing economics of coordination and ownership. *Journal of Management Information*, pp. 9-28.

Cokcetin, G., 2017. Digital Sustainability in the Banking and Finance Sector. In: T. O. & C. L. (Eds.), ed. *Sustainability in a Digital World: New Opportunities Through New Technologies*. Berlin: Springer, pp. 181-187.

Corden, A. & Sainsbury, R., 2005. *The impact of verbatim quotations on research users: Qualitative exploration*, York: Social Policy Research Unit .

Coreynen, W., Matthyssens, P. & van Bockhaven, W., 2017. Boosting servitization through digitization: pathways and dynamic resource configurations for manufacturers. *Industrial Marketing Management*, Volume 60, pp. 42-53.

Cotton, P. & Hart, P., 2003. Occupational wellbeing and performance: A review of organisational health research. *Australian Psychologist* , 38(2), pp. 118-127.

Coupette, J., 2015. Digitalisierung zwischen Erwartung und Implementierung. *Organisation und Management*, Volume 1, pp. 69-75.

Cousins, P., 2005. The alignment of appropriate firm and supply strategies for competitive advantage. *International Journal of Operations & Production Management*, 25(5), pp. 403-428.

Cousins, P. D., Lawson, B. & Squire, B., 2006. An empirical taxonomy of purchasing functions. *International Journal of Operations & Production Management*, 26(7), pp. 775-794.

Cousins, P. D., Lawson, B. & Squire, B., 2006. Supply chain management: theory and practice; The emergence of an academic discipline?. *International Journal of Operations & Production Management*, 26(7), pp. 697-702.

Cresswell, J., 1994. *Research design: Qualitative, Quantitative and Mixed Approaches*. Thousand Oak, California: Sage Publications.

Creswell, J., 1998. *Qualitative Inquiry and Research Design Choosing Among Five Traditions*. Thousand Oaks, CA: Sage Publications.

Creswell, J., 2003. *Research Design: Qualitative, Quantitative, and Mixed Method Approaches*. Thousand Oaks: Sage Publications.

- Creswell, J., 2005. *Research design: Planning, conducting, and evaluating quantitative and qualitative research*. Upper Saddle River, NJ: Pearson Education.
- Creswell, J. W., 2013. *Qualitative inquiry and research design: Choosing among five approaches*. 3rd ed. Thousand Oaks: Sage.
- Creswell, M. & Miller, D. L., 2000. Determining validity in qualitative inquiry. *THEORY INTO PRACTICE*, 39(3), pp. 124-130.
- Cyert, R. M. & March, J. G., 1963. *A Behavioral Theory of the Firm*. s.l.:John Wiley & Sons, Ltd..
- Daft, R. L., 2004. *Organization Theory and Design*. 8th ed. Mason, OH.: Thomson South-Western.
- Daft, R. L. & Lewin, A., 1993. Where are the theories for the "new" organizational forms? An editorial essay. *Organ. Science*, Volume 4, pp. i - vi.
- Dale, A., 1993. Le rôle de l'analyse secondaire dans la recherche en sciences sociales. *Sociétés contemporaines*, 15(15), pp. 7-21.
- Danko, S., Eshelman, P. & Hedge, A., 1990. A Taxonomy of Health, Safety, and Welfare Implications of Interior Design Decisions. *Journal of Interior Design Education and Research*, 16(2), pp. 19-30.
- Darlington, Y. & Scott, D., 2002. Qualitative research in practice. *Journal of Orthopaedic Nursing*, 6(4), pp. 237-238 .
- Dass, A., 2017. *Are businesses tapping into the potential of digital transformation?* , Kuala Lumpur: The Star Online.
- De Wit, B. & Meyer, R., 1999. *Strategy synthesis-resolving strategy paradoxes to create competitive advantage*. London: International Thomson Business Press.
- del Río Castro, G., González-Fernández, M. C. & Uruburu-Colsa, A., 2020. Unleashing the convergence amid digitalization and sustainability towards pursuing the Sustainable Development Goals (SDGs). *Journal of Cleaner Production*, Volume 122204, p. 280.
- Dellermann, D., Fliaster, A. & Kolloch, M., 2017. Innovation risk in digital business models: the German energy sector. *Journal of Business Strategy*, 38(5), p. 35–43.
- Deloitte, 2004. *It's 2008: Do you know where your talent is? Why acquisition and retention strategies don't work?*, New York: Deloitte Development LLC.
- Demil, B. & Lecocq, X., 2010. Business Model Evolution: In Search of Dynamic Consistency. *Long Range Planning*, Volume 43(Issues 2–3), pp. 227-246.
- Denchev, N. A., van Balen, M. & Haezendonck, E., 2015. On voluntarism and the role of governments in CSR : towards a contingency approach. *Business ethics : a European review*, 24(4), pp. 378-397.
- Denicolai, S., Zucchella, A. & Magnani, G., 2021. Internationalization digitalization, and sustainability: Are SMEs ready? A survey on synergies and substituting effects among growth paths.. *Technological Forecasting and Social Change*, Volume 120650, p. 166.

- Devold H., 2013. *Oil and Gas Production Handbook: An Introduction to Oil and Gas Production*. 3rd ed. Oslo: ABB.
- Digital News Asia, 2019. *IDC Urges Malaysian Businesses to Become Digitally Determined Organizations*. Kuala Lumpur, Digital News Asia.
- Doganova, L. & Eyquem-Renault, M., 2009. What do business models do?: Innovation devices in technology entrepreneurship. *Research Policy*, 38(10), pp. 1559-1570.
- Dowling, M. & McGee, J., 1994. Business and technology strategies and new venture performance: A Study of the telecommunications equipment industry.. *Management Science*, Volume 40, pp. 1663-1677.
- Downes, L. & Nunes, P. F., 2013. Big Bang Disruption. *Harvard Business Review*, 91(3), pp. 44-56.
- Dubosson-Torbay, M., Osterwalder, A. & Pigneur, Y., 2002. E-business model design classification, and measurements. *Thunderbird International Business Review*, 44(1), pp. 5-23.
- Duijm, N. J. et al., 2008. Management of health, safety and environment in process industry. *Safety Science*, Volume 46, p. 908–920.
- Dyer, J. & Singh, H., 1998. The relational view: cooperative strategy and sources of interorganizational competitive advantage. *Academy of Management Review*, Volume 23, pp. 660-679.
- Economist Intelligence Unit, 2005. *Business 2010: Embracing the Challenge of Change*, New York: Economist Intelligence Unit.
- El Sawy, O., Kræmmergaard, P., Amsinck, H. & Vinther, A., 2016. How LEGO built the foundations and enterprise capabilities for digital leadership. *MIS Q. Exec.*, 15(2), pp. 141-166.
- Elkington, J., 2018. 25 Years Ago I Coined the Phrase “Triple Bottom Line.” Here’s Why It’s Time to Rethink It.. *Harvard Business Review Digital Articles*.
- Ellram, L. & Carr, A., 1994. Strategic purchasing: a history and review of the literature. *International Journal of Purchasing & Materials Management*, 30(2), pp. 10-22.
- e-Marketer, 2018. *eMarketer. Retail ecommerce sales worldwide, 2016–2021*. [Online] Available at: <https://www.emarketer.com/Chart/Retail-Ecommerce-Sales-Worldwide-2016-2021-trillions-change-of-total-retail-sales/215138/> [Accessed 10 March 2019].
- Ernst & Young Global Limited, 2012. Globalization Index. In: M. E. M. M. L. Joyce S. Osland, ed. *Advances in Global Leadership*. s.l.:Emerald Group Publishing.
- European-Commission, 2020. *Recovery plan for Europe. Strategy*. [Online] Available at: https://ec.europa.eu/info/strategy/recovery-plan-europe_en. [Accessed December 2022].
- Falloon, P. et al., 2013. Assessing Skill for Impacts in Seasonal to Decadal Climate Forecasts. *Geology & Geosciences*, 2(3), pp. 1-3.
- Farmer, D., 1972. The impact of supply markets on corporate planning. *Long Range Planning*, 5(1), pp. 10-15.

- Farmer, D. & van Amstel, R., 1991. *Effective Pipeline Management*. London: Gower-Publishing.
- Ferreira, C. M. & Serpa, S., 2018. Society 5.0 and social development. *Management and Organizational Studies*, Volume 5, p. 26–31.
- Fichter, K. & Clausen, J., 2016. Diffusion Dynamics of Sustainable Innovation - Insights on Diffusion Patterns Based on the Analysis of 100 Sustainable Product and Service Innovations.. *Journal of Innovation Management*, 4(2), p. 30–67.
- Fink, A. & Kosecoff, J., 1985. *How to conduct surveys*. Thousand Oaks: Sage Publications.
- Fitzgerald, M., Kruschwitz, N., Bonnet, D. & Welch, M., 2013. Embracing Digital Technology. A New Strategic Imperative.. *MIT Sloan management review*..
- Fleisch, E., Weinberger, M. & Wortmann, F., 2014. *Business models and the internet of things*. Zürich, Bosch IoT Lab White Paper, University of St. Gallen, Bosch Software Innovations GmbH.
- Fontana, A. & Frey, J., 1994. The art of science. In: N. a. Y. L. Denzin, ed. *The handbook of qualitative research*. Thousand Oaks: Sage, pp. 361-376.
- Foss, N. J., 2002. Introduction: New organizational forms - critical perspectives. *Internat Journal - The Economic. of Business*, Volume 9, pp. 1-8.
- Fowler, F. J. (., 1993. Applied social research methods series. In: R. K. Yin, ed. *Case Study Research: Design & Methods*. Thousand Oaks: Sage Publication, pp. 1-18.
- Fowler, S. J. & Hope, C., 2007. Incorporating Sustainable Business Practices into Company Strategy. *Business Strategy and the Environment*, Volume 16, pp. 26-38.
- Frank, A., Mendes, G., Ayala, N. & Ghezzi, A., 2019. Servitization and Industry 4.0 convergence in the digital transformation of product firms: a business model innovation perspective. *Technological Forecasting and Social Change*, Volume 141, pp. 341-351.
- Frey, J. H. & Oishi, S. M., 1995. *How To Conduct Interviews by Telephone and In Person. The Survey Kit*. Volume 4 ed. Thousand Oaks: SAGE Publications, Inc..
- Frick, K. et al., 2000. *Systematic occupational health and safety management*. Amsterdam: Elsevier Science Ltd.
- Friend, M. A. & Khon, J. P., 2007. *Fundamentals of Occupational safety and Health*. 4th ed. Maryland, United States of America: Scarecrow Press.
- Friese, S., 2013. *ATLAS. ti 7 user guide and reference*. Berlin: ATLAS.ti Scientific Software Development .
- Frohlich, M. & Westbrook, R., 2001. Arcs of integration: an international study of supply chain strategies. *Journal of Operations Management*, Volume 19, pp. 185-200.
- Gaiardelli, P. et al., 2014. A classification model for product-service offerings. *Journal of Cleaner Production*, Volume 66, pp. 507-519.
- Gall, M., Gall, J., Borg, W. & Mendel, P., 2007. *A guide for preparing a thesis or dissertation proposal in education*. 8th ed. Boston: Pearson Education.

Gambardella, A. & McGahan, A. M., 2010. Business-Model Innovation: General Purpose Technologies and their Implications for Industry Structure. *Long Range Planning*, Volume 43(Issues 2–3), pp. 262-271.

Gandhi, S., Thota, B., Kuchembuck, R. & Swartz, J., 2018. Demystifying data monetization. *MIT Sloan Management Review*, pp. 1-9.

Gartner Inc., 2020. *gartner.com*. [Online] Available at: <https://www.gartner.com/en/information-technology/glossary/digitalization> [Accessed 10 June 2020].

Gartner, 2019. *Digitalization. Information technology glossary*. [Online] Available at: <https://www.gartner.com/en/information-technology/glossary/digitalization> [Accessed 11 December 2022].

Gartner, 2021. *Sustainability management. Information technology glossary*. [Online] Available at: <https://www.gartner.com/en/information-technology/glossary/sustainability-management>. [Accessed December 2022].

Gazprom-Neft, 2010. *2010 Sustainability Report.*, Moscow: Gazprom-Neft.

Gebhardt, C., 2017. Humans in the Loop: The Clash of Concepts in Digital Sustainability in Smart Cities. In: T. O. & C. L. (Eds.), ed. *Sustainability in a Digital World: New Opportunities Through New Technologies*. Berlin: Springer, p. 85–94.

Geertz, C., 1983. *Local Knowledge: Further Essays in Interpretive Anthropology*. New York: Basic Books.

Gensch, C.-O., Prakash, S. & Hilbert, I., 2017. Is Digitalisation a Driver for Sustainability?. In: T. Osburg & C. Lohrmann (Eds.), ed. *Sustainability in a Digital World: New Opportunities Through New Technologies*. Berlin: Springer, pp. 117-129.

Geoffrion, A. & Krishnan, R., 2003. E-business and management science: Mutual impacts (Part 1 of 2).. *Management Science*, Volume 49, pp. 1275-1286.

George, G. & Bock, A., 2009. *The business model in practice and its implications for entrepreneurship research*, London: Working Paper, Imperial College, London.

Germann, F., Lilien, G. & Rangaswamy, A., 2013. Performance implications of deploying marketing analytics.. *International Journal of Research in Marketing*, 30(2), pp. 114-128.

Ghauri, P. & Gronhaug, K., 2005. *Research Methods in business research*. Harlow: Prentice Hall.

Ghemawat, P., 1991. *Commitment: The Dynamic of Strategy*, s.l.: Free Press.

Gibbs, G. R., 2007. *Using software in qualitative analysis*. Thousand Oaks: Sage Publication.

Gillespie, P., 2011. How does legislation affect oil palm smallholders in the Sanggau district of Kalimantan, Indonesia?. *Australasian Journal of Natural Resources Law and Policy*, 14(1), p. 1–37.

Glaser, B. G. & Strauss, A. L., 1967. *The Discovery of Grounded Theory: Strategies for Qualitative Research*. Chicago: Aldine Publishing.

Gordijn, J. & Akkermans, J., 2003. Gordijn, J., Akkermans, J.M., 2003. Value-based requirements engineering. *Exploring innovative e-commerce ideas*, Volume 8, p. 114.

- Gordijn, J., Osterwalder, A. & Pigneur, Y., 2005. *Comparing Two Business Model Ontologies for Designing e-Business Models and Value Constellations*. Bled, Slovenia, BLED 2005 Proceedings - Paper 15.
- Gradwell, S. S., 2004. *Communicating planned change: A case study of leadership credibility*, s.l.: Drexel University.
- Gray, J. & Rumpe, B., 2015. Models for digitalization. *Software System Model*, 14(October 2015), p. 1319–1320.
- Grix, J., 2004. *The foundations of research*. London: Palgrave. London: Palgrave Macmillan.
- Gross, N., Giacuinta, J. & Bernstein, M., 1971. *Implementing Organizational Innovations*. New York: Basic Books.
- Guba, E. & Lincoln, Y., 1981. Effective evaluation: Improving the usefulness of evaluation results through responsive and naturalistic approaches.. In: *The Jossey-Bass series in social and behavioral science and in higher education*. San Francisco: Jossey-Bass Inc., pp. 383-410.
- Gubán, Á. & Sándor, Á., 2021. Opportunities for digital maturity measurement for SMEs.. *Management Review*, 52(3), pp. 13-28.
- Gulati, R., Zaheer, N. & A., N., 2000. Strategic networks. *Strategic Management Journal*, Volume 21, p. 203–215.
- Gunasekaran, A., Subramanian, N. & Ngai, W., 2019. Quality management in the 21st century enterprises: research pathway towards Industry 4.0. *International Journal of Production Economics*, Volume 207, pp. 125-129.
- Gupta, S., Motlagh, M. & Rhyner, J., 2020. The digitalization sustainability matrix: A participatory research tool for investigating digitainability.. *Sustainability*, 12(21), p. 9283.
- Haefner, N., Wincent, J., Parida, V. & Gassmann, O., 2021. Artificial intelligence and innovation management: A review, framework, and research agenda. *Technological Forecasting and Social Change*, Volume 162.
- Halldórsson, Á., Kotzab, H. & Skjøtt-Larsen, T., 2009. Supply chain management on the crossroad to sustainability: a blessing or a curse?.. *Logistics Research*, 1(2), pp. 83-94.
- Hamel, G., 2000. *Leading the revolution*. s.l.:Harvard Business Press.
- Hammer, M. & Champly, J., 1993. *Reengineering the Corporation*. New York, NY: Harper Business.
- Hao, K., 2019. *Training a single AI model can emit as much carbon as five cars in their lifetimes*. MIT Technology Review. [Online] Available at: <https://www.technologyreview.com/2019/06/06/239031/training-a-single-ai-model-can-emit-as-much-carbon-as-five-cars-in-their-lifetimes/> [Accessed December 2022].
- Hargadorn, A. B. & Douglas, Y., 2001. When innovations meet institutions: Edison and the design of the electric light. *Administration Science Quarter*, Volume 46, pp. 476-501.

- Harrison, A., Christopher, M. & Van Hoek, R., 1999. Creating the Agile Supply Chain. *Corby: Institute of Logistics and Transportation*.
- Hartley, J., 2004. Case study research. In: C. C. & G. Symon, ed. *Essential guide to qualitative methods in organizational research*. London: Sage, pp. 323-333.
- Hayes, B. K., Heit, E. & Swendsen, H., 2010. Inductive reasoning. *John Wiley & Sons, Ltd. WIREs Cogn Sci*, Volume 1, p. 278–292.
- Hebb, D., 1954. The social significance of animal studies. In: G. Lindzey, ed. *Handbook of social psychology*. Reading: Addison-Wesley.
- Helmreich, R. & Merrit, A. C., 1998. *Culture at Work in Aviation and Medicine; National, Organisational and Professional Influences*. Ashgate: Routledge.
- Henriette, E., Feki, M. & Boughzala, I., 2016. *Digital Transformation Challenges*. Cyprus, Association for Information Systems.
- Hess, T., Benlian, A., Matt, C. & Wiesböck, F., 2016. Options for formulating a digital transformation strategy. *MIS Quarterly Executive*, 15(2), p. 123–139.
- Hines, P. et al., 1999. *Lean Supply Streams Value, Strategy and Excellence in the Supply Chain*. London: Financial Times.
- Hirschhorn, L., 1987. *The workplace within*. Cambridge, Ma.: MIT Press.
- Hite, J. M. & Hesterly, W., 2001. The evolution of firm networks: From emergence to early growth of the firm.. *Strategic Management Journal*, Volume 22, pp. 275-286.
- Høivik, D., 2009. *Health, Safety and Environment Culture in the Petroleum Industry in Norway*, Bergen: University of Bergen, Norway .
- Holst, A., Löffler, C. R. & Philipps, S., 2017. How Digital Reframes the Business Case for Sustainability in Consumer Markets. In: T. O. & C. L. (Eds.), ed. *Sustainability in a Digital World: New Opportunities Through New Technologies*. Berlin: Springer, pp. 105-116.
- Holsti, O., 1969. *Content analysis for the social sciences and humanities*. Reading: Addison Wesley Publishing Company.
- Howorth, C. & Ali, Z. A., 2001. Family business succession in Portugal: An examination of case studies in the furniture industry. *Family Business Review*, 14(3), pp. 231-244.
- Huang, J., Henfridsson, O., Liu, M. J. & Newell, S., 2017. Growing on Steroids: Rapidly Scaling the User Base of Digital Ventures Through Digital Innovation. *MIS Quarterly*, 41(1), p. 301–314.
- Hudson, P., 2007. Implementing a safety culture in a major multi-national. *Safety Science* , 45(6), pp. 697-722.
- Huelsenbeck, C., 2007. Next-Gen Data Management. *Pollution Engineering*, 39(1), p. 32–35.
- Hussy, J. & Hussy, R., 1997. *Business Research: a Practical Guide for Undergraduate and Postgraduate Students*. Basingstock: Macmillan Business.

- Hyne N., 2014. *Dictionary of Petroleum Exploration, Drilling & Production*. 2nd ed. Oklahoma: PennWell.
- Ichniowski, C. et al., 1996. What works at work: Overview and assessment. *Industrial Relations*, Volume 35, pp. 299-333.
- Ilinitch, A. Y., D'Aveni, R. A. & Lewin, A. Y., 1996. New organizational forms and strategies for managing in hypercompetitive environments. *Organization Science*, Volume 7, pp. 211-220.
- ILO, I. L. O., 2009. "ILO standards on occupational safety and health," presented at International Labour Conference. Geneva, International Labour Office.
- Inkpen A.; Moffett M. H. , 2011. *The global oil& gas industry: Management, strategy & finance*. 1st ed. Oklahoma: PennWell Corporation.
- International Energy Agency, 2019. *International Energy Agency*. [Online] Available at: <https://www.iea.org/analysis/all?q=Monthly%20OECD%20Crude&year=2019> [Accessed 20 May 2020].
- International Monetary Fund, 2019. *International Monetary Fund*. [Online] Available at: <https://www.imf.org/en/Publications/SPROLLS/world-economic-outlook-databases#sort=%40imfdate%20descending> [Accessed 20 May 2020].
- International Monetary Fund, 2019. *WORLD ECONOMIC OUTLOOK: GLOBAL MANUFACTURING DOWNTURN, RISING TRADE BARRIERS*, Washington: International Monetary Fund.
- Ireland, R. D., M. A. H., Camp, M. & Sexton, D., 2001. Integrating entrepreneurship and strategic management actions to create firm wealth. *Academy of Management Executive*, Volume 15, pp. 49-63.
- Irving, P. G., Marcus, J. & Sharma, P., 2007. *Examining the behavioral outcomes of family business successor commitment*. Philadelphia, Academy of Management Conference.
- Itami, H. & Nishino, K., 2010. Killing Two Birds with One Stone. Profit for Now and Learning for the Future. *Long Range Planning*, Volume 43(Issues 2–3), pp. 364-369.
- Johnson, M. W., Christensen, C. M. & Kagermann, H., 2008. Reinventing your business model. *Harvard Business Review*, 86(12), pp. 58-68.
- Kallinikos, J., Aaltonen, A. & Marton, A., 2013. The ambivalent ontology of digital artifacts. *MIS Quarterly*, pp. 357-370.
- Kamal S. Z.; Williams J.; Liddle J., 2014. *Continuous Improvement of Assets Through Existing and New Digital Oilfield Technology*.. [Online] Available at: <http://dx.doi.org/10.2118/167908-MS> [Accessed 22 July 2019].
- Kaplan, R. S. & Norton, D. P., 1992. The balanced scorecard – measures that drive performance. *Harvard Business Review*, 70(5), p. 71–79.
- Karimi, J. & Walter, Z., 2015. The role of dynamic capabilities in responding to digital disruption: A factor-based study of the newspaper industry. *Journal of Management Information Systems*, 21(1), p. 39–81.

- Keller, W. & Bette, N., 2020. Shaping digital sustainable development in chemical companies.. *Journal of Business Chemistry*, Volume 2, pp. 9-18.
- Kelly, D., 1999. *Researching industrial relations*. New South Wales: The Federation Press.
- Kets de Vries, M. F. R. & Miller, D., 1984. *The neurotic organization*. San Francisco: Jossey-Bass.
- Kirk, J. & Miller, M. L., 1986. *Reliability and validity in qualitative research*. Thousand Oaks: Sage.
- Kiron, D. & Unruh, G., 2018. *The Convergence of Digitalization and Sustainability*. *MIT Sloan Management Review*. [Online] Available at: <https://sloanreview.mit.edu/article/the-convergence-of-digitalization-and-sustainability/> [Accessed December 2022].
- Kitay, J. & Callus, R., 1998. The role and challenge of case study design in industrial relations research. In: K. W. & G. Strauss, ed. *Researching the world of work: Strategies and methods in studying industrial relations*. Ithaca, NY: Cornell University Press, p. 101–112..
- Kohtamäki, M., Parida, V., Oghazi, P. G. H. & Baines, T., 2019. Digital servitization business models in ecosystems: a theory of the firm. *Journal of Business Research*, Volume 104, pp. 380-392.
- Kotler, P. & Armstrong, G., 2010. *Principles of marketing*. 17th ed. s.l.:Pearson education.
- Kotzab, H., 2000. *Managing the Fast Moving Goods Supply Chain—Does Efficient Customer Response Matter*. Cardiff University, Wales, Proceedings of the Logistics Research Network Conference, pp. 336-342.
- Kraljic, P., 1983. Purchasing must become supplymanagement. *Harvard Business Review*, pp. 110-117.
- Lai, K.-H., Wong, W. & Cheng, T., 2008. A coordination-theoretic investigation of the impact of electronic integration on logistics performance. *Information & Management*, Volume 45(Issue 1), pp. 10-20.
- Lamming, R., 1993. *Beyond Partnership: Strategies for Innovation and Lean Supply*. 1st ed. London: Prentice-Hall.
- Lansbury, R. D. & Macdonald, D., 1992. *Workplace industrial relations: Australian case studies*. Melbourne: Oxford University Press.
- Leman, A. M., 2013. *Occupational safety and health: workers and industrial safety monitoring for sustainable work environment development*. s.l.:s.n.
- Lewin, A. Y. & Volbverda, H., 1999. Prolegomena on coevolution: A framework for research on strategy and new organizational forms. *Organization Science*, Volume 10, pp. 519-534.
- Liao, Y., Deschamps, F., Loures, E. & Ramos, L., 2017. Past, present and future of Industry 4.0 – a systematic literature review and research agenda proposal. *International Journal of Production Research*, 55(12), pp. 3609-3629.
- Lichtenthaler, U., 2017. Shared Value Innovation: Linking Competitiveness and Societal Goals in the Context of Digital Transformation. *International Journal of Innovation and Technology Management*, Volume 14, pp. 1-14.

- Lichtenthaler, U., 2020. *Integrated intelligence: Combining human and artificial intelligence for competitive advantage..* Frankfurt, Campus.
- Lichtenthaler, U., 2021. Digitainability: the combined effects of the megatrends digitalization and sustainability.. *Journal of Innovation Management*, 9(2), pp. 64-80.
- Li, H. & Kannan, P. K., 2014. Attributing conversions in a multichannel online marketing environment: An empirical model and a field experiment. *Journal of Marketing Research*, 51(1), p. 40–56.
- Li, L., Su, F., Zhang, W. & Mao, J., 2018. Digital transformation by SME entrepreneurs: A capability perspective.. *Information Systems Journal*, 28(6), pp. 1129-1157.
- Li, L., Su, F., Zhang, W. & Mao, J. Y., 2017. Digital transformation by SME entrepreneurs: A capability perspective. *Information Systems Journal*, p. 1129–1157.
- Lim, YS.; Teh, WV.; Esparan, Loganantha.; Bobby, J.; Karyn Chua, SY., 2017. *MALAYSIA'S DIGITAL PERFORMANCE INDEX*, Kuala Lumpur: Accenture Malaysia.
- Linkov, I., Trump, B. D., Poinsette-Jones, K. & Florin, M.-V., 2018. Governance Strategies for a Sustainable Digital World. *Sustainability*, Volume 10, pp. 1-8.
- Linz, C., Müller-Stewens, G. & Zimmermann, A., 2017. *Radical Business Model Transformation: Gaining the Competitive Edge in a Disruptive World*. London, Philadelphia, PA and New Delhi: Kogan Page.
- Lior, N., 2010. Sustainable energy development: the present (2009) situation and possible paths to the future.. *Energy*, 35(10), pp. 3976-3994.
- Loch, C. et al., 2008. *How to Translate a New Technology into a Business model*, Fontainebleau, France: INSEAD.
- Loebbecke, C. & Picot, A., 2015. Reflections on societal and business model transformation arising from digitization and big data analytics: A research agenda.. *Journal of Strategic Information Systems*, Volume 24, p. 149–157.
- Lohrmann, C., 2017. Leadership in a Digital World: New Ways of Leadership for Sustainable Development. In: T. O. & C. L. (Eds.), ed. *Sustainability in a Digital World: New Opportunities Through New Technologies*. Berlin: Springer, pp. 51-58.
- Long, T. B., Blok, V. & Poldner, K., 2016. Business models for maximising the diffusion of technological innovations for climate-smart agriculture. *International Food and Agribusiness Management Review*, 20(1), pp. 5 - 23.
- Lucas, H. C. et al., 2013. Impactful research on transformational information technology: An opportunity to inform new audiences. *MIS Quarterly*, 37(2), p. 371–382.
- Lukac, E. G. & Frazler, D., 2012. Linking Strategy to Value. *Journal of Business Strategy*, 33(4), pp. 49-57.
- Lukoil, 2011. www.lukoil.com. [Online] Available at: <https://www.lukoil.com/ArchiveFinancialReports2011> [Accessed 02 January 2022].

Magretta, J., 2002. Why Business Model Matters. *Harvard Business Review Spotlight: Practical Strategy*, Volume r0205f, pp. 3-8.

Marcysiak, A. & Pleskacz, Z., 2021. Determinants of digitization in SMEs.. *Entrepreneurship and Sustainability Issues*, 9(1), p. 300.

Markides, C. & Charitou, C. D., 2004. Competing with dual business models: A contingency approach. *Academy of Management Executive*, 18(3), pp. 22-36.

Martín-Peña, M., Díaz-Garrido, E. & Sánchez-López, J., 2018. The digitalization and servitization of manufacturing: a review on digital business models. *Strategic Change*, 27(2), pp. 91-99.

Maslow, A. H., 1943. A theory of human motivation. *Psychological Review*. *Psychological Review*, 50(4), pp. 370-396.

Massa, L. & Tucci, C., 2013. Business model innovation. Volume 20, p. 420.

Matt, C., Hess, T. & Benlian, A., 2015. Digital transformation strategies. *Business Information System Engineering* 57 (5) (2015), pp. 339-343, 57(5), pp. 339-343.

Matzler, K., Bailom, F., Friedrich von den Eichen, S. & Anschober, M., 2016. *Digital Disruption. Wie Sie Ihr*. Vahlen, München.: s.n.

Maxwell, J., 1992. Understanding and validity in qualitative research. *Harvard Educational Review*, Volume 62, pp. 279-300.

McClintock, C. C., Brannon, D. & Maynard-Moody, S., 1979. Applying the logic of sample surveys to qualitative case studies: the case cluster method. *Admin Science Q.*, 24(December), pp. 612-629.

McGrath, R. G., 2010. Business Models: A Discovery Driven Approach.. *Long Range* , Volume 43(Issues 2–3), pp. 247-261.

McGrath, R. & MacMillan, I., 2000. *The Entrepreneurial Mindset*. Boston, MA: Harvard Business School Press.

McKinsey Global Institute, 2015. *The Internet of Things: Mapping The Value Beyond The Hype*. [Online] Available at: www.mckinsey.com/mgi [Accessed 28 August 2019].

Mearns, K. & Hope, L., 2005. *Health and well-being in the offshore environment: The management of personal health*, UK: Health and Safety Executive.

Mearns, K. & Reader, T., 2008. Organizational support and safety outcomes: An uninvestigated relationship?. *Safety Science*, Volume 46, p. 388–397.

Mearns, K., Whitaker, S. & Flin, R., 2003. Safety climate, safety management practice and safety performance in offshore environments. *Safety Science*, Volume 41, p. 641–680.

Mearns, K. & Yule, S., 2009. The role of national culture in determining safety performance: Challenges for the global oil and gas industry. *Safety Science*, Volume 47, p. 777–785.

- Mendelson, H., 2000. Organizational architecture and success in the information technology industry. *Management Science*, Volume 46, pp. 513-529.
- Mention, A.-L., Torkkeli, M. & Pinto-Ferreira, J. J., 2020. The Era of Digital Enablement: A Blessing or a Curse?. *Journal of Innovation Management*, 8(3), pp. 1-5.
- Menzies, I. E. P., 1960. A case study in the functioning of social systems as a defense against anxiety. *Human relations*, Volume 13, pp. 95-121.
- Merriam, S., 1988. Case Study Research in Education: a Qualitative Approach. In: *The Jossey-Bass social and behavioral science series*. San Francisco: Jossey-Bass Inc., pp. 207-219.
- Merriam, S. B., 1998. *Qualitative Research and Case Study Applications in Education. Revised and Expanded from "Case Study Research in Education."*. San Francisco: Jossey-Bass Publishers.
- Merriam, S. B., 2009. *Qualitative research: A guide to design and implementation*. San Francisco, CA: John Wiley.
- Meyer, M., Milgrom, P. & Roberts, J., 1992. Organizational prospects, influence costs, and ownership changes. *Journal of Economics and Management Strategy*, Volume 1, p. 9–35.
- Mezger, F., 2014. Toward a capability-based conceptualization of business model innovation: insights from an explorative study. *R&D Management*, 44(5), pp. 429-449.
- Michie, S. & Williams, S., 2003. Reducing work related psychological ill health and sickness absence: a systematic literature review. *Journal of Occupational and Environment Med*, Volume 60, pp. 3-9.
- Miles, M. & Huberman, A. M., 1994. *Qualitative data analysis: A sourcebook of new methods*. Beverly Hills, CA: Sage.
- Miles, R. E. & Snow, C. C., 1986. Organizations: New concepts for new forms. *California Management Review*, Volume 28, pp. 62-73.
- Milgram, P. R. & Roberts, J., 1992. *Economy, organization and management*. Upper Saddle River, NJ: Prentice-Hall.
- Miller, D., 1988. Relating Porter's business strategies to environment and structure: Analysis and performance implications. *Academy of Management Journal*, 31(2), pp. 280-308.
- Mitchell, R. W., Wooliscroft, B. & Higham, J., 2010. Sustainable Market Orientation: A New Approach to Managing Marketing Strategy. *Journal of Macromarketing*, 30(2), pp. 160-170.
- Morken, T., Bratveit, M. & Moen, B., 2005. Reporting of occupational hearing loss in the Norwegian offshore industry 1992– 2003. *Tidsskr. Nor Laegeforen*, Volume 125, p. 3272–3274.
- Morken, T., Mehlum, I. & Moen, B., 2007. Work-related musculoskeletal disorders in Norway's offshore petroleum industry. *Occupational Med.*, Volume 57, p. 112–117.
- Morris, M., Schindehutte, M. & Allen, J., 2005. The entrepreneur's business model: Toward a unified perspective. *Journal of Business Research*, Volume 58, pp. 726-735.

- Morse, J. M., 1991. Approaches to Qualitative-Quantitative Triangulation. *Nursing Research*, Volume 40, pp. 120-123.
- Motwani, S., 2014. Managing Data Efficiency in Data Centers. *Voice & Data*, 21(2), p. 28–30.
- Mühlbacher, H. & Böbel, I., 2019. From zero-sum to win-win - Organisational conditions for successful shared value strategy implementation. *European Management Journal*, 37(3), p. 313–324.
- Muñoz, P. & Dimov, D., 2015. The call of the whole in understanding the development of sustainable ventures.. *Journal of Business Venturing*, 30(4), pp. 632-654.
- Mustapha, L., 2019. *PETRONAS Activity Outlook 2020 - 2023*, Kuala Lumpur: PETRONAS.
- Naisbitt, J. & Aburdene, P., 1985. *Re-inventing the corporation*. New York: Wamer Books.
- Narasimhan, R. & Das, A., 2001. The impact of purchasing integration and practices on manufacturing performance. *Journal of Operations Management*, 19(5), pp. 593-609.
- Narasimhan, R. & Kim, S., 2002. Effect of supply chain integration on the relationship between diversification and performance: evidence from Japanese and Korean firms. *Journal of Operations Management*, Volume 20, pp. 303-23.
- Neale, J. M. & Liebert, R. M., 1980. Science and Behavior. In: *An Introduction to Methods of Research*. 2nd ed. Englewood Cliffs, NJ: Prentice-Hall, pp. 56-62.
- Nielsen, C. & Lund, M., 2014. An introduction to business models. *The Basics of Business Models*, 1(1).
- Nielsen, M. et al., 2006. Psychosocial work environment predictors of short and long spells of registered sickness absence during a 2-years follow up. *Journal of Occupational and Env Med*, Volume 48, p. 591–598.
- Nystrom, P. C. & Starbuck, W. H., 1981. *Handbook of Organizational Design*. London: Oxford University Press.
- O'Connor, A. & Gronewold, K. L., 2013. Black Gold, Green Earth: An Analysis of the Petroleum Industry's CSR Environmental Sustainability Discourse. *Management Communication Quarterly*, Volume 27, pp. 210-236.
- Onajite E., 2013. *Seismic Data Analysis Techniques in Hydrocarbon Exploration*. s.l.:Elsevier Inc..
- Oppenheim, A. N., 1992. *Questionnaire Design, Interviewing and Attitude Measurement*. London: Pinter.
- Ordieres-Meré, J., Remón, T. P. & Rubio, J., 2020. Ordieres-Meré, J., Remón, T. P., & Digitalization: An Opportunity for Contributing to Sustainability From Knowledge Creation. *Sustainability*, Volume 12, p. 1–21.
- Osburg, T., 2017. Sustainability in a Digital World Needs Trust. In: T. O. & C. Lohrmann, ed. *Sustainability in a Digital World: New Opportunities Through New Technologies*. Berlin: Springer, pp. 3-19.
- O'Shannassy, T., 2004. *Strategic thinking and strategic planning to optimize organization performance*. Dunedin, New Zealand, University of Otago, Department of Management.

- Osterwalder, A., 2004. *The business model ontology—A proposition in a design science approach*, Switzerland: Dissertation 173, University of Lausanne, Switzerland.
- Osterwalder, A. & Pigneur, Y., 2010. *Business Model Generation: A Handbook for Visionaries, Gamechangers and Challengers*. s.l.:Self-Published.
- Osterwalder, A., Pigneur, Y. & Tucci, C. L., 2005. Clarifying business models: Origins, present and future of the concept. *Communications of the Association for Information Science (CAIS)*, Volume 16, pp. 1-25.
- Pagell, M., 2004. Understanding the factors that enable and inhibit the integration of operations, purchasing and logistics. *Journal of Operations Management*, 22(5), pp. 459-487.
- Paiola, M. & Gebauer, H., 2020. Internet of things, digital servitization and business model innovation in BtoB manufacturing firms. *Industrial Marketing Management*, pp. 1-20.
- Parker, D., Lawrie, M. & Hudson, P., 2006. A framework for understanding the development of organisational safety culture. *Safety Science*, 44(6), pp. 551-562.
- Park, S. B., 2018. Multinationals and sustainable development: Does internationalization develop corporate sustainability of emerging market multinationals?. *Business Strategy and the Environment*, 28(8), pp. 1514-1524.
- Pateli, A. G. & Giaglis, G. M., 2004. A research framework for analysing eBusiness models.. *European Journal of Information Systems*, 13(4), pp. 302-314.
- Patton, E. & Appelbaum, S. H., 2003. The case for case studies in management research. *Management Research News*, 26(5), pp. 60-71.
- Patton, M. Q., 2002. In Qualitative research and evaluation methods. In: 3rd, ed. *Qualitative interviewing*. Thousand Oaks: Sage, p. 339–427.
- PETROBRAS, 2011. *Sustainability Report 2011*, Sao Paulo: PETROBRAS.
- PETRONAS , 2018. *PETRONAS Annual Report 2018*, Kuala Lumpur: PETRONAS Group Strategic Communication.
- PETRONAS Group Strategic Communication, 2014. *PETRONAS Annual Report 2014*, Kuala Lumpur: PETRONAS.
- PETRONAS Group Strategic Communications, 2016. *PETRONAS Induction Program For New Hires*, Kuala Lumpur: PETRONAS.
- PETRONAS, 2016. *PETRONAS Corporate Profile*, Kuala Lumpur: PETRONAS Group Strategic Communications.
- PETRONAS, 2019. *PETRONAS Activity Outlook 2020 - 2023*, Kuala Lumpur: PETRONAS.
- PETRONAS, M. C. D. G. S. C., 2022. <https://www.petronas.com>. [Online] Available at: <https://www.petronas.com/media/press-release/petronas-thrives-strong-performance-fy2021> [Accessed 8 May 2022].
- PETRONAS, P. N. B., 2021. *Integrated Report 2020*, Kuala Lumpur: PETROLIAM NASIONAL BERHAD.

- Pfitzer, M., Bockstette, V. & Stamp, M., 2013. Innovating for Shared Value. *Harvard Business Review*, Volume 91, pp. 100-107.
- Phondej, W., Kittisarn, A. & Neck, P., 2011. The seven steps of case study development: a strategic qualitative research methodology in female leadership field. *W Phondej, A Kittisarn, P Neck - Review of International Comparative*, 12(1), pp. 123-133.
- Poland, B. D., 1995. Transcription quality as an aspect of rigor in qualitative research. In: *Qualitative Inquiry*. Thousand Oaks: Sage, pp. 290-310.
- Poppo, L. & Zenger, T., 1998. Testing alternative theories of the firm: transaction cost, knowledge-based, and measurement explanations for make-or-buy decisions in information services. *Strategic management journal*, Volume 19, p. 853–877.
- Porter, M., 1996. What Is Strategy?. *Harvard Business Review*.
- Porter, M. E., 1985. TECHNOLOGY AND COMPETITIVE ADVANTAGE. *Journal of Business Strategy*, 5(3), pp. 60-78.
- Priest, J., McColl, B. A., Thomas, L. & Bond, S., 1995. Developing and refining a new measurement tool. *Nurse Researcher*, Volume 2, p. 69–81.
- Rachinger, M. et al., 2019. Digitalization and its influence on business model innovation. *Journal of Manufacturing Technology Management*, 30(8), pp. 1143-1160.
- Reck, R. & Long, B., 1988. Purchasing: a competitive weapon. *Journal of Purchasing & Materials Management*, pp. 2-8.
- Reeves, M., Lang, N. & Carlsson-Szlezak, P., 2020. *Lead your business through the coronavirus crisis*. [Online] Available at: <https://hbr.org/2020/02/lead-your-business-through-the-coronavirus-crisis> [Accessed December 2022].
- REPSOL, 2011. *Corporate Responsibility Report 2011*, Madrid: REPSOL.
- REPSOL, 2011. www.repsol.com. [Online] Available at: <https://www.repsol.com/en/press-room/press-releases/2011/09/08/repsol-named-most-transparent-and-sustainable-oil-company-in-the-world/index.cshtml> [Accessed 02 Jan 2022].
- Ricardo, R. & Wade, D., 2001. *Corporate Performance Management: How to Build a Better Organization through Measurement Driven Strategies Alignment*. s.l.:Butterworth Heinemann.
- Rich, N. & Hines, P., 1997. Supply-chain management and time-based competition: the role of the supplier association. *International Journal of Physical Distribution & Logistics Management*, Volume 27, p. 210.
- Robson, C., 2002. *Real world research: A resource for social scientists and practitioner-researchers*. s.l.:s.n.
- Rogner, H. & Popescu, A., 2000. An introduction to energy. *World Energy Assessment: Energy and the Challenge of Sustainability*, Issue United Nations Development Programme [UNDP](Eds.), pp. 31-37.

- Romanelli, E., 1991. The evolution of new organizational forms. *Annual Review of Sociology*, Volume 17, pp. 79-103.
- Romme, A. G. L., 2003. Making a difference: Organization as design. *Organization Science*, Volume 14, pp. 558-573.
- Rubin, H. J. & Rubin, I. S., 2011. *Qualitative interviewing: The art of hearing data*. 3rd ed. Thousand Oaks, CA: Sage Publications.
- Rubin, H. & Rubin, I., 1995. *Qualitative interviewing: The art of hearing data*. Thousand Oaks: Sage.
- Ryggvik, H., Smith-Solbakken, M. & Oljehistorie, N., 1997. *Blod, svette og olje*. In *Norwegian - [Norways oil history - Blood, sweat and oil]*, Norsk petroleumssforening: Ad Notam Gyldendal.
- Rymaszewska, A., Helo, P. & Gunasekaran, A., 2017. IoT powered servitization of manufacturing: an exploratory case study. *International Journal of Production Economics*, Volume 192, pp. 92-105.
- S. Z. Kamal; J. Williams; J. Liddle, 2014. *Continuous Improvement of Assets Through Existing and New Digital Oilfield Technology*. [Online] Available at: <http://dx.doi.org/10.2118/167908-MS> [Accessed 22 July 2019].
- Sachs, J. D. et al., 2019. Six Transformations to achieve the Sustainable Development Goals. *Nature Sustainability*, 2(9), p. 805–814.
- Sambo, A., 2008. Matching electricity supply with demand in Nigeria. *International Association of Energy Economics*, Volume 4, pp. 32-36.
- Senge, P., 1990. *The fifth discipline—The art & practice of the learning organization*. First ed. ed. Double Day: Currency.
- Santos, F. & Eisenhardt, K., 2005. Organizational boundaries and theories of organization. *Organization Science*, Volume 16, pp. 491-508.
- Santos, J., Spector, B. & Heyden, L. V. D., 2009. *Toward a Theory of Business Model Innovation Within Incumbent Firms*. Fontainebleau, France: INSEAD.
- Schaltegger, S. & Wagner, M., 2011. Sustainable entrepreneurship and sustainability innovation: Categories and interactions. *Business Strategy and the Environment*, Volume 20, p. 222–237.
- Schein, E. H., 1985b. Organizational culture: Skill, defense mechanism or addiction. In: F. R. B. & J. B. Overmier, ed. *Affect, conditioning, and cognition*. Hillsdale, N.J.: Erlbaum Assoc..
- Schein, E. H., 1988. *ORGANIZATIONAL CULTURE*. s.l.:Sloan School of Management, MIT.
- Schilling, M. A., 2016. *Strategic Management of Technological Innovation*. 5th ed. New York: McGraw Hill Education.
- Schmidt, C. & Wagner, S., 2019. Blockchain and supply chain relations: a transaction cost theory perspective. *Journal of Purchasing and Supply Management*, Volume 254, p. 100552.
- Schonberger, R., 1986. *World Class Manufacturing*. New York, NY.: The Free Press.

- Schumpeter, J. A., 1934. *The Theory of Economic Development: An Inquiry into Profits, Capital Credit, Interest and the Business Cycle*. Reprint 1996 ed. Cambridge: Harvard University Press.
- Schweizer, L., 2005. Knowledge transfer and R&D in pharmaceutical companies: a case study. *Journal of Engineering and Technology Management*, 22(4), pp. 315-331.
- Scott, M., Shafera, H. & Smitha, J., 2005. The power of business models. *Business Horizons*, Volume 48, p. 199 — 207.
- Seele, P. & Lock, I., 2017. The game-changing potential of digitalization for sustainability: possibilities, perils, and pathways.. *Sustainability Science*, Volume 12, p. 183–185.
- Sekaran, U. & Bougie, R., 2013. *Research Methods for Business: A skill-building approach..* 6th Edition ed. West Sussex, UK: John Wiley & Sons Ltd.
- Seuring, S. & Müller, M., 2008. From a literature review to a conceptual framework for sustainable supply chain management. *Journal of cleaner production*, 16(15), pp. 1699-1710.
- Shafer, S. M., Smith, H. J. & Linder, J., 2005. The power of business models. *Business Horizons*, Volume 48, pp. 199-207.
- Shafer, S. M., Smith, H. J. & Linder, J. C., 2005. The power of business models. *Business Horizons*, 48(3), pp. 199-207.
- Shah, J. & Shah, N., 2020. *Fighting Coronavirus with Big Data*. *Harvard Business Review Digital Articles*. [Online] Available at: <https://hbr.org/2020/04/fighting-coronavirus-with-big-data>. [Accessed December 2022].
- Sia, S., Soh, C. & Weill, P., 2016. How DBS bank pursued a digital business strategy. *MIS Q. Exec.*, 15(2), pp. 105-121.
- Simpson, V., 2020. *www.worldatlas.com*. [Online] Available at: <https://www.worldatlas.com/articles/the-world-s-largest-oil-reserves-by-country.html> [Accessed January 2021].
- Sklyar, A., Kowalkowski, C., Tronvoll, B. & Sörhammar, D., 2019. Organizing for digital servitization: a service ecosystem perspective. *Journal of Business Research*, Volume 104, pp. 450-460.
- Smart, A., 2017. *The Digital Oil Company: Getting Ahead of the Energy Transition*, Chicago: Accenture Consulting.
- Speight J. G., 2014. *Handbook of Offshore Oil and Gas Operations*. 1st ed. Wyoming: Elsevier.
- Stake, R. E., 1995. *The art of case study research*. Thousand Oaks: Sage Publications.
- Stinchcombe, A., 1965. Social structure and organizations. In: J.G. March, ed. *Handbook of Organizations*. Chicago, IL: Rand McNally, pp. 142-193.
- Stortingsmelding, 2002. *White Paper no.7, 2002; On health, environment and safety in petroleum operations*, Oslo: Ministry of Labour and Government Administration.

- Stouffer, S. A., 1941. Notes on the case-study and the unique case. *Sociometry*, 4(November), pp. 349-357.
- Strauss, A., 1987. *Qualitative analysis for social scientists*. New York: Cambridge University Press.
- Stuermer, M., Abu-Tayeh, G. & Myrach, T., 2017. Digital sustainability: basic conditions for sustainable digital artifacts and their ecosystems. *Sustainability Science*, Volume 12, p. 247–262.
- Subramaniam, M. & Venkatraman, N., 2001. Determinants of transnational new product development capability: Testing the influence of transferring and deploying tacit overseas knowledge. *Strategic Management Journal*, 22(4), p. 359–378.
- Sudev Bangah, 2019. *IDC Urges Malaysian Businesses to Become Digitally Determined Organizations*. Kuala Lumpur, Digital News Asia.
- Sun, P. Y. & Scott, J. L., 2003. Towards better qualitative performance measurement in organizations. *The Learning Organization*, 10(5), pp. 258-271.
- Svahn, F., Matthiasen, L. & Lindgren, R., 2017. Embracing Digital Innovation in Incumbent Firms: How Volvo Cars Managed Competing Concerns. *MIS Quarterly*, 41(1), p. 239–253.
- Syam, N. & Sharma, A., 2018. Waiting for a sales renaissance in the fourth industrial revolution: Machine learning and artificial intelligence in sales research and practice. *Industrial marketing management*, Volume 69, pp. 135-146.
- Teece, D. J., 2007. Explicating dynamic capabilities: the nature and microfoundations of (sustainable) development. *Strategic Management Journal*, 28(13), p. 1319–1350.
- Teece, D. J., 2010. Business models, business strategy and innovation. *Long Range Planning*, Volume 43, pp. 172-194.
- Teece, D., Pisano, G. & Shuen, A., 1997. Dynamic capabilities and strategic management. *Strategic Management Journal*, 18(7), pp. 509-533.
- Thayer, A. et al., 2007. Content analysis as a best practice in technical communication research. *Journal of Technical*, 37(3).
- Thompson, J. D., 1967. *Organizations in Action*. New York: McGraw-Hill.
- Timmers, P., 1998. Business models for electronic markets. *Electronic Markets*, 8(2), pp. 3-8.
- Todeva, E., 2007. *Behavioural Theory of the Firm*, s.l.: Research Gate.
- Turkay, B., Dincer, F. I. & Dincer, M. Z., 2019. An Evaluation of New Values in Economy and Their Impacts on Future Transformation in Tourism. *Elsevier: Procedia Computer Science*, 158(2019), p. 1095–1102.
- Ulaga, W. & Eggert, A., 2006. Relationship value and relationship quality: broadening the nomological network of business-to-business relationships. *European Journal of Marketing*, 40(3-4), pp. 311-327.
- United-Nations, 2015. *Transforming our world: The 2030 agenda for sustainable development*. New York, General Assembly. United-Nations.

- Van Marrewijk, M., 2003. Concepts and definitions of CSR and corporate sustainability: Between agency and communion. *Journal of Business Ethics*, 44(2), pp. 95-105.
- Vaughan, C., Buja, L., Kruczkiewicz, A. & Goddard, L., 2016. Identifying research priorities to advance climate services. *Climate Services*, Volume 4, pp. 65-74.
- Ven, A. V. d., Hudson, D. & Schroeder, M., 1984. Designing new business startups: Entrepreneurial, organizational, and ecological considerations. *Journal Management*, Volume 10, pp. 87-107.
- Vendrell-Herrero, F., Bustinza, O., Parry, G. & Georgantzis, N., 2017. Servitization, digitization and supply chain interdependency. *Industrial Marketing Management*, Volume 60, pp. 69-81.
- Verhoef, P. C. & Bijmolt, T. H. A., 2019. Marketing perspectives on digital business models: A framework and overview of the special issue. *International Journal of Research in Marketing*, Volume 36, p. 341–349.
- Wade, D. & Recardo, R., 2001. *Corporate Performance Management*. Boston: Butterworth-Heinemann.
- Warner, K. & Wäger, M., 2019. Building dynamic capabilities for digital transformation: An ongoing process of strategic renewal. *Long Range Planning*, 52(3), p. 326–349.
- Warr, D. J., 2004. Stories in the Flesh and Voices in the Head: Reflections on the Context and Impact of Research with Disadvantaged Populations. *Qualitative Health Research*, 14(4), p. 578–587.
- Weill, P. & Vitale, M. R., 2001. *Place to space: Migrating to e-business models*. Boston, MA: Harvard Business School Press.
- Weill, P. & Woerner, S., 2015. Thriving in an increasingly digital ecosystem 56 (4), 27–34.. *MIT Sloan Management Review*, 56(4), p. 27–34.
- Weill, P. & Woerner, S., 2018. *What's Your Digital Business Model?: Six Questions to Help You Build the Next-Generation Enterprise*. Cambridge (MA) : Harvard Business School Press.
- Weiss, R. S., 1994. *Learning from strangers: The art and method of qualitative interview studies*. New York: The Free Press.
- Wenzel, F., 2017. Sustainable Digital Business: Crucial Success Factor for Small and Medium-Sized Enterprises and Start-Ups. In: T. O. & C. L. (Eds.), ed. *Sustainability in a Digital World: New Opportunities Through New Technologies*. Berlin: Springer, p. 131–143.
- Westerman, G. & Bonnet, D., 2015. Revamping your business through digital transformation.. *MIT Sloan Management Review*, Volume 56, p. 10–13.
- Westerman, G., Bonnet, D. & McAfee, A., 2014. *Leading Digital – Turning Technology into Business Transformation*. Boston: HBR Press.
- Williamson, O. E., 1975. *Markets and Hierarchies: Analysis and Antitrust Implications*, New York: The Free Press.
- Williamson, O. E., 1983. Organization Form, Residual Claimants, and Corporate Control. *Journal of Law & Economics*, XXVI(2), p. 351.

- Winston, T., 1997. *Introduction to Case Study The Qualitative Report*, s.l.: s.n.
- Wirtz, B. W., Pistoia, A., Ullrich, S. & Göttel, V., 2016. Business Models: Origin, Development and Future Research Perspectives. *Long Range Planning*, Volume 49(Issue 1), pp. 36-54.
- Wittbold, K. A. et al., 2020. *How Hospitals Are Using AI to Battle Covid-19. Harvard Business Review Digital Articles*. [Online] Available at: <https://hbr.org/2020/04/how-hospitals-are-using-ai-to-battle-covid-19> [Accessed December 2022].
- Wolf, C. O. H. & Tordo, S., 2009. *The petroleum sector value chain*, Washington: The World Bank Group.
- Womack, J., Jones, D. & Roos, D., 1990. *The Machine that Changed the World*,. New York, NY.: Rawlinson Associates.
- Wong, S., 2013. Environmental Requirements, Knowledge Sharing and Green Innovation: Empirical Evidence from the Electronics Industry in China.. *Business Strategy and the Environment*, Volume 22, pp. 321-338.
- Woodard, C., Ramasubbu, N., Tschang, F. & Sambamurthy, V., 2012. Design capital and design moves: the logic of digital business strategy. *MIS Q.*, 37(2), pp. 537-564.
- World Health Organization, 1994. *Global Strategy On Occupational Health for All. The Way to Health At Work Recommendation of the Second Meeting of the WHO Collaboration Centres in Occupational Health*. Geneva, World Health Organization (WHO).
- Yin, R., 1984/1994. *Case Study Research: Design and Methods*. Sage ed. London: Thousand Oaks.
- Yin, R. K., 2003. *Case study research design and methods. Thousand*. Thousand Oaks, CA: Sage.
- Yin, R. K., 2004. *The case study anthology*. Thousand Oaks: Sage Publications.
- Yin, R. K., 2009. *Case study research: Design and methods*. 4th ed. Thousand Oaks, CA: Sage.
- Yin, R. K., 2011. *Applications of case study research*. 3rd ed. Thousand Oaks: Sage.
- Yin, X. & Zajac, E., 2004. The strategy/governance structure fit relationship: theory and evidence in franchising arrangements. *Strategic Management Journal*, Volume 25, pp. 365-383.
- Yoo, Y., 2012. The tables have turned: How can the information systems field contribute to technology and innovation management research?. *Journal of the association for information systems*, 14(5), p. 4.
- Zamfir, A. M., Mocanu, C. & A., G., 2017. Circular economy and decision models among European SMEs. *Sustainability*, 9(9), p. 1507.
- Zikmund, W. G., 2003. Sample designs and sampling procedures. In: G. Z. William, ed. *Business research methods*. Ohio: Thomson South-Western publications, pp. 368-400.
- Zott, C. & Amit, R., 2007. Business Model Design and the Performance of Entrepreneurial Firms. *Organization Science*, 18(2), pp. 181-199.
- Zott, C. & Amit, R., 2010. Business Model Design: An Activity System Perspective.. *Long Range Planning*, Volume 43(Issues 2–3), pp. 216-226.

Zott, C. & Amit, R. H., 2008. The Fit Between Product Market Strategy and Business Model: Implications for Firm Performance. *Strategic Management Journal*, 29(1), pp. 1-26.

Zott, C., Amit, R. & Massa, L., 2011. THE BUSINESS MODEL: RECENT DEVELOPMENTS AND FUTURE RESEARCH. *ScholarlyCommons*, pp. 1-40.

Zulfikar, R. et al., 2021. Encourage SMEs sustainable behavior during Covid-19 pandemic through competitive advantages and corporate culture. *Serbian Journal of Management*, 16(2), pp. 45-417.

APPENDIX A:

Case Study Protocol and Implementation

A Qualitative Investigation of the Roles of Digitalization in Transforming the Business Model and Improving the Performance of Petroliam Nasional Berhad (PETRONAS) in Malaysia

A. INTRODUCTION TO THE CASE STUDY AND THE PURPOSE OF THE PROTOCOL

1. Philosophical considerations

In order to do a case study, this is the very first step. Understanding research philosophy is critical because it sets the stage for how you do your study (Wilson, 2014). In most cases, researchers begin their investigations by determining whether they would employ quantitative data or some other type of data (Maree, 2010) or that of the qualitative in nature employing descriptive data (Brynard, Hanekom, and Brynard, 2014).

According to Yin (2004), an empirical investigation is carried out in the context of a contemporary phenomenon, particularly when it does not show clearly the boundaries between the phenomena and the context. Yin (2004) added that case study has a unique capability and strength to examine a case thoroughly in its real-life context compared to other methods, because it resulted from six common evidence sources, such as documents, archival records, interviews, direct observations, observations of participation and physical objects.

The interview is one of the most important sources of case studies. Interviews are frequently found in case studies. However, interviews can help by offering explanations (i.e. the "how" and "why") of key events and insights reflecting the relativistic outlook of the participants. Interviews in case studies will look like guided conversations rather than structured queries. Although the researcher follows a consistent line of investigation, in a case study interview, the actual flow of questions is likely to be fluid instead of rigid (Rubin & Rubin, 2011). Alternatively, this kind of interview has been referred to as an 'intensive, in-depth or unstructured interview (Weiss, 1994). Interviews are an important source of case studies because most case studies deal with human affairs or actions. Well-informed interviewees can offer important insights into the subject matter. Interviewees may also provide shortcuts to the history of these situations and help the researcher identify other relevant evidence sources (Yin, 2009).

At the same time, when the interviews of researchers focus on actions because they are a central ingredient in the case study, verbal reports should always be considered. As such, the interviewed people's responses are even subject to the common problems of partiality, bad reminder and poor or inaccurate articulation when reporting or explaining such events. Again, a reasonable approach is to co-organization information from other sources from interviews (Yin, 2009).

2. Purpose of Research Activity

With the oil market volatility prevails compared to previous years, it has reshaped global energy companies' external business landscape. Digitalization is seen as the core concept of business models. It involves transforming the business into a digital model by using technology platforms to increase the overall sales, branding and market presence. Hence, PETRONAS need to focus on new areas of critical development that meet the demands of its businesses by infusing digitalization into a business model for sustainability and improvement in business performance.

3. Aims of Research Activity

Existing literature does not adequately analyze the effects of digitalization on oil and gas companies, there are gaps in the business model infused by digitalization towards business performance to be further explored. This study aims at contributing to an understanding of the strategic management field of study specific to the business model referencing the Business Model Canvas by Osterwalder and Pigneur (2010), using the element of technology and digitalization to improve business performance by exploring PETRONAS and its Group of Companies.

4. Proposed methods

This study employs a qualitative research design approach and an exploratory case study aimed at defining research questions and establishing the feasibility of the research. The research takes into consideration the interest of the researcher in obtaining a holistic perspective on the progressive roles of digitalization on the business models as well as the business performance of an oil and gas organization. The case study design of this research will be on a single case, with embedded designs supported by PETROLIAM NASIONAL BERHAD (PETRONAS) and its group of companies. This research approach focuses on the actual situation of the data collected. It aims to provide a more detailed overview of the problems relating to the research issues (Rubin & Rubin, 1995). This improves knowledge of the cases and the situation studied (Grix, 2004).

4.1 Definition of Case Study

The case study method by Yin (2004) is an empirical investigation into a contemporary phenomenon in the context of its reality, a situation where the boundaries between the phenomenon and the context are not clear, and multiple sources of evidence are used. The aim of the exploratory research study is to determine how much the digitalization of the business model plays a role on PETRONAS performance. In order to gain a detailed understanding of their organizations, the case study method for collecting data, such as face-to-face interviews with the participants, is used.

4.2 Relevance of the Case Study Method to this Research

The methodology of qualitative case research provides researchers with tools for studying complex phenomena within their contexts. When properly applied, it is a valuable means of developing theory, evaluating programmes and developing interventions for strategic management research. This qualitative case study is a research approach that enables the digitalization of Petroliam Nasional Berhad's (PETRONAS) performance using a variety of data sources to be explored. This ensures that the problem is not examined by one lens but rather by a variety of lenses that can reveal and understand multiple facets of the phenomenon. Two key approaches guide the methodology of the case study, and this study uses the one proposed by Yin (2004).

4.3 Purpose of using Case Study Method

- i. What are the importance of the business model on PETRONAS' business performance?
- ii. What are the roles of the digitalization infused to business model on PETRONAS' business performance?
- iii. How does the business model improve an organization's business performance that embraces digitalization as its competitive advantage?

4.4 Role of Protocol

The primary role of the protocol is to provide researchers with guidance as researchers in the conduct of the research. As a researcher, the researcher is expected to follow this protocol and follow the line of investigation into the case. This protocol provides the researchers with a standardized agenda to achieve the stated objectives. The reliability of the case study method throughout the researchers and cases can therefore be guaranteed by adhering to the case study protocol.

B. DATA COLLECTION PROCEDURES

1. Unit of Analysis

For this study, the unit of analysis is an organization of Petroliam Nasional Berhad (PETRONAS) and its group of companies based in Kuala Lumpur, Malaysia. The Chief Executive Officers (CEOs)/Head of Departments (HODs) of PETRONAS will represent the organization. The case study report will be geared toward the PETRONAS and its Group of Companies as the case study.

2. Case Selection

The case for this study is PETRONAS and its Group of Companies. In other word, one case constitutes one PETRONAS as an organization. Meanwhile, PETRONAS Carigali Sdn. Bhd. (PCSB) will be representing Upstream Business Portfolio, PETRONAS Refinery and Petrochemical Corporation Sdn. Bhd. (PRPC) for Downstream Business Portfolio, Gas and New Energy (GNE), PD&T representing Corporate Business and PETRONAS Dagangan Berhad (PDB) as representative of Retail and Trading in Malaysia is part of a holistic embedded single case.

3. Selection Procedure

The selection for the embedded single case study is as follows:

- a) The researchers responsible for selecting three (3) subsidiaries of PETRONAS representing Upstream, Downstream, PD&T, Corporate, Gas and New Energy and Retail and Trading business portfolios.

b) The selection is based on the following criteria:

(i) They are PETRONAS registered subsidiaries,

(ii) They are in Oil and Gas industry,

(iii) The contact person is the CEOs/HODs as a unit of analysis in this study,

(iv) Based on the subsidiaries identified, the researcher shall contact the CEOs/HODs or their secretary for an appointment on the date and time of each appointment,

(v) The interview time duration of about forty-five (45) minutes each with the possibility of a repeat visit for another half an hour, if necessary.

C. CASE STUDY REPORTING

The study research process flow as shown in the diagram below:

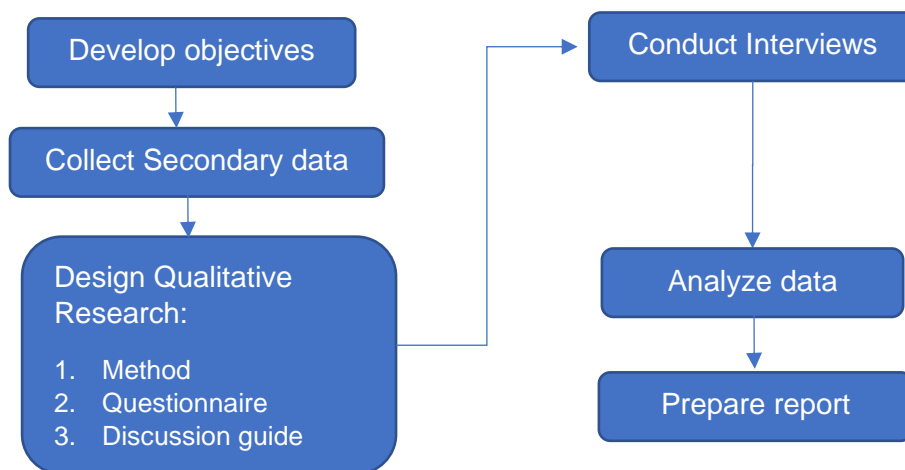


Figure A.1: The Research Process adapted from (Cresswell, 1994)

PETRONAS and its Group of Companies' employees are the target population. The researcher wants to study a company engaged in digital transformation to improve business performance. Furthermore, PETRONAS has the full breadth of the supply chain of the oil and gas industry from the Upstream to Downstream business, an International Oil and gas Company (IOC) and the National Oil and Gas Company (NOC) Malaysia. The samples are the leaders (CEO/Department Head) of PETRONAS and its Group of Companies relevant to the research objectives. The aim is to obtain the most significant information and perspectives on the field of study. Several steps will be undertaken to perform this exploratory research, from a selection of techniques, defining problems, and research methods to sampling and data analysis to produce the final findings.

The interview session and secondary data will be focusing on PETRONAS and its subsidiaries companies, which will take part and participate in this study representing the oil and gas business areas within PETRONAS. Face-to-face interviews could lead to a higher response than surveys convinced by Fink and Kosecoff (1985). The interview will be conducted in English at the PETRONAS Head Quarters (HQ) in Kuala Lumpur. The interview sessions shall be recorded using the Microsoft M365 software in order to make the documents of the data independent (Flick, 1998). The planned interview session will take approximately one (1) hour for data collection purposes. There will be several interviews adapted and self-developed from Amit and Zott (2012) and Weill and Woerner (2018) guidelines.

Next, observation is one of the strategies used to collect data in the case study. The direct observation used in this study is intended to gather the information by monitoring the behaviour, events and physical conditions of the organization and its employees in their natural environment. Direct observation allows the collection and accuracy of the information that could not be collected through questions and interviews (Ghauri & Gronhaug, 2005). Direct observations shall be made during the interviews. Driven comments shall be using an observation guide (Yin, 2009). The direct observations in this study will be limited to discussions, workstations, work environments and enterprise facilities.

QUESTIONNAIRES

Research Objective 1: To determine the importance of the business model on PETRONAS business performance.			
No	Research Question(s)	Interview Question(s)	Expected answer
1.	What are the importance of the business model on PETRONAS' business performance?	How do you describe a business model against a business strategy?	The rationale of how an organization creates, delivers, and captures value in economic, social, cultural or other contexts. The process of business model construction and modification is also called business model innovation and forms a part of business strategy. Meanwhile, Business Strategy refers to the <i>creation</i> of a unique and valuable position, involving a different set of activities” (emphasis added). The word “creation” implies the <i>choice</i> of the particular way in which the organization competes (Porter, 1996).

2.		<p>In your experience, do any of the fundamental elements of a business or product listed below influence PETRONAS' business performance?</p> <ul style="list-style-type: none"> i. value proposition; ii. customer relationship; iii. channels; iv. customer segments; v. revenue streams; vi. key activities; vii. key resources; viii. key partners; and ix. cost structure. 	<p>Yes, the value proposition; customer relationship; channels; customer segments; revenue streams; key activities; key resources; key partners; and cost structure influence the company's business performance.</p>
3.		<p>Is the experience positive or negative? Please share your experience and your thought based on such experience.</p>	<p>Positive</p>
4.		<p>How does PETRONAS leverage the fundamental elements mentioned above in addressing the PETRONAS business model to ensure improvement in its performance?</p>	<p>Embrace changes by transforming the company processes, people and tools to be more agile and fluid in responding to the business environment change.</p>

Research Objective 2: To explore and investigate the roles of the business model infused by digitalization on PETRONAS business performance.			
No	Research Question	Question(s)	Expected answer(s)
5.	What are the roles of the Business Model infused by Digitalization to PETRONAS' business performance?	What is digitalization to you?	Digitalization is defined as the use of digital technologies to change business patterns and offer new revenue and value-productive opportunities; it's the process to move to a digital business" (Gartner Inc., 2020).
6.		Does digitalization play a role in improving PETRONAS's business performance? Please state your reason.	Yes
7.		In specific, which fundamental elements are enhanced with the infusion of digitalization based on your experience? Please state your reason. i. value proposition; ii. customer relationship; iii. channels; iv. customer segments; v. revenue streams; vi. key activities; vii. key resources;	All. a) Value proposition - more attractive and appealing to the customers; b) customer relationship - enhanced where the business could get closer to their customers by understanding their buying patterns and behaviour; c) channels - greater reach to the customer; customer segments – able to create new and manage existing

		viii. key partners; and cost structure.	customer more effectively; revenue streams – the creation of multiple sources and improving company’s balance sheet; key activities – focus more on cash generator; key resources – focus more on capability improvement; key partners – build greater relationship from vendors to partners; and cost structure – able to have more insightful data for informed decision making.
8.		Is the experience positive or negative to the PETRONAS business performance? Please share your experience and your thought on such an experience.	Positive
9.		In your opinion, shall digitalization be considered as one of the fundamental elements or as a catalyst? Please state your reason.	The aim of digital transformation is to enable the enterprise, using cost savings and revenue increase, to improve productivity and innovation, to bring all the benefits of digital technologies.

10.		Does the business strategy have any roles on PETRONAS business performance? Please share your view.	Business Strategy refers to the <i>creation</i> of a unique and valuable position, involving a different set of activities” (emphasis added). The word “creation” implies the <i>choice</i> of the particular way in which the organization competes (Porter, 1996).
11.		Does PETRONAS revisit its strategy and implement new initiatives to adapt to the changes?	Yes
12.		In your opinion, does business strategy be considered as one of the fundamental elements or as a catalyst to the business model? Please state your reason.	Catalyst
Research Objective 3: To formulate a single unified business model infused by digitalization in enhancing PETRONAS business performance.			
No	Research Question	Question(s)	Expected answer(s)
13.	How does the business model improve the business performance of an organization that embraces digitalization as	Do the environment and socio-economy play a significant role in the oil and gas industry and influence the business performance of PETRONAS? Please state your reason.	Yes, occupational safety and health aims at protecting human and facility resources, as well as recognising, evaluating, controlling, and

14.	its competitive advantage?	Should environment and socio-economy be one of the fundamental elements in the PETRONAS business model? Please state your reason.	eliminating hazards in the working environment to avert serious injuries and damages (Friend & Khon, 2007). They also believed
15.		Do health and safety play a significant role in the oil and gas industry and influence of business performance of PETRONAS? Please state your reason.	that besides moral issues, occupational safety and health must include economic issues as covering the expenses of the accidents may far outweigh the costs of administering a safe and healthy workplace.
16.		Should health and safety be part of the fundamental element in the PETRONAS business model? Please state your reason.	
17.		How about organizational culture, does it play a role in the company's business model in your organization? Please share your view.	Yes, it does. Organizational Culture is defined as the shared rules governing cognitive and affective aspects of membership in an organization and the means whereby they are shaped and expressed (Alvesson, 2002).

18.		Based on your experience, does the organizational culture of an organization plays an important role in promoting organizational innovation?	Businesses must promote a culture of innovation and adoption of technology – two speed OT, operation and IT, and information technology. Any sector, including the oil industry, faces the challenge of shifting the energy balance.
19.		In your opinion, does organizational culture be considered as one of the fundamental elements or as a catalyst to the business model? Please state your reason.	Catalyst
20.		Should there be any other fundamental elements in the PETRONAS business model?	No
21.		If yes, what would you propose? Please state your reason.	N/A
22.		Do the newly proposed additional fundamental element(s) influence PETRONAS' business performance? Please state your reason.	N/A

D. NATURE OF INTERVIEW

Please be reminded that the nature of the interview is that of a free-wheeling, conversational based discussion with the CEOs/HODs of PETRONAS. While conducting the interview, please be mindful of the following:

1. The interview is semi-structured. Use your own personal interview style in gathering the required data. In other words, phrase the questions in your own way.
2. Listen attentively when the participant speaks. Avoid interrupting.
3. Use an audio cassette to capture the discussion. However, request permission from the participant before beginning to record.
4. Take notes as you go along in the discussion to assist your analysis.
5. Take stock in the coverage on the issues that need to be covered for the case study analysis before you terminate the discussion.