



UNIVERSITY OF
PORTSMOUTH

Exploring Frugal Innovation and Reverse Innovation in Saudi Arabia: A Case Study

Awwad AlShammari
Faculty of Business and Law

The thesis is submitted in partial fulfilment of the requirements for the award of the degree of Doctor of Philosophy of the University of Portsmouth.

July 2019

Whilst registered as a candidate for the above degree, I have not been registered for any other research award. The results and conclusions embodied in this thesis are the work of the named candidate and have not been submitted for any other academic award.

Awwad Alshammari, July, 2019

Abstract

Saudi Arabia is in the process of developing a broader base for the economy, which for many years has been reliant on oil and gas, non-renewable fossil fuels which are reaching their end. However, the country has many other natural resources, and one of the major companies in the “non-oil” economy is the Saudi Ceramic Company (SCC). In recent decades Saudi Arabian companies, including SCC, have begun to accept the need for innovation if they are to sell their products to a wider market and to increase exports. Of particular interest to companies in Saudi Arabia are Frugal Innovation and Reverse Innovation.

This thesis examines the relationship between these two forms of innovation, and the ways in which they have been accepted by the water-heater division of SCC and their supply chain. Three levels of management (Macro – Directors and Academic advisors directors who contribute to economic and business policy development within the SCC water-heater division, Meso – Senior Management of the manufacturing division within the SCC, and Micro – The Organisational Managers of production and supply, along the local supply chain.) were interviewed about their understanding of the terms and the application in their experience. A total of 18 interviews, each lasting 45-60 min were carried out, 5 at the Macro level, 5 at the Meso level, and 8 at the Micro level.

It was found that, although culturally resistant to innovation and change, Saudi Arabian businesses found Frugal Innovation and Reverse Innovation acceptable, and indeed essential, if the planned economic expansion is to continue. By analysing their views regarding the drivers and barriers to Frugal Innovation and Reverse Innovation, the research project has been able to formulate a framework for F&R Innovation which may be useful for companies in other developing economies attempting to expand their exports back to the developed countries. Throughout there was also found to be an underlying need for sustainability.

Acknowledgements

Bismillah Al-Rahman Al-Rahim (In the name of God (Allah) The Most Gracious, The Most Merciful). Thanks to the Glory of God (Allah) whose great mercy has made this work possible.

In addition, I would like to extend my thanks; to my first supervisor, Professor, David Pickernell, my second supervisor, Dr. Xiaoti Hu, and the academic team at the university for their support, feedback, and advice; to my family – my mother Hajuss Alshammari, my wife Abeer, and my sons, Saad, Yazan, and Musab for their patience and support; to my sponsor for making this opportunity available to me; and to the Saudi Ceramic Company for their time and the information they were able to provide about the company.

Contents

Abstract	i
Acknowledgements	ii
List of Appendices	vii
List of Figures.....	viii
List of Tables.....	ix
Chapter 1 Introduction.....	1
1.1 Context	1
1.2 Introduction	1
1.3 Background.....	2
1.4 Research Aim and motivation	4
1.5 Research Objectives.....	5
1.6 Research Questions	5
1.7 Main Findings	7
1.8 Contributions of this study	7
1.9 Summary	7
Chapter 2 Literature Review.....	9
2.1 Overview.....	9
2.1.1 Innovation Conceptualisations: Descriptions, Types and Definitions	13
2.2 Conceptualising Frugal Innovation and Reverse Innovation	23
2.2.1 Frugal Innovation	23
2.2.2 Reverse Innovation	28
2.3 Frugal Innovation and Reverse Innovation: Implementation in Firms	32
2.3.1 Frugal Innovation Implementation	35
2.3.2 Reverse Innovation Implementation.....	39
2.4 Diffusion of Innovation	42
2.5 Diffusion of Frugal Innovation and Reverse Innovation	43
2.6 Frugal Innovation and Reverse Innovation, Sustainability, Governance, and the Environment.	50
2.7 Research Gap.....	53
2.8 Summary	59
Chapter 3 Contextual Background and Conceptual Framework	61
3.1 Introduction	61
3.2 Contextual Background	61
3.3 Conceptual Framework.....	65

3.4 Summary	71
Chapter 4 Methodology	73
4.1 Introduction	73
4.1.1 Research Methodological Philosophy and Approach	73
4.2 Rationale for Chosen Methodology.....	74
4.2.1 Limitations of chosen methodology	75
4.3 Methodology	75
4.3.1 The Case Study	78
4.3.2 The Semi-Structured Interview.....	79
4.3.3 Data collection.....	80
4.3.4 Background.....	82
4.3.5 Industry Analysis	83
4.3.6 Selecting the Sample for Interviews	84
4.4 Validity and Reliability.....	85
4.5 Summary	87
Chapter 5 Findings and Analysis.....	89
5.1 Introduction.....	89
5.1.2 Clustering and Grouping of data	92
5.1.3 Data Structure	93
5.2 Analysing	94
5.3 Findings	95
5.3.1 Frugal Innovation and Reverse Innovation defined by the Interviewees ..	96
5.3.2 Macro Level Findings	97
5.3.3 Meso Level Findings	105
5.3.4 Micro Level Findings	110
5.4 Conclusions from the data	118
5.4.1 Drivers and Barriers to Innovation.....	119
5.4.2 The Relationship between Frugal Innovation and Reverse Innovation at SCC	120
5.4.3 Applying SCC experience in other developing economies	122
5.5 Summary	123
Chapter 6 Discussions	125
6.1 Introduction.....	125
6.1.1 Research Aim revisited	125
6.1.2 Research Objectives reflection.....	125

6.2 Research Question One	126
6.2.1 Macro Level Data	127
6.2.2 Meso Level Data	128
6.2.3 Micro Level Data	130
6.3 Research Question Two	133
6.3.1 Macro Level Data	133
6.3.2 Meso Level Data	135
6.3.3 Micro Level Data	136
6.4 Contribution of this Research.....	138
6.4.1 Direct Contributions.....	140
6.5 Framework of Drivers for Frugal Innovation and Reverse Innovation in a Developing Economy.....	140
6.6 Summary	141
Chapter 7 Conclusions	143
7.1 Introduction.....	143
7.2 Practical Recommendations for the Application of the Framework.....	143
7.2.1 Frugal Innovation & Reverse Innovation Drivers – Sustainability	144
7.2.2 Frugal Innovation & Reverse Innovation Drivers – Innovation strategy..	144
7.2.3 Frugal Innovation & Reverse Innovation Drivers – Business processes and Resourcing.....	145
7.2.4 Frugal Innovation & Reverse Innovation Drivers – Organisational learning	146
7.2.5 Frugal Innovation & Reverse Innovation Drivers – Organisational structure and culture	147
7.2.6 Frugal Innovation & Reverse Innovation Drivers – Corporate culture	147
7.2.7 Frugal Innovation & Reverse Innovation Drivers – Leadership	148
7.2.8 Frugal Innovation & Reverse Innovation Drivers – Risk criteria	148
7.2.9 Frugal Innovation & Reverse Innovation Drivers – Attitudes towards Frugal/Reverse Innovation.....	149
7.2.10 Frugal Innovation & Reverse Innovation Drivers – Experience of Frugal/Reverse Innovation.....	150
7.2.11 Frugal Innovation & Reverse Innovation Drivers – Destination Market Innovation Strategy	150
7.2.12 Frugal Innovation & Reverse Innovation Drivers – Dual Business Models	151
7.2.13 Frugal Innovation & Reverse Innovation Drivers – Culture.....	153
7.2.14 Frugal Innovation & Reverse Innovation Drivers – Socioeconomic.....	155

7.2.15 Frugal Innovation & Reverse Innovation Drivers – Resource Scarcity .	156
7.2.16 Frugal Innovation & Reverse Innovation Drivers – Good Enough innovation	156
7.3 Summary of the Research Contribution.....	156
7.4 Conclusion and Recommendations for Further Research	158
7.5 Limitations and Future Research	159
7.5.1 Limitations.....	159
7.5.2 Future Research	160
7.6 Conclusion.....	162
References.....	163
Appendices	172

List of Appendices

Appendix I – The Interview Plan.....	172
Appendix II - Hierarchical map of directors and management.....	173
Appendix III – Ethical Approval Form	174

List of Figures

Figure 1: Dimensions of Innovation.	15
Figure 2: Dellermann's suggested framework.	33
Figure 3: Organic Growth in a Developing economy.	51
Figure 4: Conceptual Framework for Researching the Drivers of Frugal Innovation and Reverse Innovation in an Economically Developing Country	68
Figure 5: Simula, et al.'s Pathways for Diffusion.	69
Figure 6: The Research 'Onion'.....	74
Figure 7: Validity and Reliability.	86
Figure 8: Sources Clustered by Word Similarity. Three sets of data interviews.	92
Figure 9: Data Structure - Conceptual to Theoretical to Essential (with simplified links)	94
Figure 10: Display of Coding Matrix	95
Figure 11: The accepted relationship between Frugal Innovation and Reverse Innovation.....	122
Figure 12: (Overleaf) The Simplified Framework of Drivers and Barriers to F&R Innovation in a Developing Economy and F&R Innovation Timeline.	141
Figure 13: The decision chart for dual business models.	152

List of Tables

Table 1: Definitions of Innovation. These include regional variations, and variations in name only.....	18
Table 2: Ten Frugal Innovations from Around the World.....	54
Table 3: Ten of the studies examined. Only three have a flow of innovation into the emerging market.	57
Table 4: The Interviews for data collection	81
Table 5: Interview Schedule	85
Table 6: The structure of the research programme. A view of what is happening now.	87
Table 7: Coding Matrix	96
Table 8: Summary of Findings. Macro Level Data.....	97
Table 9: Summary of Findings. Meso Level Data.....	105
Table 10: Summary of Findings. Micro Level Data.....	111
Table 11: A brief summary table of both drivers and barriers to F&R innovation at the three management levels examined.....	120

Chapter 1 Introduction

1.1 Context

Saudi Arabia is in the process of broadening its economy to reduce its reliance on oil and gas, and to ensure a sustainable future for the country. Some of the areas into which the economy is expanded are mining, chemicals, and manufacturing. A company whose activities fall into these categories is the Saudi Ceramic Company (SCERCO or SCC), described as;

“Saudi Ceramic Company (SCERCO) is one of the oldest and leading ceramic companies in the Middle East. It owns and operates 25 exclusive showrooms, located in all the major cities of Saudi Arabia, and deals in the manufacturing and trade of ceramic products... The company [has] the following segments: Ceramic Tiles, Sanitary Ware, and Water-heaters. The company's products include ceramic tiles, porcelain tiles, sanitary ware, ceramic road markers and bathroom fittings, electric water-heaters, including baths, shower trays, mirrors and mixers. SCERCO has a branch called 'Desert Mines', which is engaged in the production of silica sand, feldspar, zircon powder, dolomite and other materials, which serve as raw materials for the company's production” (Gulf Base, 2018).

The company intends to increase its exports and to sell in developed as well as in developing countries. This research has largely concentrated on the water-heater division, and the drivers at different levels which are developed into company policy to facilitate these increased sustainable sales by using resource-constrained innovation.

1.2 Introduction

This chapter states the aim of the study and delineates the research questions. In the summary of the Chapter there is a brief breakdown of the structure of the work, allowing the reader to discover any areas of specific interest as well as showing the overall flow of the work.

Throughout this work various kinds of “innovation” are discussed, which are defined in the following Chapter. Essentially, business relies on innovation for growth, and since

the growth is intended to be sustainable, risks of innovation also need to be minimised. Innovation can include new ways to sell products as well as new ways to make or use them, and SCERCO need to be competitive in whichever marketplace they select for their sales. Being competitive is not only about the price of the goods which one sells, the quality and unique selling points (USPs) are also important.

In this context, SCERCO are aiming to be competitive by “Frugal Innovation and Reverse Innovation” (see Chapter 2 for definitions) and expects to supply water-heaters (and/or coolers) competitively in the world market, strengthening the Saudi Arabian economy in the process. This export sales drive covers advanced and developing economies across the world – the water-heaters meet European (EU) safety standards. A list of export countries is included in Chapter 5, Section 5.1.1.1. At this point it is also emphasised that the water-heater division of SCC is currently the most profitable and is experiencing growth. This makes it an ideal case-study for a company in a developing economy seeking sustainable diversification.

1.3 Background

If a company has access to unlimited resources, innovation is relatively easy, as a product can be designed and developed to suit the needs of each customer. Real business never has unlimited resources however, and much of the innovation which does occur consists of adapting an existing product so that it meets the requirements of a wider range of customers or provides them with something not available elsewhere. When resources are limited or cost-constrained (which is almost always the case in real businesses), innovations have to be affordable, effective, and as simple as possible.

Although the Saudi Arabian economy is oil-based, manufacturing of ceramics and the related business of SCERCO does not rely on oil, and, additionally, cannot use any

existing income from oil to expand. It is not in a position where existing oil and gas business could provide investment to expand and innovate, and it is therefore resource-constrained like many other companies. Therefore, to be a competitive international manufacturer, SCERCO must seek to innovate cost-effectively, which includes discovering new markets for existing products as well as adapting existing products to suit different customers. However, the research needs to examine the supply chain and other market competitors when trying to decide the best way to expand the business, and the drivers and barriers to innovation, some of which may be cultural.

Saudi Arabia is in an unusual position, because although the oil and gas produced here have made the country very wealthy, it is still classified by the UN as a “developing economy” (UN, 2016). Other emerging or developing economies may not have the same levels of internal investment that is available in the Kingdom and may also not benefit from the substantial Foreign Direct Investment (FDI) which has taken place here over the past fifty years. Nevertheless, this research aims to provide information which is appropriate and timely for economies where modernisation, expansion, and sustainability are needed to allow their industries to compete globally.

Consequently, the research not only has the aims, objectives, and questions shown below, but also considers the basic concept of innovation, and attempt to show why, in some form, innovation is a necessary ingredient of modern sustainable business in the Twenty-First Century. This is also, in part, why the research vehicle was a single case study – SCC may be used as an example because they are a successful company. A company that has developed in a way that other regional companies have not, as when the oil demand was at its highest many companies in the Middle East and North Africa (MENA) relied so heavily upon imported goods, even in the building

and construction trades, that the few industries which they had traditionally followed fell into closure and recession (Held and McGrew, 2003).

The unfortunate effect of oil in large parts of the MENA has been, according to an eminent observer of the region, an increase in “orientalism” (Said, 1979) and in some cases a loss of identity as Western cultures have taken over (Said, 1994). Although both of these are far from recent observations, they still form the basis of the Saudi Arabian situation. Now that the world has reached “*The End of Oil*” (Roberts, 2004), there may be a reaction against these difficulties, but a framework that could help existing companies cope with a transition to a non-oil economy may be a generally helpful concept. A framework will be devised which is culturally sensitive and which outlines the drivers and barriers to innovation, indicates how the drivers may be applied and, shows how the barriers may be overcome.

1.4 Research Aim and motivation

The main aim of this research is to develop a framework of the drivers of Frugal Innovation and Reverse Innovation in the developing economy context, which is culturally sensitive so that it may be applied even within states with a rigid hierarchy.

This framework will be of particular interest to those developing economies that have previously been dominated by one product (such as oil in the case of Saudi Arabia), or which have been largely dependent on imported goods.

The research is motivated by the desire to see Saudi Arabia’s economy develop sustainable, with a reputation for taking sustainability seriously, and becoming a country where innovation is no longer considered as an alien concept but is fully accepted and endorsed.

The data gathered comes from a series of interviews at three levels of the business and supply chain. These interviews were each approximately 15 minutes in length, and because of their range are believed to be both valid and reliable, as explained in section 4.4

These aims delineate what the research will achieve, and the objectives below are measurable steps towards that goal.

1.5 Research Objectives

- To analyse the macro/ meso/ micro drivers and/or barriers to Frugal Innovation and Reverse Innovation and the extent to which these are applicable to developing economies like Saudi Arabia.
- To analyse the nature of the relationship, if any, between Frugal Innovation and Reverse Innovation in the Saudi Ceramic Electric Water-heater Division.
- To identify ways through which companies in developing economies could manage successful Frugal Innovation and Reverse Innovation.

When successfully reached, these objectives allow the management of any company in a similar position to SCC to know the starting point for their own research, and to define whether the framework can be applied directly to their company, or whether it needs amendment. It also allows the management at SCC to see any links or crossover between the two innovation types within their own organisation to reduce any duplication which may be present. Finally, they will enable company management in other developing economies to grasp the importance of applying the framework and of making use of these innovation concepts.

1.6 Research Questions

1. How does the product development and associated innovation in Frugal – Reverse Innovation impact on the need to increase product competitiveness within SCC?

2. What is the effectiveness of resource constrained innovation in promoting firm performance for SCC?
3. In what ways have SCC managed to overcome the barriers to Frugal-Reverse Innovation within their management structure?

These three questions arise from the gap identified in the Literature Review (Chapter 2) and are answered when the objectives have been met. The idea behind the research can be deduced from the questions – a company in a developing economy needs to discover an appropriate strategy for breaking in to existing developed economies. If Reverse Innovation and Frugal Innovation and the framework prepared are a suitable strategy in any specific case, the management are in a better position to adopt that strategy. It is intended to show the effectiveness of this strategy not only for SCC, but for any company, in any developing economy, that has similar barriers and drivers.

The literature that has been studied in the following Chapter is largely Western-centric, and perhaps over-emphasises the “need” for developed economies to subsidise or support the developing economies from which most of their natural resources come. Despite this, the literature remains valid for Saudi Arabia because of the subject matter – Frugal Innovation and Reverse Innovation are both concerned with making use of what is available, regardless of its original source. This means that, by reviewing the literature from a Saudi Arabian viewpoint, the strengths of the Western, developed economies can, in themselves, be used to innovate within the kingdom. It is hoped that by doing so other companies, and perhaps economies, will be stimulated to take a similar approach and to expand and grow beyond their current limits.

1.7 Main Findings

The main findings, which are discussed more fully in Chapter 5, are that management at all levels in Saudi Arabia are beginning to adapt to a more flexible pattern, despite the high power-distance in the country. Although most changes in the country continue to be “top down”, there appears to be evidence that innovation is becoming accepted as a “bottom up” process, particularly by the lower levels of management. It will take some time for this to permeate the entire business culture, but the research shows that there are some encouraging signs.

1.8 Contributions of this study

These are discussed more fully in section 6.4 but briefly it has added to the knowledge about Frugal Innovation and Reverse Innovation in the management within Saudi Arabia, and has demonstrated some ways in which that knowledge can be put into practice both within the kingdom and throughout the region.

By creating a suitable framework, the research has provided other companies in a similar position to SCC with a suitable tool to ensure that sustainable growth is achieved through using these two innovation types.

1.9 Summary

In this Chapter, the ideas behind the research have been carefully laid out, with the aims and objectives. The research questions have been formulated and the basic need for innovation explained. The next Chapter reviews the extant literature on innovation, much of which is Western-centric in its approach but remains relevant in Saudi Arabia.

Chapter 3 explains the contextual background and the conceptual framework used in the research, Chapter 4 covers the methodology used for research, including a discussion of the underlying philosophy and the means by which data was collected

at three levels within the industry. This data is then displayed and analysed in Chapter 5 – the thematic analysis of the interviews from the three levels has been completed using NVivo 11. The findings and data are then discussed in Chapter 6, this then leads to the final Chapter - the conclusions and recommendations of the study and describes the strengths and limitations of the research.

Chapter 2 Literature Review

2.1 Overview

Innovation has always been integral to the efficient development and operation of nations, organisations and firms (Markatou, 2011). It is widely believed that innovation is a crucial source of gaining competitive advantage in the changing business environment (cf. Crossan and Apaydin, 2009; Klein and Knight, 2005). Therefore, it is unsurprising that innovation and myriad related topics have been the subject of considerable and continuous empirical research and conceptual debate in the academic literature. The debate ranges from what 'innovation' is through to argument over the concept of 'newness' in the following paragraphs, the scope of this study is made clear. Moreover, such is the abundance of available literature that attempting to tackle it in its entirety would likely prove an overwhelming task. However, various types of innovation exist and, consequently, various types of research focus on the specified types of innovation. As the aims of the current study centre on creating a framework for, and applying, Frugal Innovation and Reverse Innovation within an emerging market, this Chapter focuses primarily on these two types of resource constrained innovation. A conceptualisation of these is given below, but a working definition for Frugal Innovation is that it is an attempt to create quality innovations using limited resources for resource-constrained customers. Reverse Innovation is where an innovation originating in an economically developing country can also be transferred to a developed economy to gain new resource-constrained customers – a completely new market area.

The concepts of Frugal Innovation and Reverse Innovation have, in recent years, received significant attention in academic and management literature. The increased

scholarly and professional consideration may be explained by the fact that both Frugal Innovation and Reverse Innovation are considered critical to companies striving to maintain their competitiveness in the rapidly changing contemporary global economy. The centrality of innovation to successful company and organisational performance remains the same irrespective of the size and type of organisation. Addressing this point, Hossain (2017) points out that Frugal Innovation is of vital importance for different types of organisations, including government and state organisations, multinationals and small and medium enterprises (SMEs). The rise of emerging markets such as China and India have resulted in increasing competitiveness among enterprises striving to profit from the growth and spending of middle-class consumers in economically developing countries (Zeschky, Winterhalter, and Gassmann, 2014). Many companies in developing economies face significant challenges in seeking to define their business models to the new, expanding markets in economically developing countries. The main problem they face is that the income, both gross and disposable, of middle-class consumers in economically developing countries, such as China and India, is significantly lower than those in economically developed nations such as the UK and USA. This makes it impossible to sell goods and services within the same price ranges as is the case in Western developed countries. As a result, companies have had to adapt to the new markets by searching for, developing and employing inventive solutions, such as Frugal Innovation and Reverse Innovation. Frugal Innovation is an efficient source of providing low-income consumers with the opportunity to satisfy their needs (Hossain, 2017; Lim and Fujimoto, 2019). The primary idea behind Frugal Innovation lays in the attempt to create quality innovations using limited resources for resource-constrained consumers. In contrast, Reverse Innovation demonstrates an important turn in the economic mindset that presupposes

that innovations developed in low-cost or emerging markets may enter the markets of wealthier and more economically developed countries (Simula, Hossain, and Halme, 2015; Govindarajan and Ramamurti, 2011). Von Zedtwitz, *et al.*, (2015) contend that the idea that innovation may originate from an economically developing country and be transferred to economically developed one is not new. This assertion notwithstanding, it is inarguable that taken together, both Frugal Innovation and Reverse Innovation form a phenomenon. This phenomenon, crucial to many businesses' success, has become a highly and, often, hotly debatable topic in scholarly and managerial literature.

The Chapter begins by examining conceptualisations, descriptions, typologies and definitions of innovation, specifically, those relating to resource constrained innovations, Frugal Innovation and Reverse Innovation. These conceptualisations begin with the basic process-outcome characterisation, through to classifications and frameworks with up to ten dimensions, and many have further subdivisions and types. This conceptual and definitional diversity and complexity is testimony the broadness of the innovation subject area. To provide discipline, direction and emphasis on the conceptualisations, descriptions and definitions, the Chapter moves on to examine representations of resource-constrained innovations in emerging markets. These include differences in cultures and business practices between emerging and developed markets that create the need for particularised understandings of resource constrained environments and resource constrained innovations strategies. It should be considered that, in the view of some academics, "culture" includes everything we do, see, read, or make use of (Stephen and Edwards, 2018). The Chapter analyses literature that illustrates how such strategies are underpinned by categories of different types resource constrained innovation, such as bottom of the pyramid innovation, cost

innovation and of course, Frugal Innovation and Reverse Innovation. Following analyses of the breadth of resource constrained innovation types, the next section focuses on the conceptualising of Frugal Innovation and Reverse Innovation. As is the case with innovation in general, the definitions, descriptions and conceptualisations of Frugal Innovation and Reverse Innovation occupy a scale with simple and straightforward at one end and complex, interrelated dynamism at the other. Having analysed conceptualisations of Frugal Innovation and Reverse Innovation, the next examines literature on the ways in which the two types of resource constrained innovation are implemented within organisations. The focus is on the ways in which implementation impacts upon performance and cost reduction. Specifically, attention is given to the challenges to operating in markets with vastly differing socioeconomic environments (AlOmar, Parslow, and Law, 2018) and expectations and to the approach's companies take to finding optimal solutions that overcome the challenging commercial and cultural situations. The Chapter follows a coherent direction, so having examined literature on how companies implement Frugal Innovation and Reverse Innovation, the following section considers studies about the way the two types of innovation are diffused. As with the previous sections, the diffusion of innovation in general, and Frugal Innovation and Reverse Innovation specifically, has multiple conceptualisations and characterisations that vary according to the complexity and, their locations of their starting and arrival points.

In concluding and leading up to the conceptual framework in the next Chapter that provides structure, direction and theoretical underpinning for this study's empirical research, the complexity and diversity the innovation conceptual field is acknowledged, as are the multidimensional, multilevel and interacting aspects of both Frugal Innovation and Reverse Innovation. The Western centrality of much of the

literature on resource constrained innovation is also reflected upon in the Chapter conclusion. The conceptual framework which follows this Chapter seeks to simplify the intricacy of the resource constrained innovation concept, whilst simultaneously accounting for multiple and interacting innovation flows. Additionally, as this study's research aims are rooted within the perspective of an economically developing nation and its outward looking focus, this is reflected in the conceptual framework.

2.1.1 Innovation Conceptualisations: Descriptions, Types and Definitions

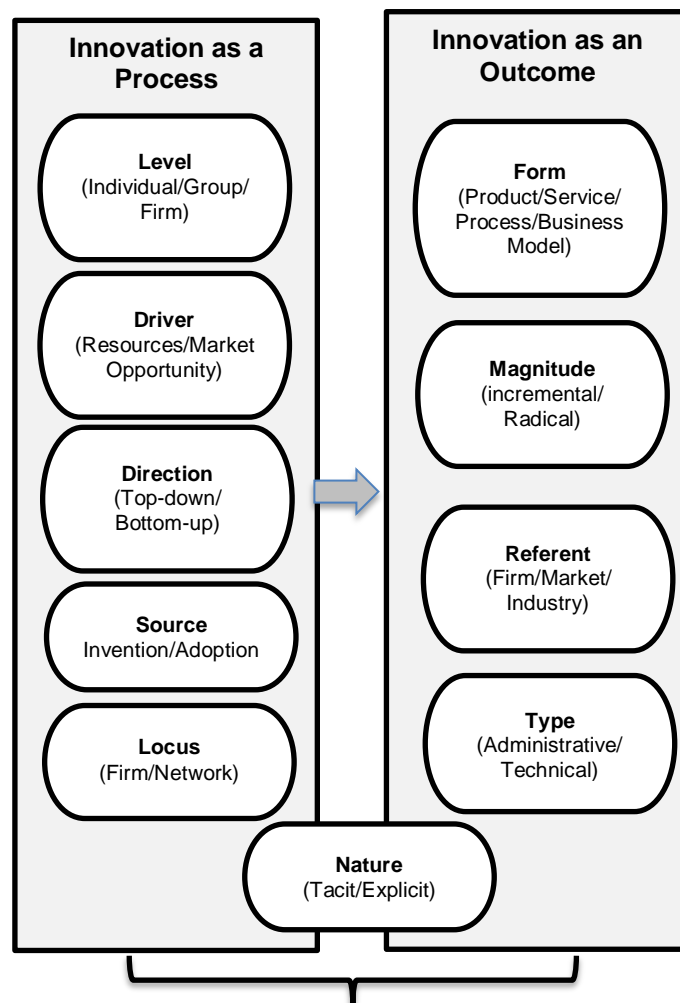
There are numerous understandings and definitions of the term innovation and it is used in a variety of contexts that are dependent or affected by geographical location and organisational sector, whether private or public, manufacturing or service, Multinational Corporation (MNC) or Small to Medium Enterprise (SME). In the first definition of innovation, developed by Joseph Schumpeter in the 1920s, the primary distinguishing characteristic was novelty or the ability to do things in a different way (Crossan and Apaydin, 2009). However, over time other scholars and theorists came to see this as a rather limited definition and offered numerous differentiations and characteristics of innovation. These included definitions highlighting its beneficial nature (Camisón-Zornoza, *et al.*, 2004), successful implementation, (Hobday, 2005), and intentionality (Lämsisalmi, *et al.*, 2006). Nevertheless, not all innovations are the same. They may differ depending on the level of innovation novelty or the sphere of its application. Consequently, it is important to understand what types of innovation may be differentiated.

According to Coccia (2006), the most fundamental classification is based on whether the innovation is viewed as a process or as an outcome. Crossan and Apaydin (2009) undertook an in-depth examination of these two dimensions of innovation. They assert that when viewing innovation as a process, the constituent elements should provide

answer to *how* questions. Such elements include: the level (e.g., firm or individual); the driver (e.g., lack of resources); the direction (e.g., bottom-up); the source (e.g., adoption); and the locus (e.g., network) (see Figure 1). Acknowledging Sood and Tellis's (2005) assertion that often it is difficult to distinguish between innovation as a process and as an outcome, Crossan and Apaydin (2009) nonetheless identify a number of characteristics as indicative of outcome innovation that addresses questions of *what* and/or *what kind*. These include form (e.g., product or service); magnitude (e.g., radical innovation); referent (e.g., market, industry); and type (e.g., technical or administrative). The authors also argue that both views on innovation share a common dimension of nature, which can be explicit or tacit (Crossan and Apaydin, 2009).

Although Coccia's (2006) position that there are two primary types or classes of innovation is not always supported in the literature, it remains the underlying substrate dividing the classes, but there are also several classifications of innovation. For example, a study investigating innovative decision making in investment-construction contains four classes of innovation: "project, process, service and organizational" (Domnina, Savoskina, and Shekhova, 2016, p. 741). Focusing on innovations in healthcare, Adams, Tranfield, and Denyer, (2011, p. 359) surveyed and conducted a cluster analysis of more than 300 innovations and identified three types: "readily-adopted, challenging and under-cover". The authors also developed 13 innovation attribute variables including observability, risk, disruption and profile. The development of these variables indicates that innovation is best examined and understood within the context of the organisation, firm, location and/or sector. Konovalova and Jatuliavičiene, (2015) present what they represent as a scientific classification of innovation that borrows from and builds on Schumpeter's original definition.

Figure 1: Dimensions of Innovation.



Dimensions of Innovation

Source: Crossan and Apaydin, 2009, p.1167

The seven-criterion classification comprises: newness, scale, cyclicity, target/approach, field of application and efficiency. Each criterion is divided into constituent features, which in turn, are sub-divided and linked to identifying types.

Keeley, *et al.*, (2013) developed the Ten Types Framework (TTF) as a supposedly easy tool for the identification of innovation types. The TTF is comprised of three main groups or types of innovation: configuration, offering and experience. Configuration innovation refers to, in most processes of the enterprise, offering innovation focuses on the selected service or products developed by the enterprise, whilst experience innovation refers to more customer-related aspects of business systems (Keeley, *et*

al., 2013). The existence of multiple classifications of innovation points to such categorising being dependent on, or at least, influenced by, industry/sector. This notwithstanding, a specific group of innovations has received a considerable attention in recent years. These are resource-constrained innovations, particularly in the emerging markets of economically developing nations.

2.1.1.1 Resource-constrained Innovations in Emerging Markets

The rapid growth and development of emerging markets have reshaped the global business environment over the last few decades (Zeschky, Winterhalter, and Gassmann, 2014). Drummond (2012) highlights four features of developing economies that signify their importance for the global business: First, emerging markets contain vast and rapidly expanding numbers of new consumers. Second, emerging markets may be characterised, not only by the immense volume of potential consumers, but also as a source market for new inventions and developments. Third, global business enterprises should realise the fact that the local business practices may differ significantly, even drastically from the established global practices. Fourth, emerging market multinationals have already altered the global market significantly and this change poses numerous challenges to Western global businesses. One of the primary challenges to companies headquartered in Western, economically developed nations is the discrepancy between available resources from Western markets and the limited paying abilities of consumers from emerging markets (Zeschky, Winterhalter, and Gassmann, 2014). This constraint resulted in the need to adapt to the new environment by developing a resource constrained innovation (RCI) strategy. *“Success does not lie in having abundant resources, but in utilising limited resources in ways that enhance organisational capabilities”* (Batra, et al., 2015, p. 20). This strategy is equally applicable for resource-constrained marketplaces as it is for

resource-constrained companies. A resource-constrained environment may be described as an environment that sets new goals and challenges without providing additional resources (Baker and Nelson, 2005). These challenges are managed with the help of a separate group of innovations known as resource-constrained innovations.

Towards the end of the Chapter, the importance of resource-constrained innovation to the Chinese economy is discussed, and the Indian experience has been similar. Unfortunately, not enough is known in Saudi Arabia about innovation as a process or as an outcome, since the conservative views of the country have long prevailed against the acceptance of any innovation. The literature also mainly examines pathways by which existing successful economies can appropriate to themselves the potentially enormous markets that are opening in China and India, where almost two-thirds of the world's population live (Corsi, Di Minin, and Piccaluga, 2014; Dellermann, 2017). Of course, Saudi Arabia would also like to make use of this massively enlarged marketplace, but it is not necessarily possible to use Euro-centric views of company expansion in a developing economy such as Saudi Arabia's.

2.1.1.2 Types of Resource-constrained Innovations

Resource-constrained innovation is often used as a general term to refer to various types of innovations in the emerging markets (cf Zeschky, Winterhalter, and Gassmann, 2014; Pansera and Owen, 2015). Zeschky, Winterhalter, and Gassmann, (2014) use this term in discussing various types of resource-constrained innovations, such as, cost innovation, Frugal Innovation or good-enough innovation. Pansera and Owen (2015) also employ the term resource-constrained innovation when referring to 'bottom of the pyramid' types of innovation. Pansera (2013) utilises the term 'below the radar innovation' in referring to resource-constrained innovation in general. An

abundance of terms may be found in the academic literature on the topic of resource-constrained innovation. Therefore, it is considered apposite herein to provide an overview of various existing definitions in attempt to provide definitional clarity and avoid ambiguity in the future research.

Table 1: Definitions of Innovation. These include regional variations, and variations in name only.

Type of Innovation	Definition	References
Blowback innovation	Innovative solutions developed and adopted first in emerging markets	Brown and Hagel (2005)
Bottom of the Pyramid Innovation	Innovations that aim to meet the needs of unserved poor populations	Prahalad (2004)
Cost Innovation	Innovations that offer expensive products (usually Western) leveraging developing economies' cost advantage to develop innovation at dramatically lower costs	Zeng and Williamson (2007); Zeschky, Winterhalter, and Gassmann, (2014)
Disruptive innovation	Affordable, "good enough" products that meet consumers' basic needs at a relatively low cost	Christensen (1997), Yu and Hang (2010), Hart and Christensen (2002)
Frugal Innovation	Innovations specifically designed to satisfy the needs of low-income consumers in developing markets and has a large cost advantage, and in some cases inferior performance, compared to existing solutions, and developed in a resource-constrained context	Hossain (2017); Hossain, Simula, and Halme, (2016); Radjou, <i>et al.</i> , (2012); Simula, Hossain, and Halme (2015) Zeschky, Winterhalter, and Gassmann (2014)
Good Enough Innovation	Innovations that include functionalities and features designed to meet a range of resource constraints beyond capital constraints	Zeschky, Winterhalter, and Gassmann, (2014)
Indigenous innovation	A process of making use of technologies transferred from the western developed economies to develop superior technologies at home	Lazonick (2004), Lu (2000)
Innovation at the bottom of the pyramid	Innovation developed in and targeting the large unserved segments of poor people inhabiting developing economies	London and Hart (2004), Prahalad (2004)
Jugaad/Gandhian innovation	Design of low-cost yet efficient innovations for the Indian market that responds to two Gandhian tenets: affordability and sustainability	Prahalad and Mashelkar (2010)
Lean Innovation	Innovations that aim at eliminating all non-value-adding processes in order to achieve goals with the least possible result	Sehsted and Sonnenberg (2010)
Resource-constrained Innovation	Innovation developed in developing economies in a context characterised by lower power of purchase, lower understanding of technology, and lower investment resources	Ray and Ray (2010)
Reverse Innovation Reverse Innovation	Innovations that are developed in emerging market first and then accepted in the advanced markets Innovations adopted first in poor (developing) countries before being adopted in western developed economies	Govindarajan and Ramamurti (2011); Govindarajan, Trimble, and Nooyi (2012); Hossain, Simula, and Halme, (2016); Immelt, Govindarajan, and Trimble, (2009); Simula, Hossain, and Halme (2015); von Zedtwitz, <i>et al.</i> , (2015)
Shanzhai innovation	Chinese low-quality, low-price imitations of foreign branded products	Peng, Xu, and Lin (2009)
Trickle-up innovation	Innovations developed for the bottom of the pyramid that subsequently trickle up to the developed world	Prahalad (2004)

Although Frugal Innovation and Reverse Innovation are the principal terms that form the basis of this research, they are far from being the only terms currently used to define the resource-constrained types of innovation (Zeschky, Winterhalter, and Gassmann, 2014). One of the most popular ways to refer to resource-constrained innovation is 'Bottom of the Pyramid' (BOP) which denotes a specific market of customers, who as the name implies, are located at the bottom of the income pyramid. There are billions of people in economically underdeveloped and developing countries who subsist on less than \$2 a day and they represent an, as at yet, untapped market, via which MNCs can realise growth, cost saving if they outsource parts of their operations, as well as having the potential to produce innovations that may alter or even transform entire companies (Streb and Janse, 2017). After iterating that numerous classifications and attempts to identify this market exist, Prahalad (2004), states that BOP was originally created to pay attention to the needs of low-income consumers who comprised of four or five billion poor people. However, whilst this iteration represents BOP innovation as providing solutions for unserved poor population, it is also arguable that it is another means of exploiting potential new markets with the focus on improving competitiveness and sustainable profitability. Pansera and Owen (2015) offer an analysis of BOP within the prism of inclusive innovation, which they contend can be viewed as fostering socio-political empowerment or preparing market readiness and engagement. What is clear is that BOP is an instrument for utilising innovation to penetrate and reap dividends for markets in which consumers have low incomes. Unfortunately, much of the literature discusses ways in which already successful MNCs can enter these potentially vast marketplaces, rather than discussing ways that SMEs in developing economies can

grow, potentially into MNCs utilising their access to these markets – one of the overall aims of this research is to create a framework that will permit them to do so.

Cost innovation is another type of resource-constrained innovation which, according to Zeng and Williamson (2007), has been used to describe the Chinese strategy of offering 'more for less'. Zeschky, Winterhalter, and Gassmann, (2014) define cost innovation as the experience of developing similar products with similar functionalities at a lower cost. This is especially relevant when it comes to Western markets. Thus, Chinese developers use their cost advantage to produce products with the same functionality at a lower price than those produced by Western companies. Zeschky, Winterhalter, and Gassmann, (2014) contend that the reduction of the product size that results in lower cost is the purest example of cost innovation. It is not only companies in economically developing countries that employ cost innovation strategies. Companies in economically developed countries also engage in adapting products, including high end, high-tech, so that they have basic functionalities that can be produced at lower cost (Pisoni, Michelini, and Martignoni, 2018).

Lean innovation is another term used to describe resource-constrained innovation. It refers to the process of eliminating unnecessary processes or elements in order to achieve the desired goal with the least possible effort (Sehested and Sonnenberg, 2010). The main idea behind lean innovation refers to the fact that anything that does not create value for the customer should be eliminated from the product and process of producing the product. Avoiding the waste produced by unnecessary work and/or unnecessary elements in the product production process means eliminating any and all elements that do not provide. Sehested and Sonnenberg (2010) add that three fundamental principles are used in lean innovation: 'do the right thing'; 'do it right'; and 'do it better'. Lean innovation is best achieved in circumstances in which companies

look at limited resources as an enabling, opportunity producing factor that encourages experimentation and risk taking, produces the reconfiguration and reallocation of resources and can result in empowered radical innovation of limited resources (Bicen and Johnson, 2015). Kock, Heising, and Gemünden, (2015) offers a note of caution in addressing examining lean innovation's relationship to high reliability in projects that are safety critical. In such circumstances it is important to take steps that ensure that the drive for leanness of innovation does not result in compromises in either reliability or safety.

Specially designed solutions that aim at meeting resource constraints are called Good Enough innovations (Zeschky, Winterhalter, and Gassmann, 2014). Good enough innovation can be achieved using the advantages of the developing marketing, that is, the low cost of development. In addition, good enough innovations often re-engineer a specific product and minimise or alter functionality to make it more affordable. In their typology of Reverse Innovation, von Zedtwitz, *et al.*, (2015) categorise good enough innovation as a form of disruptive innovation wherein products are produced that meet the basic needs of customers at an affordable, comparatively low price. This shows the complexity and fluidity of typologies of innovation, for not only does good enough innovation overlay cost innovation to the extent that it is difficult, if not impossible, to distinguish between the two, and Western developed country-based companies also use cost innovation by outsourcing operations, but typologies of innovation do not adopt universally agreed classifications. This definitional and classificatory diversity is reflected in this literature review in the two Tables (below). The first, produced by this author from reviewed literature, contains seven types of innovation that fall within the Frugal Innovation and Reverse Innovation rubric. The

second, also resulting from a literature review – undertaken by von Zedtwitz, *et al.*, (2015) – contains 11 types of innovation.

What becomes clear from the examination of these tables, however, is the level of Western- or Euro-centricity already briefly mentioned. Most of the authors are not interested in creating a new economy (which is what is required in Saudi Arabia and other oil-based economies in the MENA), but have focussed on allowing existing economies to take advantage of the potential new markets. This difference in focus is discussed further in section 2.6 and ways in which Saudi Arabia may be able to benefit are introduced in the same section. The viewpoint and focus of the existing studies do present some difficulty, but the largest difficulty encountered, as explained above, is that the terms have a wide range of alternative names and some vague definitions.

The definitional diversity notwithstanding, the central focus of this research is on the characterisations of, relationships between, opportunities afforded by and challenges presented by Frugal Innovation and Reverse Innovation. With this in mind, the next section reviews literature on these two types of innovation. “working definitions” of Frugal Innovation and Reverse Innovation may be found at the end of sections 2.2.1 and 2.2.2 respectively, although, as explained below these working definitions are neither “universally accepted” nor necessarily “definitive” – they simply enable comparison to the definitions which can be made from the data.

A careful examination of this table indicates that semantics plays a large part in the apparent diversity of forms which resource-constrained innovation takes – a universal or standardised definition would, in my view, show that there were two categories, Frugal Innovation and Reverse, but that each then contained sub-categories that would, perhaps, diversify according to context or region. Until such a definition has been agreed and applied, the choice of which names fit into either of the categories

used for this study remains subjective, although where this is done a rationale or explanation is given.

2.2 Conceptualising Frugal Innovation and Reverse Innovation

Because of the lack of any standardised or commonly accepted definition of either of these important concepts, the following sub-sections explain in more detail what each means within the context of this study. Each section ends with a working definition of the term, derived from the literature. This is later be compared to the definition derived from the data, so that it will be apparent how well the participants have grasped the concept. From the viewpoint of the manufacturing industry in a developing economy, the two types of innovation are necessarily differentiated from each other and from other forms of innovation.

Within this research, because of the view expressed above that they represent the two main categories, only Frugal Innovation and Reverse Innovation are considered, although there may be some overlap with other innovation types, as described by Zeschky, Winterhalter, and Gassmann, (2014), and by Hossain, Simula, and Halme, (2016). Where this occurs, the aspects which do not fit with the working definition at the end of the sub-section are not “discarded”, but considered as exceptions, to be used when assessing the understanding of the concept given by the data. Table 1 gives the definitions of the main types of innovation as suggested by the literature, and some of the common terminologies that may overlap.

2.2.1 Frugal Innovation

Hossain (2017) describes Frugal Innovation as a new phenomenon that is of significant importance to small and medium enterprises (SMEs), multinationals, state and non-governmental organisations (NGOs), aims to provide more opportunities to

low-income consumers. Zeschky, Winterhalter, and Gassmann, (2014) believe that there is no unity of opinions on the nature and definition of Frugal Innovation. This is confirmed by the definitional diversity highlighted in the two tables above. Hossain, Simula, and Halme, (2016) define Frugal Innovation as;

a resource scarce solution (i.e., product, service, process, or business model) that is designed and implemented despite financial, technological, material or other resource constraints, whereby the final outcome is significantly cheaper than competitive offerings (if available) and is good enough to meet the basic needs of customers who would otherwise remain un(der)served (Hossain, Simula, and Halme, 2016, p. 133)).

This definition highlights that resource scarcity can come in one or more forms and that the outcome involves the provision of products and/or services that offer basic functionality at prices that are affordable to low income markets. Radjou, Prabhu, and Ahuja (2012) employ a similar definition to that of Hossain, Simula, and Halme, (2016) in characterising it as being the capability to do more things with fewer resources. Simula, Hossain, and Halme (2015) state that Frugal Innovation is the practice that presupposes the development of cheap products that provides value for low-income customers. Tiwari and Herstatt (2012) also support this definition of Frugal Innovation. According to Sharma and Iyer (2012), the origin of Frugal Innovation is resource scarcity. Thus, the main idea behind it is turning disadvantages (such as the lack of resources) into competitive advantages.

It is important to add that there are numerous terms that often overlap with the notion of Frugal Innovation and understanding such is useful in navigating the diverse definitional terrain. These overlapping, and/or contiguous terms include resource-constrained innovation (Ray and Ray, 2010), cost innovation (Williams and Triest, 2009) and Jugaad in India (Radjou, Prabhu, and Ahuja, 2012). According to Pansera (2013), Frugal Innovation can be further subdivided based on local references to this

type of innovation. For instance, *Jugaad innovation* is a Frugal Innovation by its nature and this term is primarily used in India (Pansera, 2013). Prahalad and Mashelkar (2010) state that although innovations are generally associated with the notion of affluence and abundance, which are not the case in economically developing countries, some of the firms from India demonstrated a new type of business by designing inexpensive yet efficient products and services appropriate for the income level of their consumers. Such experience is called *Jugaad* or *Gandhian* innovation. Prahalad and Mashelkar (2010) prefer the term “Gandhian innovation” because the word *Jugaad* has negative connotations. Pansera (2013) notes that similar localised terms are used to describe Frugal Innovation may be observed in other countries. Thus, Frugal Innovation is called *gambiarra* in Brazil, *jua kali* in certain African countries and *zizhu chuangxin* in China (Pansera, 2013).

According to Halme, Linderman, and Linna, (2012), it is crucial for companies to understand that emerging markets require a different approach in comparison to developed markets. This is the primary reason why Frugal Innovations exist. However, various types of Frugal Innovations and their application may be identified. As Simula, Hossain, and Halme (2015) state, these innovations may be aimed both at solving everyday problems and providing critical solutions for global enterprises. Taking this into consideration, Frugal Innovations are usually divided into three types; Grassroots Innovation, Commercial Frugal Innovation, and Social Motivation Innovation.

The first type is called grassroots Frugal Innovations. Grassroots innovations has been defined as “a network of activists and organisations generating novel bottom-up solutions for sustainable development and sustainable consumption; solutions that respond to the local situation and the interests and values of the communities involved” (Hossain, 2017). A vivid example of grassroots innovation is the use of old bicycle

parts to make a wind energy source by an African boy, who had no knowledge of making renewable energy sources (Simula, Hossain, and Halme, 2015). This may also involve the integration of power, water, and other resources (Baleta, *et al.*, 2019). Grassroots innovations are of special interest for academics and management professions as they form a unique type of Frugal Innovation.

This uniqueness refers to the fact that grassroots innovations are developed by individuals who often do not possess educational qualifications or work experience that might be related to their innovations. Seyfang and Longhurst (2016) maintain that the primary difference between grassroots innovations and conventional market innovations is that the former is driven by unmet needs of local society, local ideology or the ideological commitment, whilst by way of comparison, the latter are usually driven by the idea of gaining more profit. Hargreaves, *et al.*, (2013) strongly support this opinion and describe other significant demarcations between grassroots innovations and market-based innovations.

The type of innovation organisation is a principal difference, as market-based innovations are usually organised by firms, whereas grassroots innovations are more usually found in, and managed by, informal communities (Hargreaves, *et al.*, 2013). Different resource bases comprise the second distinction, with grassroots innovations usually realised with the help of voluntary labour in comparison to paid employment within market-based innovations. Finally, Hargreaves, *et al.*, (2013) draw attention to the fact that grassroots innovations are most likely to pursue radical reform of sociotechnical systems in comparison to market-based innovations' pursuit of mainstream business greening. In other words, grassroots innovations tend to be dramatic, whilst market-based innovations are usually incremental in nature.

The interest in, and significance of, grassroots innovations are predetermined by the fact that such innovations may be observed and studied outside their local implementation. Hence, grassroots innovations may become sources of successful alternation of innovation processes in various enterprises. Hargreaves, *et al.*, (2013) provide examples of recent grassroots innovations that have become an object of study within modern sciences, namely complementary currencies (Longhurst, 2012), local and organic systems of food provision (Smith, 2006), and eco-villages and eco-housing (Avelino and Kunze, 2009). A study of such innovations demonstrates the powerful nature of grassroots innovations that can challenge established practices or technologies and promote a new way of social life organisation (Feola and Nunes, 2014). Feola and Nunes (2014) contend that grassroots innovations may serve as 'incubators' of the required societal changes.

Commercial Frugal Innovations form the second type. Simula, Hossain, and Halme (2015) use MittiCool's clay refrigerator as an example of this type of Frugal Innovations. The clay refrigeration is eco-friendly and can be made at a very low-cost. It requires no electricity and all products can be stored in it up for three days.

The third type is social motivation innovation. Inexpensive pumps made by KickStart serve as an example of social motivation innovation that leads to a better quality of life for African farmers (Fisher, 2006).

2.2.1.1 Working Definition from the Literature

The working definition of Frugal Innovation stated at the beginning of the Chapter, that it will "*create quality innovations using limited resources for resource-constrained customers*" covers all the above, which simply provide the motivation for the Frugal Innovation. In Saudi Arabia, the drivers for this innovation type will be uncovered as

the Chapter progresses, but it is clear that SCC does have “resource-constrained customers” both at home and in overseas markets, and that, whilst it wishes to provide product suitable for these customers it is not prepared to sacrifice quality, and must therefore attempt to be innovative with the existing products to allow them to be adapted without additional cost. Of these three types, the second and third are the most relevant in the case of SCC and Saudi Arabia.

2.2.2 Reverse Innovation

There is a common process for innovations, according to Xu and Xu (2016), in which economically developed countries innovate first and then this resource-constrained innovation is accepted and adopted by economically developing countries. However, the innovation process came the other way around when the portable imager was first developed in an emerging market and then entered economically developed markets. It was in response to this reversal of the development process that the term ‘Reverse Innovation’ was used by Jeffery Immelt for the first time (Xu and Xu, 2016). Reverse Innovation is usually used to describe cases in which innovations are created and adopted in economically developing countries first and then are ‘trickled-up’ to economically developed countries (Govindarajan and Ramamurti, 2011). von Zedtwitz, *et al.*, (2015) definitional description reiterates this, stating that the term ‘Reverse Innovation’ is commonly used to denote a process in which an innovation is launched in an emerging market before being introduced into developed, high income markets.

Hossain, Simula, and Halme, (2016) define Reverse Innovation as “*a resource constrained solution (i.e., product, service, process, or business model) that has been introduced first, either successfully or not, in emerging markets or developing countries and then successfully transferred (with some modifications) to developed countries*”

(p. 133). As Simula, Hossain, and Halme (2015) argue, the main idea behind Reverse Innovation is to demonstrate a Frugal Innovation to a developed economy and a wider range of new customers, which is especially efficient in times of economic crisis or when customers are cost sensitive to extra payments.

All the aforementioned definitions of innovation share particular commonalities and differences. The principal commonality within the definitions is that they all aim to provide value using limited resources. Cost innovations developed and/or produced in low income emerging markets are basic cheaper and cheaper alternatives to Western products. Good enough innovations are also cost innovations but with a difference which is the reduction of non-necessary features of the products. This feature of good enough innovation is common to the main principle within lean innovations, which is the elimination of elements that do not provide value for the customer.

The concepts of Jugaad innovation and BOP innovation also refer to the development of similar value at lower cost. However, the primary focus of these definitions is that the product is to be developed for the specific target audience rather than on the ways of making that product more affordable. In their turn, Frugal Innovations demonstrate a new level of innovations that are specifically developed for low-income markets. The main characteristic of Reverse Innovation that differentiates it from Frugal Innovation is that it enters advanced and high-income markets. At the same time, Reverse Innovation may originate from any other type of innovation (cost, good enough, Jugaad, and so forth).

Although the term 'Reverse Innovation' is relatively new, the idea behind it has been already discussed by scholars. For instance, in 2005, before the term 'Reverse Innovation' was coined and accepted into academic and management, Brown and Hagel (2005) utilised the term 'innovation blowback' to describe the low-cost

innovation practices in Asian countries that could enter developed markets and shatter the well-established Western markets (Radojevic, 2015). Similar concerns were expressed by Deloitte who shared an opinion that some of the products that were created in emerging markets had entered developed markets (Radojevic, 2015). One of the most vivid examples of such products was Renault's car Logan which was specifically designed for the Eastern Europe low-income consumers, before becoming widely accepted in Western Europe as well. The term 'Reverse Innovation' is well established nowadays and it represents an extremely interesting phenomenon. As Simula, Hossain, and Halme (2015) state, Reverse Innovation challenges the traditional view of the innovation process. Thus, wealthy countries are no longer the only source of innovation and economically developing countries have changed their role from that of always being the recipients of innovation to also being innovation creators and manufacturers.

The concept of Reverse Innovation is sometimes compared to that of glocalisation. In general terms, glocalisation is a term used to refer to a practice when companies from developed markets design products in their domestic markets and then allocate modified, more basic and cheaper versions of these products to other markets throughout the world. Such process of innovation has always been believed to be a highly efficient as it allows companies to minimise costs at a global scale and maximise market share by adapting products to local markets (Hadengue, Marcellis-Warin, and Warin, 2015). However, with the rise of emerging markets, glocalisation is no longer the most efficient option for global business. Immelt, Govindarajan, and Trimble, (2009) view glocalisation as an opposition to Reverse Innovation. However, von Zedtwitz, *et al.*, (2015) believe that this market-based understanding of Reverse Innovation is rather limited. They suggest a development-based approach to

understanding Reverse Innovation, which puts emphasis on the fact that innovation may be represented as a flow across different locations (von Zedtwitz, *et al.*, 2015). This innovation flow approach presupposes that the place of actual innovation may change without any changes to the core idea behind that innovation.

According to von Zedtwitz, *et al.*, (2015), there are four so-called 'ingredients' of Reverse Innovation that also make it possible to better understand its nature;

First. The home country of the companies is no longer targeted as a primary market. The authors contend that in the contemporary era, even MNCs target consumers from developing countries like China.

Second. Some products designed in and for emerging markets become superior to other products elsewhere.

Third. The process of product development is no longer takes place exclusively in developed countries.

Fourth. Firms in emerging markets do not only develop products, they also devise new products. This means that they are open for more markets, both developed and developing.

von Zedtwitz, *et al.*, (2015) also draw attention to the fact that various flows of global Reverse Innovation exist. von Zedtwitz, *et al.*, (2015) distinguish between what they term the Strong Sense of Reverse Innovation (SSRI) and the Weak Sense of Reverse Innovation (WSRI), with each having its demarcating flow.

GE's Logiq Book portable ultrasound device may serve as an example of Reverse Innovation. According to Zeschky, Winterhalter, and Gassmann, (2014), the device was designed in China in 2002. Since that time, its advanced version has been sold worldwide, including the United States and Europe, as the device turned out to have

great value proposition being both low cost and portable. The device is still currently used in medical offices that are too small for large stationary machines (Immelt, Govindarajan, and Trimble, 2009).

2.2.2.1 Working Definition from the Literature

Again, this allows the working definition given in the introduction to be used without further modification – Reverse Innovation is: *“where an innovation originating in an economically developing country has also been transferred to a developed economy to gain new resource-constrained customers – a completely new market area”*. However, as noted at the beginning of the section, this is a loose definition, and is not intended to be a final definition.

2.2.2.2 A Brief note on “Reverse Engineering” (Disambiguation)

It is essential that Reverse Innovation is not conflated with the very different process of Reverse Engineering. Reverse Engineering is something which is generally protected against, wherever possible (Jang, *et al.*, 2018), and is, in effect copying or stealing an existing design and making a cheaper version. It can be carried out on mechanical products or on software, and is regarded as unethical in almost every instance, whereas Reverse Innovation is completely acceptable and is simply the directional flow of innovations.

2.3 Frugal Innovation and Reverse Innovation: Implementation in Firms

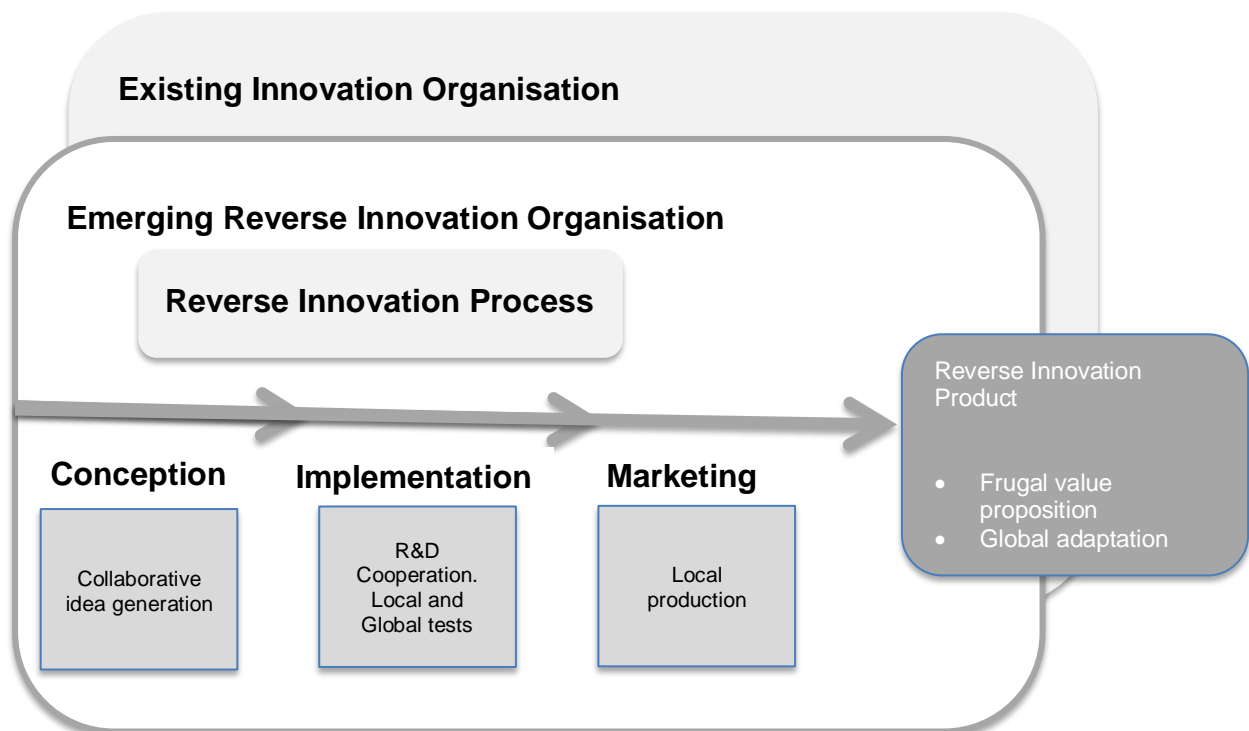
The Western-centric focus of research papers means that implementation is often seen as meaning ways in which companies in established economies can introduce themselves into the emerging markets:

“Developing countries have an expanding middle class whose yearly income is between US\$1,500 to US\$20,000 and who, as a group, represent a tremendous mass market of roughly two-thirds of the

world population, the so-called “bottom of the pyramid” (BOP)” (Dellermann, 2017, p. 31).

However, Dellermann does go on to stress the advantages for SMEs in the developing countries of what he calls “*open innovation*”. His study concentrates on Reverse Innovation in the field of medical equipment and proposes the framework in Figure 2. This framework is a clear indication that Reverse Innovation has no connection with Reverse Engineering, as detailed above in section 2.2.2.2, the main thrust being that the developing economy can usually carry out local research and development more effectively and at lower cost than an MNC with a headquarters several thousand miles away. Dellermann (2017) is one of a small number of academics who openly suggest that resource-constrained innovations are one way for SMEs to develop into MNCs, which is an aim of this research.

Figure 2: Dellermann's suggested framework.



Source: (Dellermann, 2017, p. 36)

However, the thrust of Dellermann’s (2017) work is that since “*Managers of SMEs in developed countries can expect competition from reverse innovation efforts*”

(Dellermann, 2017, p. 36), they should find ways to incorporate this into their own business. This is because, in his view:

“Developed country SMEs can leverage tremendous growth opportunities when applying a reverse innovation procedure. This recent pathway of innovation is not restricted to local success in emerging markets but can also facilitate prosperous business activity at home and, potentially, globally” (Dellermann, 2017, p. 38).

A slightly more encouraging opinion (from a Saudi Arabian viewpoint) comes from Gupta and Thomke, (2018), who found, like this study, that non-Western-centric research into Frugal Innovation and Reverse Innovation is hard to find, and that:

“microlevel product development processes in these economies are relatively unexplored, and the mechanisms by which the developing economy context might affect such processes are still unclear” (Gupta and Thomke, 2018, p. 485).

In their study, they concentrate on the implementation of these processes in India, and the advantages accruing to the developing economy rather than the already established economy. Because this is one of the aims of this research, Gupta and Thomke (2018) have been studied deeply, and although they based their study on medical devices developed in India, the relevance to SCC products in Saudi Arabia is strong.

Their findings suggest that there are *“product development challenges arising from contextual factors in developing economies”* (Gupta and Thomke, 2018, p. 490), that *“the observed iterative testing approach in India was enabled by its developing economy context”* (p. 491) and that *“product development efforts benefitted from the learning derived from the iterative testing”* (p. 491). All three of these findings become increasingly applicable in the context of Saudi Arabia when the detail of each is considered. The first is expanded (in the Indian Medical context) to:

The developing economy context creates challenges for medical device development projects. These challenges relate to lack of experience with R&D, resources, infrastructure, ecosystem and

access to and involvement of physicians” (Gupta and Thomke, 2018, p. 492).

These points are reflected in Saudi Arabia, since much of the Research and Development (R&D) is carried out abroad in the companies which originally supplied the technology, R&D resources are limited by the shortage of Saudi engineers, the infrastructure is designed around manufacture rather than design, and the ecosystem in the MENA countries is not the obvious development bed for water heaters, coolers often being more appropriate.

The second and third findings of Gupta and Thomke (2018) are also relevant to the Saudi Arabian context, since it is relatively inexpensive to try to adapt an existing product to suit the customers' needs, and small changes with many iterations is the least expensive way of making those improvements. Indeed, this also assists with the training of local engineers, because they must learn from their attempts at improvement, and the learning curve is necessarily steep. On the basis of these findings, Saudi Arabia and SCC are perfectly placed to implement Frugal or Reverse Innovation and gather all latent advantages they may bring.

2.3.1 Frugal Innovation Implementation

Although the focus is on companies in developing economies, and within those, Saudi Arabia, there are also, according Altman and Engberg (2016), a growing number of Western firms which are starting to rely on emerging markets as a result of Frugal Innovation development. The principal idea refers to the fact that Western firms may not have sufficient knowledge of the needs of local markets in developing economies. When it comes to the implementation of Frugal Innovation in Western firms, the collaboration with local markets in developing economies forms a basis for a successful implementation. Several reasons conflate to determine the extent of the

need for collaboration. The first reason is the concern about the transferability of knowledge. Thus, Western companies may need to rely on the knowledge of local developers who will be able to advise on modifications that would make a product better adapted to the needs of local consumers in emerging markets (Altman and Engberg, 2016). Correspondingly, local developers' better knowledge of the most efficient and required features of the product may result in the increased function-to-cost ratio (Corsi, Di Minin, and Piccaluga, 2014). In addition, the collaboration with local developers and firms allows Western companies to become more proficient in the local culture and knowledge, which is especially useful for quick and efficient knowledge transferability (Altman and Engberg, 2016). As a result, Western companies may consider rethinking their established business processes (Colledani, *et al.*, 2016). The establishment of the new business process is useful for the creation of a process that provides benefits for both the company and the new groups of consumers. Furthermore, an adaption of a new business process premised on Reverse Innovation may result in the disregarding of the previously established technologies that, if retained, may turn out to create hindrances in the new market (Corsi, Di Minin, and Piccaluga, 2014).

However, the adaptation of a new business process may be a challenging activity and be realised via one of several approaches. Lim, *et al.*, (2013) consider core product modification as the first approach for Frugal Innovation implementation in emerging markets. This approach is recommended in dealing with such challenges as poor product design or the inability of the product to meet customers' needs. Additionally, this approach is advantageous in case the technology of the core product does not fit the technology of the emerging market. It is argued that the presence of local partners is useful for better understanding of the required modifications and that local partners

are helpful when adapting the operational and manufacturing processes, as well as, building a suitable technology platform (Anderson and Markides, 2007; Corsi, Di Minin, and Piccaluga, 2014).

Corsi, Di Minin, and Piccaluga, (2014) propose a second approach to Frugal Innovation implementation – value engineering. Value engineering is *“a process by which the function-to-cost ratio of a product is systematically increased based on market and customer insights”* (Altman and Engberg, 2016, p. 48). This approach is often preferred in instances when Western firms face challenges in adapting to local business models. Moreover, value engineering is recommended when the price of the product is too high for emerging market or when companies’ marketing activities are aimed at the top ten or five percent of customers (Corsi, Di Minin, and Piccaluga, 2014). In this scenario, the local partners are of central importance because of their ability to provide insights into the necessary functions in particular, and the development of a more appropriate business model, in general. More importantly, local practitioners may suggest a vision in which scarcity of resources is viewed advantageously, which may result in a company’s ability to reduce product price from high to low (Corsi, Di Minin, and Piccaluga, 2014; Gupta and Wang, 2009).

Zeschky, Winterhalter, and Gassmann, (2014) detail a third approach that is premised on Western companies relying on local research and development (R&D) centres based in emerging markets. This approach is called localised products development. Western companies turn to this approach when their local R&D processes are no longer efficient in the new market of Frugal Innovation. Mostly, this happens when the R&D process is aimed at the top five to ten percent of consumers, which is not efficient within emerging markets. Therefore, by adopting local traditions of R&D, Western firms have higher chances of quick and efficient Frugal Innovation implementation (Soni and

Krishnan, 2014). Additionally, the facilitation of new R&D processes empowers local markets as active developers, which in turn results in the lower cost of product development. An interesting solution to the problem is suggested by Mourtzis, *et al.*, (2016), who describe a multi-criteria decision-making algorithm that is aimed at initiating high-performance manufacturing networks that would sufficiently adhere to Frugal Innovation needs.

One aspect of Frugal Innovation implementation is, as emphasised throughout, is building a sustainable economy. Unfortunately, as Sousa-Zomer and Cauchick-Miguel point out:

“The current approaches to sustainability, such as efficiency improvements and cleaner production, do not, on their own, deliver ... Sustainable development, which meets the needs of the present without compromising the ability of future generations to meet their own needs – according to the Brundtland Commission Report definition (UN Documents, 2013) – requires radical innovations that can be more effectively created when building on the concept of business models” (Sousa-Zomer and Cauchick-Miguel, 2019, p. 584).

The archetypes of Sustainable Business Models (SBMs) which Souza-Zomer and Cauchick-Miguel list, and which are paraphrased below, are essentially the archetypes of Frugal Innovation; (i) maximise material and energy efficiency, (ii) add value from what was wasted, (iii) change existing processes for natural or renewable versions, (iv) consider functionality over ownership (*i.e.* open innovation), (v) apply extended stakeholder rules – your company is a steward of the future, (vi) internal or self-sufficiency is important, (vii) repurposing is essential, and finally (viii) scale-up, rather than start with grand design.

Thus, the implementation of Frugal Innovation becomes one of the main support pillars of sustainability, and the core of an SBM applicable to the entire Saudi Arabian economy. Without an SBM, SMEs in Saudi Arabia will not develop a sustainable economy, and nor will they develop into MNCs the way that Chinese companies have

– mergers and acquisitions (M&A) overseas will only work with the right management attitude and SBM (He and Zhang, 2018). The importance of this for Frugal Innovation implementation comes from the perception that many, if not most, “social innovations” around the world have their roots in MNCs, not SMEs. Thus, to make a difference, expansion is essential (Holmström Lind, *et al.*, 2018). This perception of the importance of MNCs and the use of “big data” to bring about social innovations and relationship innovations is also supported by Akhtar, *et al.*, (2019), who have studied “data-driven business operations” across the world.

2.3.2 Reverse Innovation Implementation

Winter and Govindarajan (2015) posit that successful Frugal Innovation is the starting point for Reverse Innovation starts and further argue that Western companies should be able to admit to the fact that there have been drastic shifts in global business centres from Western markets to emerging markets in countries such as China and India. The success of Reverse Innovation is an extremely challenging process *“that involves major changes: throwing out old organisational structures to create new ones from scratch, revamping product-development and manufacturing methods, reorienting the sales force”* (Govindarajan, 2012, p. 120). Harman International Company is presented as an exemplar that demonstrates a unique and successful implementation of Reverse Innovation. Govindarajan (2012) describes how the company had to execute several radical changes in order to adapt its processes to the emerging market. Initially, the staff selected by the company included managers who were familiar with local markets and devoted to the company goals, as well as, engineers from Germany and United States. This workforce selection was aimed at ensuring that the company met emerging market’s needs, whilst simultaneously retaining its connection to traditional product-development centres (Govindarajan,

2012). In addition, the company sets new goals and rethought its engineering process so that all were aligned to its Reverse Innovation mediated business strategy.

According to Zhu, Zou, and Xu, (2017), a company should be able to evaluate the acceptance of the Frugal product in an economically developed country before its actual introduction. The authors' study concerned the identification and analysis of causal evaluative factors and found that firms should evaluate the perceived degree of needed adaptation, together with, the perceived risk of cannibalisation. The evaluation of the perceived degree of needed adaptation recognises the assessment of necessary changes to the product so that it would meet the needs of customers in economically developed countries. Govindarajan, Trimble, and Nooyi, (2012) add that this evaluation may demonstrate that significant financial investments are required and, consequently, there is a risk of the loss of competitive advantage in the form of low cost. According to Zhu, Zou, and Xu, (2017), the cannibalisation of products can lead to scenario in which a new low-cost product substitutes its more expensive version. This may result in a substantial loss of profit. Consequently, it is crucial to evaluate the possible risk of cannibalisation.

It is also worthwhile mentioning three factors suggested by Shina (2013) that contribute to Reverse Innovation success. Companies from economically developing countries should localise their decision-making and resources in emerging markets. It is important for firms to take risks and experiment and the local partners should be supported by global technology (Shina, 2013). Hadengue, Marcellis-Warin, and Warin, (2015) consider the change in corporate mindset as a necessary precursor to business success. Global companies who practice Reverse engineering should start by recognising the success of local markets and, consequently, be ready to challenge corporate principles of, and attitudes towards, innovation. Moreover, such companies

should shift their priorities from advanced to emerging markets. This means that Western companies should invest more of their time, money and employees into the places of Reverse Innovation, which are developing markets (Hadengue, Marcellis-Warin, and Warin, 2015). The creation and promotion of the culture of Reverse Innovation is of primary significance for the overall business or organisational success. Thus, companies should encourage emerging markets via such activities as the nomination of local employees, the promotion of immersion of employees from both developed and developing markets and the implementation of local activities that are established in the local markets. Finally, Hadengue, Marcellis-Warin, and Warin, (2015) recommend emphasising the importance of local markets. This is realisable through the stimulation of growth of local branches of the companies and specifically through the development of growth plans for these branches. Govindarajan, Trimble, and Nooyi, (2012) also suggest several management techniques that apply to the success of Reverse Innovation. It is of crucial importance to provide local developers with full powers, so they can examine and practice their innovation opportunities for full. Likewise, global companies should encourage local teams' abilities to establish new partnerships with other local manufacturers (Shina, 2013). This may be useful for finding new resources for the production process. Companies should welcome Reverse Innovation ideas coming from their local partners. Testing all new ideas should become an embedded and organised process that provides results quickly and at a low cost (Govindarajan, Trimble, and Nooyi, 2012).

Hadengue, Marcellis-Warin, and Warin, (2015) conclude that the acknowledgment of Reverse Innovation by multi-national companies results in the change of the concept of technology transfer. Specifically, several new ideas arise. First, the idea of Reverse Innovation itself challenges the established view of an exclusive technology transfer

flow from advanced to developing markets. In the case of Reverse Innovation, global corporations can acquire new knowledge from local businesses (Hadengue, Marcellis-Warin, and Warin, 2015). Likewise, Western companies can also learn from local MNCs that are rooted in and developed out of emerging markets. Hadengue, Marcellis-Warin, and Warin, (2015) believe that these ideas lead to the development of a new notion of Reverse technology transfer. Thus, Reverse Innovation provides opportunities for global companies to learn from emerging markets, acquire new knowledge and perceive resource constraints as opportunities for pursuing strategies and operations that lead to attaining competitive advantage.

The reverse of this also needs to be considered here – can the adoption of Reverse Innovation provide opportunities for an SME in an emerging market to develop into a global MNC? Dellermann (2017) suggests that it can, and when discussing the growth of companies inside (and outside) developing economies, Peng, *et al.*, (2018) agree. There are some *caveats* to this process, however. Because (a.) the aim is to build a sustainable economy, and (b.) there are ever-increasing pressures for environmental governance, it becomes essential that Reverse Innovation of products maintains not only their functionality, but also their compliance with international environmental regulations (Barau and Al Hosani, 2015; Ramzy and Zaki, 2018). Overall, however, the advice of Hadengue, Marcellis-Warin, and Warin, (2015) for global MNCs to adopt Reverse Innovation can be equally applied to SMEs that are looking for sustainable growth.

2.4 Diffusion of Innovation

It is important to start with the classic understanding of innovation diffusion in order to differentiate it from the diffusion of Frugal Innovation and Reverse Innovation. Peng and Vlas (2017) draw attention to three aspects of the diffusion of innovations;

innovation is understood as a new concept or idea, diffusion of innovation takes time for spreading from one domain into another, and adoption of innovation may be realised on three levels. These are: 'optional' or adoption by individuals, 'collective' – adopted by mutual agreement of the particular group, and 'authority' or the diffusion that has been implemented by higher authorities (Peng and Vlas, 2017). Elsewhere, diffusion is defined as a process “in which an innovation is communicated through certain channels over time among the members of the social system and spreads in market” (Ray and Ray, 2010, p. 144). This definition contains myriad communication media through which innovation is shared over a continuous period. Rogers (2010) states that the diffusion of innovation consists of four main elements: innovation, communication channels, time and the social system. Innovation is an object, idea or service that is perceived as new and useful by an individual or by a group of people.

Rogers was one of the popularisers of diffusion theory and has argued that it is the main process by which a social system, over time, adopts innovation. If the innovation is adopted sufficiently widely, it reaches a critical mass and becomes self-sustaining. Diffusion theory has found particular support in the medical arena (Dearing & Cox, 2018; Hayward, Poed, & McKay-Brown, 2018). In most cases of innovation, the process is simple and efficient – social media being a convenient and much-used communication channel (Cloutier, et al., 2017). There is, however, a perception that the diffusion of Frugal Innovation and Reverse Innovation may not spread in quite the same manner.

2.5 Diffusion of Frugal Innovation and Reverse Innovation

The issue of diffusion of Frugal Innovation and Reverse Innovation is an emerging area of academic research and has not been studied in detail yet. However, several studies exist on the topic and provide valuable insights.

The concept of newness requires definition. Newness does not necessarily refer to the experience when an individual has never seen or heard about the innovation. On the contrary, someone may have heard about an innovation, but has not formed an opinion about its efficacy or usefulness. Newness can be envisioned as referring to the new knowledge or decision to adopt the innovation (Rogers, 2010). Rogers also emphasises the fact that adoption of innovation should not be associated with the readiness to use it as adoption may be both positive and negative. Communication channel(s) form(s) the second constituent of innovation diffusion. Diffusion of innovation is a type of communication predicated on sharing information that is connected to new ideas. Cloutier, *et al.*, (2017) claim that information exchange is the essence of any diffusion. This exchange may be realised via various channels. Mass communication is probably the most popular type of communication channel. In this case, the information about innovation is shared using such media as radio, television, newspaper or the Internet. The mass communication channel is a powerful source of information sharing as it can reach millions of people over a short period of time. Rogers (2010) describes the other common type of channel - interpersonal channels. Although individual communication does not have a large coverage (in comparison to mass media channels), its impact is usually much more powerful in persuading individuals to adopt an innovation. Time is the third component of innovation diffusion. This is problematic as time is a crucial component that permits and encourages investigation of various aspects of diffusion, such as the overall period during which an innovation is adopted by a particular group. Such measures are useful for the evaluation of the efficiency of the innovation across various groups. Finally, Rogers (2010) identifies the social system as the fourth component of innovation, that is identifiable as a set of equal units that are united by common goal, interests or values.

For instance, American consumers or Indian hospitals may be regarded as two social systems. The importance of the social system for diffusion cannot be overestimated, as it is often the social system that exerts a determinative influence over the success or failure of adoption of innovation. A significant factor within the social system is leaders' opinions on innovation, social structure or values, as all of these may affect the diffusion and adoption of innovation, and the advent of social media has had a massive impact (Dearing & Cox, 2018).

Edwards and Tempel (2010) differentiate between two types of innovation diffusion: evolutionary and transformative. In the case of evolutionary diffusion, the firm adopts useful practices and implements them in its current strategy and plan for development. Basically, the firm learns new ideas and embeds them in business processes without drastic changes to these processes (Edwards and Tempel, 2010). On the contrary, transformative diffusion occurs when an MNC faces practices that are absolutely novel for their business processes. In such circumstances, transformative diffusion is based on the rapid adoption of previously unknown methods and strategies (Edwards and Tempel, 2010). Sereenonchai, *et al.*, (2017) describe three classic theories of innovation adoption. These are Diffusion of Innovation (DOI), Theory of Reasoned Action (TRA) and Technology Acceptance Model (TAM). The principal idea behind DOI theory refers to the investigation of various factors that influence the diffusion and adoption of innovation. According to Sereenonchai, *et al.*, (2017), five aspects of innovation are employed for its evaluation: complexity, relative advantage, trialability, observability and compatibility. Moreover, according to this theory, five groups of people may be distinguished on the basis of their desire and timing of innovation adoption: innovators, early adopters, early majority, late majority and laggards (Sereenonchai, *et al.*, 2017). The second theory, TRA, was developed in 1975 and its

principal idea refers to two drivers that impact the diffusion of innovation: personal interest and influence of society. TAM theory, which was developed by Davis in 1989, also presupposes that two main factors, perceived usefulness and perceived ease, influence the successful diffusion of innovation.

According to Hossain, Simula, and Halme, (2016), numerous other models of innovation diffusion exist. Bass's model, Roger's model or Moore's crossing-the-chasm model are all examples of approaches to describing the diffusion of innovation (Sinkovics, *et al.*, 2014). Nevertheless, when it comes to Frugal Innovation and Reverse Innovation, these models turn out to be of little help considering the distinct natures of Frugal Innovation and Reverse Innovations (Hossain, Simula, and Halme, 2016). It is important to add that the concept of diffusion is always relevant for Reverse Innovation as any Reverse Innovation is Frugal by its nature. However, not all Frugal Innovations become Reverse (Rosca, Arnold, and Bendul, 2017). They support this opinion by stating that few Frugal Innovations become Reverse. This is explained by the fact that most Frugal Innovations are developed to solve urgent problems in economically developing societies and these problems have, in many instances, already been addressed in economically developed societies.

Hossain, Simula, and Halme's, (2016) research seeking to identify patterns of diffusion of Frugal Innovation, identified four diffusion patterns of Frugal Innovation: local, proximity, distance and global innovations. Local patterns of diffusion happen when the innovation is spread and accepted in one country or its numerous states or other administrative units. The example of such diffusion pattern is the ChotuKool fridge that has diffused in India, its country of origin. Proximity diffusion occurs when innovation has diffused to neighbouring countries with similar economic and social conditions. The example is the Tata Nano, the world's cheapest car, which has been

manufactured in Mumbai and adopted into other neighbouring countries with similar conditions (Hossain, Simula, and Halme, 2016). When the innovation is accepted by distant countries with similar social and economic conditions, the distance diffusion pattern may be observed. Vortex Grammateller is an example of such product. Vortex's Automatic Teller Machines (ATMs) use solar energy and consume one-tenth of the energy that is consumed by a common ATM. The development of this product provided a solution to problems with energy consumption and costs in economically developing countries. The product was developed in India but later diffused to another continent – Africa, which makes it a good example of distance diffusion. Finally, global diffusion occurs when a product from an economically developing country is accepted by economically developed countries. The previously mentioned Ultrasound Machine produced in China in 2002 is a vivid example of the case. Hossain, Simula, and Halme, (2016) conclude that Reverse Innovation is a global Frugal Innovation.

According to Mannan, *et al.*, (2017), various factors influence the adoption of innovation in the new country. Bhattacharyya, *et al.*, (2017) believe that it is difficult to identify what innovations will be successful in high-income countries. The influence of innovation attributes, awareness in aiding diffusion and communication channels comprise three important factors that impact the diffusion of innovation (Mannan, *et al.*, 2017). Harris, *et al.*, (2015) believe that the diffusion of Reverse Innovation in the economically developed country is often negatively impacted by the stereotypes related to the product's country of origin. The authors cite one of the interviewees in their study who remarked, “...they hear “Africa” and they think that there can't be any good services” (Harris, *et al.*, 2015, p. 6). In a follow-up study, Harris, *et al.*, (2016) characterise this as a paradox of Reverse Innovation. Multiple understandings of Reverse Innovation exist (both positive and negative). Such a situation poses

challenges for the successful diffusion of products in economically developed countries. Crisp (2014) and Bencsik, Machová, and Tóth, (2016) postulate the importance of knowledge sharing for successful Frugal Innovation and Reverse Innovation diffusion, asserting that it is only by sharing knowledge the highest level of development can be achieved.

The role of the individual should not be neglected when it comes to innovation diffusion. According to Talukder (2012), individual adoption of innovation relies heavily on personal attitudes and beliefs. Thus, some of the most significant individual factors influencing the diffusion of innovation include prior experience, personal innovativeness, personal image of innovation, perceived usefulness of innovation, and the enjoyment of innovation. Additionally, social factors, such as the use of innovation by peers, significantly influence the adoption of innovation. Talukder (2012) also argues that the level of innovation adoption differs among various demographic groups of its potential users.

Shibin, *et al.*, (2018, p. 1088) make an important observation;

“there are very few, if any, attempts made to understand the implications of a sustainability oriented frugal innovations”.

This introduction of “sustainability” into the discussion is a significant factor when it comes to these individual attitudes towards the diffusion of innovation. Many of the social factors expressed by Talukder (2012) can be mitigated by concentrating on sustainability – peer pressure for “sustainable behaviour” appears to be increasing amongst the younger users of social media and could be exploited to overcome some of the negative views of Reverse Innovation. The authors clearly believe that this is self-explanatory, since they state;

“Sustainability is a major and growing driver of the business change ... Its implications for innovation are clear – living and working in the populous world of scarce resources” (Shibin, et al., 2018, p. 1088).

This leads to the concept that Frugal Innovation and Reverse Innovation are not only needed for the growth of developing economies, they are also generally applicable for every business that wishes to be sustainable.

The further effect of “open innovation” (Akhtar, *et al.*, 2019) is that, combined with the pressure to “go green”, the global diffusion of ideas from developing economies will happen faster than was previously the case – the acceptors of an innovation do not ask “which country invented this?” but simply “does this innovation help to save the planet?” (Baleta, *et al.*, 2019), a thought pattern that goes some way to overcoming the “Africa” discrimination noted by Harris, *et al.*, (2015), above (p. 47). There is, however, an apparent fear of “open innovation”, with companies generally being very protective of their innovations. The difficulty that arises then is that diffusion slows almost to a stop if barriers of copyright and patent are erected around it, so that while these are essential tools for competitive business, they are also a hindrance to “open innovation” which can only be overcome with “relationship innovation” (Akhtar, *et al.*, 2019).

It should be possible for Reverse Innovation to spread faster than other innovations, because the basic idea has already been accepted by an advanced economy, and the resistance noted by Harris, *et al.*, (2015), above (p. 47), only partially explains why this is generally not the case. In some parts of the world, such as the MENA, the underlying conservatism perhaps prevents the acceptance of any innovation, despite the need for innovation in business (Drucker, 2015). Nevertheless, bringing innovation “to life” is perhaps the best way for the diffusion programme to be speeded up, and that process strongly implies “open innovation” in its broadest sense – people are the ingredient which actually spreads or diffuses the innovation; unless they talk about it, write about it on social media, demonstrate it in the workplace, and bring it to the

attention of others, it will remain obscure and hidden. Peng, *et al.*, (2018) emphasise this point when discussing business growth; an innovation needs to be talked about to become “real” to many people.

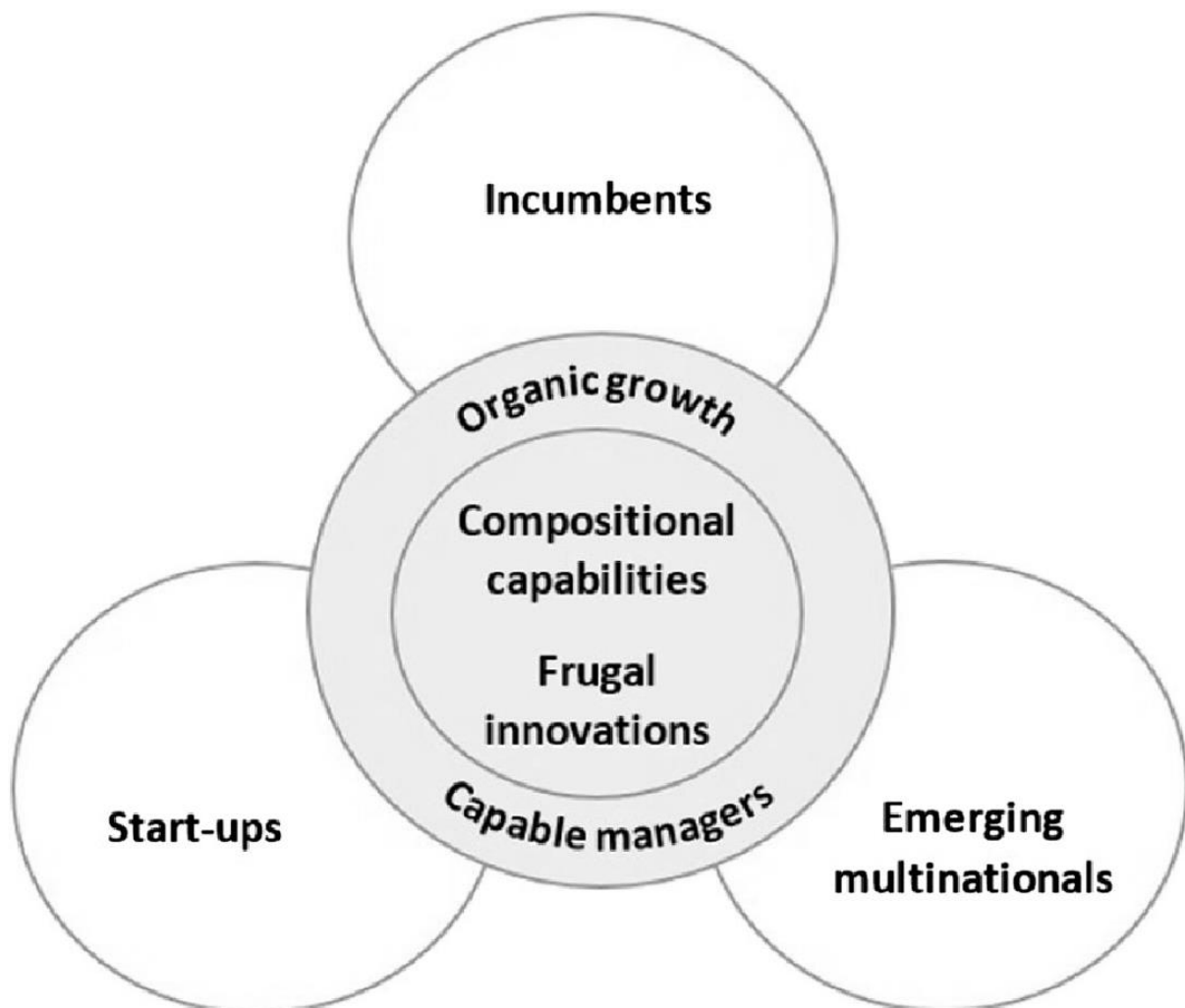
2.6 Frugal Innovation and Reverse Innovation, Sustainability, Governance, and the Environment.

Successful companies grow bigger, both in developing economies and in developed economies. It has been suggested that there are three major ways in which growth can occur – organic, network-based, and acquisitive (Peng, *et al.*, 2018). In general, the first of these is usually viewed as the most sustainable, and in the developing economy, organic growth naturally requires Frugal Innovation. Their concept of this, shown in Figure 3, is applicable both inside and outside a developing economy. This is therefore potentially applicable to any company in any country that is looking for sustainable, organic growth, because they are in the “*populous world of scarce resources*” of Shibin, *et al.*, (2018). However, sustainable growth must, by its nature, consider the natural environment because this is one area where a lack of sustainability potentially makes every human endeavour unsustainable.

This is reflected in the previous sub-section relating to the diffusion of innovation, unless the innovation is (a.) sustainable (Albert, 2019), and (b.) talked about, it does not spread, and so the company introducing it is likely to fail (Zeng and Williamson, 2007). It follows from this that countries with a large population (China, India, Pakistan, etc.) and good communication channels will have an advantage in terms of dissemination of ideas, and that in these countries, acceptance of innovations is also potentially faster – consider an innovative design launched in the UK. If one in a thousand of the population hear of it and buy it around 65,000 will be sold. If the same occurred in China, the sales would be around 1,400,000 – a figure which make mass-

production a realistic proposition. It follows from this that access to the mass emerging markets is an essential ingredient for any product, and it is also vital to get people talking about any innovation if it is to be successful. In turn, organic growth will take place because word-of-mouth (WOM) or electronic-word-of-mouth (e-WOM) are still the most powerful marketing tools in existence. The globalisation of communication, with products or innovations “going viral” is a perfect example of the power of e-WOM, but also accounts for companies failing, when they have not grasped the true importance of their innovation.

Figure 3: Organic Growth in a Developing economy.



Source: (Peng, et al., 2018, p. 834)

In order to consider sustainability, it becomes necessary to consider environmental regulations and governance. In turn, governance and regulations must consider the need for Frugal Innovations if sustainability is to have any real meaning. For example, Ramzy and Zaki (2018) conclude that for trade between the EU and MENA *“More stringent environmental regulations stimulate innovative efforts in cost-saving green technologies, which increase productivity”* (Ramzy and Zaki, 2018, p. 4197). If environmental regulations are made to be more stringent, then, in turn, closer environmental governance will be needed to enforce them, which will stimulate the Frugal Innovations needed for sustainable growth. Barau and Al Hosani (2015), studying desalination of seawater in the Arabian Gulf, for example, carried out a study which *“suggests that the industry’s network of stakeholders can develop good ideas for fostering sustainability by using innovative tools”* (Barau and Al Hosani, 2015, p. 145), indicating the need for Frugal Innovation in an industry far removed from the area where SCC operate.

This global applicability of sustainability having an underlying need for innovation, and probably Frugal Innovation, has also been held to apply “relationship innovation” in global partnerships (Akhtar, *et al.*, 2019), with the conclusion that the results of their study;

“indicate that collaborative partners that exercise mediated powers (i.e., coercive and manipulative) will have a negative effect on building relationship innovation in collaborative partnerships” (Akhtar, et al., 2019, p. 15).

This idea that innovation is needed in every growing company is also supported by a study in Brazil, where *“The main findings show the role of collaborative approaches and stakeholder interaction”* (Sousa-Zomer and Cauchick-Miguel, 2019, p. 594). This diversity of applications for innovation if sustainability is desired emphasises again that

in every company, in any type of economy, and in any country, the key concept for organic, sustainable growth is Frugal Innovation in one of its forms.

2.7 Research Gap

Almost all the extant literature on Frugal Innovation and Reverse Innovation concentrates on both types of innovation from the points of view of Western, economically advanced nations and companies that are headquartered in such countries (see Table 3). This presents the gap in the research which this study fills – the interest in and importance of this observation lies in the fact that for the purposes of the present study, the perspective is that of a company based in the capital city of a developing country. Furthermore, the findings from the empirical research and the analyses and conclusions drawn are intended to form the basis of an innovative approach to resource constrained innovation in which the source(s) of the innovation(s) is(are) within the emerging market domain and the diffusion destinations are both emerging and developed markets.

The idea that stakeholders must be consulted and kept happy, and that in any developing economy the most important aspect must be that growth is sustainable, is one that appears to be growing stronger. However, it naturally leads to gaps in the knowledge that is held, because more and more information is required about the effects and side-effects of every action, and some of these remain unknown until many years after the action was taken. This strengthens the case for Frugal Innovation and Reverse Innovation, because these both encourage companies to do more with less, which must, in turn, have less impact on the environment. It is also pointed out by BMI-lab (University of St. Gallen) (BMllab, 2017) that without Frugal Innovation, the Chinese “Tech Giants” (such as Samsung and TenCent) would not be in such a dominating position – the Chinese government has positively encouraged this

approach, a view also strongly supported by Nevejan (2016), who provided the following list of examples of Frugal Innovation (Table 2), some of which have already been mentioned in the text. The reason for the Chinese government support for Frugal Innovation is simple – it permits small companies to grow, thereby increasing tax revenue and allowing greater government investment – a virtuous circle (Peng, *et al.*, 2018) that fits into the policies of the Chinese government and leads (eventually) to the giant MNCs that “rule the world” – the power of Multi-National Corporations is beyond the scope of this research, but has been researched by many (e.g. Holmström Lind, *et al.*, 2018); He and Zhang, 2018).

Table 2: Ten Frugal Innovations from Around the World.

COUNTRY OF ORIGIN	ITEM
CHINA	Haier Washing Machine ‘Mini Magical Child’
CHINA	BYD lithium-ion batteries
GHANA	Toyola charcoal stove
INDIA	TATA Nano car
INDIA	Chotukool
INDIA	General Electric portable electrocardiogram (ECG) Mac 400
INDIA	Aakash the \$35 tablet
EGYPT	ADAPT housing
Togo	3D printer from E-Waste

Source: adapted from Nevejan, (2016)

Briefly, the “top ten” shown in Table 2, many of which have been mentioned already are clear examples of the application of Frugal Innovation; the “Haier Washing Machine ‘Mini Magical Child’” was a response by an appliance company (Haier) to local market needs – in the poorer areas of China, ordinary washing machines were too expensive to own, and too large for practical use in small family units with limited clothing. The resulting machine was small enough and cheap enough (Zeschky, Winterhalter, and Gassmann, 2014). BYD lithium-ion batteries, another example of Frugal Innovation was developed by a large company (BYD) in response to the inflow

of hi-tech industries from around the world into China – batteries were needed that were cheaper, more efficient, rechargeable, and longer lasting.

The Toyola charcoal stove, from Ghana, was also a response to local need. Most families already cooked using charcoal, but their stoves were inefficient, and very polluting. The new, efficient design would not have been adopted unless it was also affordable. Affordability was also the key to the TATA Nano, Indian roads and traffic combined with local demand made a very small car a practical possibility. “Chotukool”, another Frugal Innovation from India uses a solar panel to operate a portable refrigerator – more than a third of food is wasted in India, because it goes off in the heat. Rather than improving the performance of existing refrigerators, the Chotukool was designed to just meet the needs of a disadvantaged part of the population. This concept was also applied in the case of the other two Indian examples, General Electric portable electrocardiogram (ECG) Mac 400, and the Aakash \$35 tablet; innovations that do no more than is needed and cost no more than is necessary.

The best description of the ADAPT housing projects from Egypt is;

“ADAPT offers low-cost housing solutions for poor communities (also environmentally-adapted), by producing appropriate building material, adopting local building techniques and a participatory community approach. The idea is focused on low-income housing shortages and inhumane living conditions in ‘informal’ areas (also remote rural/desert locations or marginalized communities)” (El Miniawy,2017, p. np.)

Whilst Togo’s 3D printer was a response not only to local need, but also as a reaction against the masses of hi-tech equipment being thrown away because it was “outdated” or not working – it combines recycling with Frugal Innovation in an unprecedented way.

The Chinese and Indian economies have been growing rapidly, and some analysts give Frugal Innovation as one of the main reasons for this growth (Bhaskaran and

Sukumaran, 2007; Dellermann, 2017). Thus, part of the knowledge gap identified relates to using the examples of India and China and applying them to Saudi Arabia – there is insufficient data regarding the business culture of Saudi Arabia to do this without research.

Table 3 indicates that in most cases, the researchers are examining ways of getting Frugal Innovation out of the emerging market and into the Western market to improve profitability or sales in the emerging market. This study aims to examine how Saudi Arabia can develop its own Frugal Innovations but keep them inside the country's own economy, but at the same time provide a framework for other developing economies that may wish to do the same. This provides a new viewpoint and is not intended to allow external companies to profit from Saudi Markets, but vice versa. With the framework in place Saudi Ceramic Company should be in a position to increase exports substantially.

The difficulty which Saudi Arabia faces in becoming a centre of innovation is addressed in Chapter 3, with some of the steps the country is taking to address this difficulty. There may be some advantage to engaging in partnerships with overseas manufacturers (Shina, 2013), but even these are predominantly viewed as being more favourable to the Western partner than to the Saudi partner, because of the reliance on imported labour. This, and other factors involved with the growth of a manufacturing industry within the country are examined in this study, which shows how the concepts of Frugal Innovation and Reverse Innovation are being used or considered in the context of a specific product range from an established Saudi Arabian manufacturer. The research gaps identified are summarised at the end of this section, showing how the research questions were developed naturally from the perceived gaps. As noted in the introduction Chapter, Saudi Arabia is, in many respects, a “special case”, since

the financial resources are potentially less constrained, but at the same time it is essential that any changes within the economy are sustainable and are not “solutions” created by spending money.

Table 3: Ten of the studies examined. Only three have a flow of innovation into the emerging market.

<i>Citation</i>	<i>Country Studied</i>	<i>Focus</i>	<i>Method</i>	<i>Cost Basis</i>	<i>Intent</i>	<i>Inbound/outbound innovation flow</i>
<i>Anand and Monin (2009)</i>	India	BoP	Multiple-case study	Affordable products and services	Local responses to emerging market issues	Out
<i>Heeks (2012)</i>	India	BoP	Literature Review	Affordable products and services	Local IT innovations for resource-constrained customers	Out
<i>Radjou, Prabhu, and Ahuja (2012)</i>	USA/ India	Good Enough	Literature Review	Affordable products and services	US response to Indian market	Out
<i>Singh, Gupta, and Mondal (2012)</i>	India	BoP	Mixed Methods + Literature Review	Affordable products and services	Developing ‘making do’ into real products	In
<i>Vinall (2012)</i>	Australia/ India	Good Enough	Literature Review	Affordable products and services	Developing healthcare in India with minimal investment	In
<i>Jaroslawski and Saberwal (2013)</i>	India	BoP	Single-case study	Affordable products and services	Developing healthcare in India with minimal investment	In
<i>Zeschky, Winterhalter, and Gassmann (2014)</i>	Switzerland/ China	BoP	Single-case study	Very Affordable products and services	Transferring Chinese techniques to Europe	Out
<i>Rao (2014)</i>	India	BoP	Literature Review	Affordable products and services	Advancing innovation management	Out
<i>Ojha (2014)</i>	India	BoP	Single-case study	Affordable products and services	Techniques to improve sales in low-income markets	Out
<i>Prathap (2014)</i>	India	BoP	Empirical research from datasets	Affordable products and services	Techniques to improves sales in low-income markets	Out

As Zeschky, Winterhalter, and Gassmann (2014, p. np) point out, the ‘opening up’ of markets in China and India has led to “fierce competition among firms fighting for the middle-class consumers emerging in these areas” – in other words, most of the research is to identify ways in which Western companies can make their product affordable in these countries, whereas the intent with this study is to concentrate on the developing economy from within. This change of viewpoint also has an impact on the way that existing studies can be understood and applied in a developing economy.

Saudi Ceramic Company needs to be able to sell product to those parts of Europe and the US where currently sales are prevented because the customers are resource constrained. However, it is true that often these same customers have a greater disposable income than the “middle-class consumers” in the emerging market (Zeschky, Winterhalter, and Gassmann, 2014). This means that the chance is increased that sales of a basic product are increased to a group who, in the Saudi marketplace, would buy a more advanced model. Clearly, this requires very careful market research into what these customers require, and to alter existing models to those exact needs, and the standards required for the country where the item is to be sold.

Thus, the gap identified which leads to the first research question refers to the competitiveness of the product. The company (SCC) wishes to compete on an equal basis with the Western companies offering a similar product, both in Saudi Arabia and in the export market. If too much is spent on developing the product (*i.e.* the innovation is not Frugal in nature) this may be reflected in the sale price, but it is important to measure the extent to which this affects the competitiveness of the product, hence research question 1. *“How does the product development and associated innovation*

in Frugal – Reverse Innovation impact on the need to increase product competitiveness?”.

The second research question is raised by another gap in the knowledge or information available to the Saudi Arabian market. The companies which are trying to diversify the Saudi Arabian economy need to perform as well as, or better than, their Western counterparts. This leads naturally to research question 2. *“What is the effectiveness of resource constrained innovation in promoting firm performance?”*. This is a question that needed to be answered, because in a developing economy, the promotion of a firms’ performance is regarded as an essential objective, and it is not enough to tell a company that Indian and Chinese success stories (e.g. TATA and Samsung) became successful through using resource-constrained innovation. The growing SME also needs to know how effective the policy was, how it was applied, when it was applied, and when it started to have an effect.

2.8 Summary

This Chapter has examined the different conceptualisations of innovation and provided working definitions for Frugal Innovation and Reverse Innovation. It then discusses both the implementation and the diffusion of Frugal Innovation and Reverse Innovation in companies around the world. This has emphasised the importance of these, particularly Frugal Innovation, in the rapid growth of economies such as India and China. However, despite the fact that these innovation methods have proved so effective in developing economies, most of the available research is strongly Western-centric or Euro-centric, and as such mainly examines ways in which western developed economies can use these resource-constrained methods to open up new markets in the developing world – sometimes in partnerships, but more usually at the expense of indigenous firms.

This Western centricity can also be viewed as being part of the research gap, because this research approaches Frugal Innovation and Reverse Innovations as possible methods for creating a stable and sustainable economy for Saudi Arabia. The country has a long history of trading with the world, positioned as it is on the land-based trade routes to the East, but in the last fifty years has had an economy entirely based on non-renewable fuels, *i.e.* oil and gas. The Chapter has found literature that supports the idea that developing economies need to examine Frugal Innovation and Reverse Innovation as possible options and has briefly examined the situation regarding their use in both China and India.

This has culminated with a section demonstrating the gaps in the research which may currently prevent Saudi Arabia and other developing economies from emulating the success of these successful economies which have emerged in recent decades. The indications of the literature are that Frugal Innovation and/or Reverse Innovation may offer Saudi Arabia a pathway to a strong, sustainable economy which is no longer based on oil and gas, but first it is necessary to provide industry with some answers about the application of these innovation types, telling them whether there is any impact on any other business factors, for example, and how effective resource-constrained innovation can be. The next Chapter concentrates on the specific contextual background within the Kingdom of Saudi Arabia (KSA) and creates the conceptual framework for researching the drivers and barriers to innovation inside Saudi Arabia.

Chapter 3 Contextual Background and Conceptual Framework

3.1 Introduction

Innovation is a complex and diverse field of academic study. It is also of significance to business, organisational and institutional theory and practice. The same is true for all resource constrained innovation types, including the two that form the basis of this study, Frugal Innovation and Reverse Innovation. Although geographical location, cultural values, orientations and practices, and state of societal economic development, are variables that influence the conceptualisation and application of Frugal Innovation and Reverse Innovation, such innovations are invariably multifaceted, operate on multiple levels, and can have innovation flows that go in more than one direction.

In view of this, this Chapter builds on the literature review to give the reader two distinct views – first, Frugal Innovation and Reverse Innovation in the context of Saudi Arabia, and second, a clear conceptual framework for the rest of the research showing the way that the three levels (Macro, Meso and Micro (Dopfer, Foster, and Potts, 2004)) were examined for drivers of innovation.

3.2 Contextual Background

The Kingdom of Saudi Arabia is home to world's largest reserves of natural oil and gas (Roberts, 2004). Revenues gained from oil and gas, and associated products, form the largest contribution to Kingdom's economy. Indeed, oil and gas revenues have been the primary source of Saudi Arabia's robust economic growth (Roberts, 2004). However, the government of Saudi Arabia is well aware that these natural resources upon which its economy has and continues to depend, have finite lifespans of several decades (Government of Saudi Arabia, 2017). Thus, the Saudi government has prioritised diversification of its economy. In one sense, the spirit and endeavour of

innovation may be viewed as being as an important driver of diversification within the Kingdom. However, such optimism has to be set against pressing economic realities that exert negative pressures on the Saudi government's ambitions to achieve economically developed nation status (Government of Saudi Arabia, 2017). These include the fact that the majority of the Kingdom's workforce is made up of overseas workers, covering all employment levels, from managerial, professional and technical, to manual and domestic (SAMIRAD, 2018). Added to which, is the increasing employment crisis among Saudi citizens. This is particularly pressing among young Saudis (Government of Saudi Arabia, 2017). As a rentier state relying on the income derived from sales of oil and gas, Saudi Arabia cannot rely on tax receipts from its citizens to boost its national income. On top of this, the downturn in much of the global economy that followed the 2008 credit crunch and financial crisis, along with the increase in non-oil and gas energy sources, such as fracking in the USA, has led to falls in the price of oil (Alkhathlan and Javid, 2015; Kyriakides, 2006). Taken together, these factors exert considerable pressure on the Saudi economy.

A nation that is reliant on overseas managers, professionals, technicians, industrial designers, engineers and the like, is not best placed to be a source of innovation (Dackert, Lööv, and Mårtensson, 2004). Centres of innovation tend to be in regions within countries that are renowned for specialisation and excellence in particular industries and sectors. For example, Silicon Valley in the United States and Karlsruhe in Germany are centres of innovation excellence in information and communication technology (ICT) and automotive engineering, respectively (Dackert, Lööv, and Mårtensson, 2004). Whilst industries in both of these regional centres of innovation excellence are staffed by multi-ethnic professionals in many disciplines, the majority (57%) of engineers working in Silicon Valley are from the United States (including

Chinese American, Taiwanese American) (Schiavenza, 2018), whilst Germans make up the majority of the automotive engineering workforce in Karlsruhe. This means that Saudi Arabia is unlikely to be an innovation hub. It is more likely to be a nation that receives innovation flows from other, more innovation-oriented countries.

However, Frugal Innovation and Reverse Innovation do, to some degree, have different drivers. These kinds of innovation are most commonly found in the developing economies, Brazil, China, India, and the MENA (Dellermann, 2017), although the literature examined in the previous Chapter indicates that many academics believe that they should also be adopted in the developed economies.

The Saudi government has in place what is known as a 'Saudization' programme (Government of Saudi Arabia, 2017), aimed at getting more Saudi citizens into its workforce. Despite the decades old Saudization policy and programme, it has been of limited success. As well as leading to a continuing reliance on foreign workers, there has also been a negative impact on employment amongst Saudi nationals. Unemployment in Saudi Arabia is a serious economic problem and is of greatest concern amongst young people (Government of Saudi Arabia, 2017). Saudi Arabia has a relatively young population and many of these are unable to find employment. This is a situation that is unlikely to result in increased innovation.

Additionally, Saudi Arabia is in the early stages of producing world class professionals, scientists, technicians, engineers, designers and others who will be the innovators of today and the future (Government of Saudi Arabia, 2017). The King Fahd University of Petroleum and Minerals is developing its academic reputation in the fields of engineering and science. Despite this progress, however, one of the main reasons for Saudi Arabia lagging behind other nations in its level of innovation is the longstanding under performance of its education system in comparison to the leading innovation

nations (RESA, 2016). Recognising the vital importance of education to a nation's economic and social development, the Saudi government is investing heavily in education, including higher education (RESA, 2016). However, whilst paying the majority of its labour force wage bill to foreign nationals, Saudi Arabia is sending tens of thousands of its citizens to study at universities in Western developed countries such as the US and UK. In both instances, Saudi Arabia is paying its international competitors and partners and is not getting a satisfactory return on investment in terms of innovation performance. Moreover, the Saudi population does not yet have the levels of academic, managerial, technical, professional, engineering, design and other education areas that are necessary to compete on the global innovation stage.

Culture is another important reason for Saudi Arabia not being a nation of innovation and innovators (Jiang, Gu, and Wang, 2015). Saudi Arabia is a nation of strict hierarchies in its political, social and family spheres. It is a high 'power distance' culture (Hofstede and Hofstede, 2005) in which instructions are given by superiors and carried out by subordinates. In Saudi Arabian education, teachers instruct, and pupils obey, whereas in Western education systems, pupils are encouraged to engage in critical thinking, to ask questions and to challenge (Emo, 2015). Critical thinking, questioning and challenging are more likely to produce the ideas and visions that lead to innovation than the passive and unquestioning acceptance and following of instructions, teachings and ways of thinking and doing. Saudi culture also exerts a de-innovating impact by the restrictions on the public, including the employment, and roles of women (although this is changing rapidly (Al Omran, 2017)). The fact that there are types and places of work that Saudi women are not permitted to do and go (Al Omran, 2017), means that the Kingdom has and continues to miss out on vast potential contributions to innovation in particular and economic development and growth in general.

From this contextual information it is clear that, although currently lagging in terms of innovation and an innovation culture, the conditions in the KSA are becoming ideal for the kind of expansion previously seen in China and India, both of which have high power-distances (Hofstede, 1981) and other similarities to the KSA. This increases the importance of creating a framework for the application of Frugal Innovation and Reverse Innovation in Saudi Arabian SMEs and emphasises the urgency of obtaining answers to the research questions.

3.3 Conceptual Framework

A conceptual framework is intended to be an aid to the process of defining, designing and directing empirical research. It can take the form of a written description and/or a visual illustration through which the author(s) *“explains either graphically, or in narrative form, the main things to be studied – the key factors, concepts or variables – and the presumed relationship among them”* (Miles and Huberman, 1994, p. 18). Moreover, the conceptual framework can also be used to inform and assist the interpretation and analysis of research data, as well as, the evaluation of the research project. In other words, the conceptual framework can be of critical importance. A clear conceptual framework can guide and direct research and can be developed as the research progresses and the researcher gains more knowledge and clarity about the research topic. Green (2014) states that the conceptual framework can play important roles in framing research questions, guiding research design, achieving research outcomes, and helping the researcher’s thought process.

In the present study, the literature review and contextual background has provided awareness of the scope, variability and trends in literature specifically on Frugal Innovation and Reverse Innovation, and on resource constrained innovation more generally. The literature indicates that resource constrained innovations, including

Frugal Innovation and Reverse Innovation, are affected by their geographical, cultural, technological and attitudinal locations. Moreover, they are multilevel constructs, which means that wider societal factors (such as culture), merge together with organisational factors (such as leadership, structure, resourcing, learning, culture and business processes), to determine or, at least, influence innovation processes, outcomes and flows.

According to Hunt and Madhavaram (2012) conceptual frameworks that are underpinned by theoretical foundations are likely to be more useful than those that are not supported by theories, theoretical models, and/or theoretical frameworks. Moreover, conceptual frameworks that are informed by existing literature within the field of study and links theory to practice and methodology contributes to structuring doctoral research (Kumar and Antonenko, 2014). With this in mind, it is imperative that this study's empirical research has a strong theoretical base.

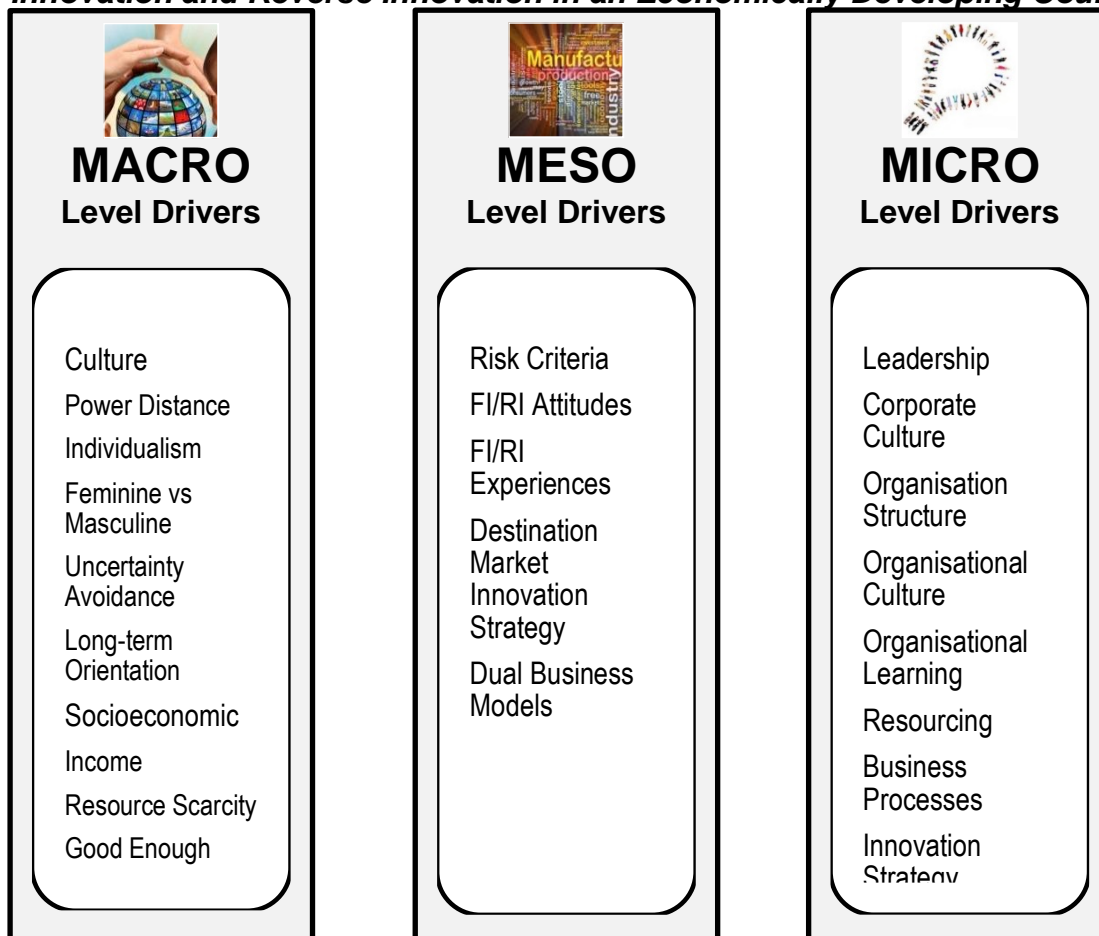
In terms of the conceptual framework's use in defining and/or clarifying the research purpose and focus and in light of the present study's contextual background and literature review, a number of keywords or key terms have emerged. These are, in no particular order of importance: culture (Hofstede, 1981), national culture (Jiang, Gu, and Wang, 2015), sustainability (Prahalad and Mashelkar, 2010), leadership (Brown and Hagel, 2005), learning organisation (Crisp, 2014), organisational learning (Harris, *et al.*, 2015; 2016), organisational structure (Hofstede, 1981), organisational culture (Hofstede and Hofstede, 2005), corporate culture (Hofstede and Hofstede, 2005), strategy (Anderson and Markides, 2007), corporate strategy (Batra, *et al.*, 2015), strategic focus (Govindarajan, 2012), innovation flow(s) (Bicen and Johnson, 2015), competitive advantage (Prahalad and Mashelkar, 2010), resource constraint opportunities (Pansera and Owen, 2015) and resource constraint attitude (Ray and

Ray, 2010). Using these key words and terms assists in thinking about the conceptual framework in an abstracted and theoretical way, in which it can be described as having several levels that can be bounded by and fit into the macro, meso and micro (Dopfer, Foster, and Potts, 2004).

Within this abstraction: (1) *macro* level represents *national culture* and the *socioeconomic* system is populated by factors such as political structure and cultural norms; (2) *meso* level incorporates perceptions of and attitudes towards potential risk and rewards, such as those relating to Frugal Innovation and Reverse Innovation at the industry level – which can be summarised as *risk criteria*, *risk identification* and *risk management (framework)* as they pertain to running Frugal Innovation and Reverse Innovation business models alongside a standard/higher cost business model; and (3) *micro* level contains organisational drivers of innovation, such as, *leadership*, *organisation structure*, *resourcing*, *learning organisation*, *organisation culture* and *business processes* (see Figure 4). These three levels have been maintained throughout the data gathering process and the analysis which follows it. Each level has its own perception of drivers and barriers, and part of the analysis is examining how compatible these perceptions are with one another.

At the *macro* level, Hofstede's (1981) cultural dimensions theoretical framework provides a theoretical basis for investigating, seeking to measure and analysing data on national cultural influences on innovation within an economically developing country, such as Saudi Arabia. The framework contains five of Hofstede's dimensions (power distance, individualism, feminine/masculine, uncertainty avoidance, and long-term orientation), that can be measured to distinguish country's dominant national cultural beliefs, norms, values and practices.

Figure 4: Conceptual Framework for Researching the Drivers of Frugal Innovation and Reverse Innovation in an Economically Developing Country



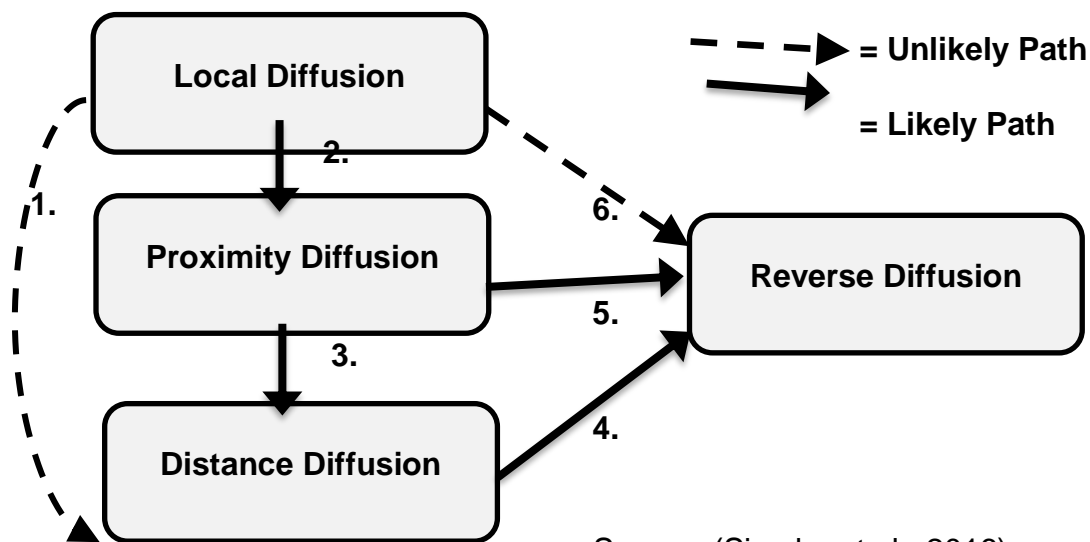
Turning to the *meso* level, this is made up of the sector or industry or even economy that is being examined. Specifically, examining and developing understanding of the industry – which in the case of the present study includes manufacturing, ceramic tiles, sanitary ware, water-heaters, and related sectors in Saudi Arabia – will provide insight into the perception and attitudes of decision makers within the industry and its related sectors towards Frugal Innovation and Reverse Innovation, in particular, and resource constrained innovation, in general.

This is particularly important as the literature indicates that decision makers and innovators who view resource constraints as hindrances are less likely to achieve the potential benefits available through Frugal Innovation and Reverse Innovation, than those who view such constraints as opportunities to create competitive advantage.

Exploring the attitudes and experiences of decision makers within the Saudi manufacturing sector towards Frugal Innovation and Reverse Innovation, particularly how they view the potential risks and rewards (their companies' risk criteria), of initiating Reverse Innovation strategies targeting economically developed markets may provide valuable insight into the extent of a resource constrained culture in the Kingdom.

This is an area of research that has not received much, if any, attention. Discussing future research directions for Frugal Innovation research, Hossain (2017) notes that much of such research concentrates on cases in India, are primarily based on case studies, and lack analyses of how companies cope with running both higher cost and Frugal business models at the same time. The present study fills these gaps in the research literature by focusing on Saudi Arabia, a country with a dearth of literature on resource constrained innovation, undertaking a qualitative survey of Saudi manufacturing businesses regarding resource constrained innovation, and investigating attitudes and experiences towards managing two business models for costlier and good enough products.

Figure 5: Simula, et al.'s Pathways for Diffusion.



Source: (Simula, et al., 2016)

In addition, informed by Simula, Hossain, and Halme's (2015) conceptual model for Frugal Innovation and Reverse Innovations (Figure 5), this study's conceptual framework includes two additional meso level drivers of resource constrained innovation to be measured. First, the attitudes of the emerging market's industry, in this case the Saudi manufacturing sector, towards macro level drivers in economically developed markets (such as austerity policies and outcomes in economically developed countries, as the income divided between consumers in emerging and developed markets). Second, the attitudes and implementation of sustainability (economic, social and environmental) in Frugal Innovation and Reverse Innovation within the industry in the emerging market. Once more, this is a topic that has received little, if any, attention in the academic literature.

The *micro* level focuses on organisational drivers of Frugal Innovation and Reverse Innovation. Crossan and Apaydin's (2009) multidimensional framework of organisational innovation has three main determinants of innovation: leadership (at individual and group level); managerial (at organisational level); and business processes (at process level), together with two dimensions of innovation: as process and as an outcome. This organisational level of the present study's conceptual framework is informed by both Crossan Apaydin's (2009) framework and Simula, Hossain, and Halme's (2015) model. Existing theories of leadership and innovation, organisational structure and innovation, organisational learning and innovation, and organisational culture and innovation information and provide the theoretical foundation for this level of the conceptual framework.

Carrying out the literature review – including literature on conceptual models and the theories underpinning the various components of the conceptual framework – together with the research for the contextual background to this study, have been helpful in

clarifying this researcher's thinking about the research aims and objectives and the primary purpose of the research, as well as, issues concerning the research methodology.

3.4 Summary

This Chapter has set out the differences in viewpoint between the bulk of the literature and the specific conditions pertaining in Saudi Arabia. The consideration of the readiness for the KSA to emulate the successes of India and China has shown that the country is ready, so that with a formula for application, Frugal Innovation and Reverse Innovation will be able to assist the country's economy in a positive way.

This contextual information includes a strong background why the conditions within the kingdom that have made it necessary to modify existing frameworks, with their Western bias, into something that is applicable to a developing economy with strong cultural influences. This has allowed the construction of a research framework that will allow suitable data to be collected and analysed in a manner which will make an application framework possible for Frugal Innovation and Reverse Innovation in SMEs.

The basic conceptions of Frugal Innovation and Reverse Innovation have a wide-range of sub-definitions and types, and it has been necessary to create definitions in the Literature Review Chapter which fits to the circumstances of the study, and these have been used to begin to formulate the way in which the research can progress – it is not simply a change of perspective to an Arabic instead of a Western, but also to give strong reasons for the necessary differences. Saudi Arabia has ambitious plans for its future as a world trading centre (Government of Saudi Arabia, 2017), but to do so requires what has been described as a new industrial revolution (The Times (London), 2002). This, naturally, must cause some disruption, but these innovation types are, in themselves, disruptive of the *status quo*. The combination may allow

Saudi Arabia to leap forward and become a major player in the Twenty-first century industrial scene, but even if it does not, it should certainly be enough to give the country's economy the boost that it needs.

Soon, there will be no world economies which are built entirely on oil and gas (Kyriakides, 2006; Roberts, 2004), which has been the basis of the kingdom's economy for more than half a century. This reliance on one product has also led to the current situation where residents are under-qualified and under-employed but has nevertheless provided sufficient revenues to allow re-investment and change to occur. This is the new direction for Saudi Arabia, and the study intends to help steer the country towards a successful future at the heart of the worlds' economies.

The rest of the Chapter details the conceptual framework for data collection and the importance of other frameworks (such as that in Figure 5) when examining the diffusion of innovation, whichever type is best suited to the specific project undertaken. This broad background is essential, since it allows the conceptual framework to applied, both in this research and in any future research into the subject.

Chapter 4 Methodology

4.1 Introduction

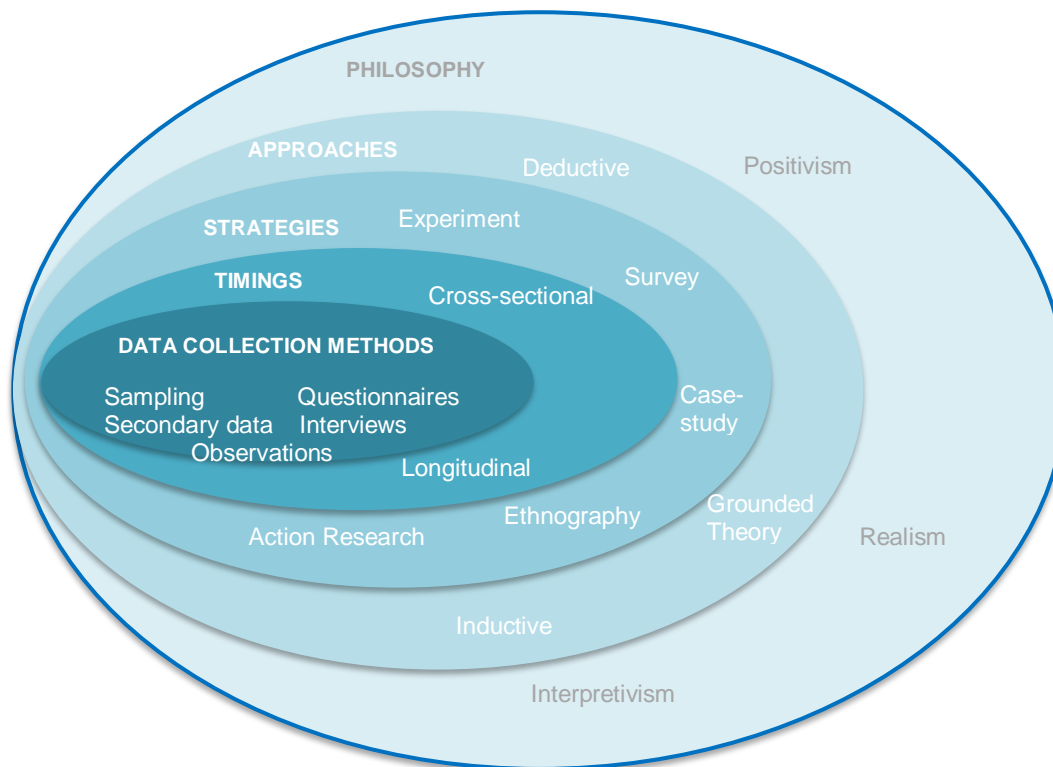
This Chapter provides the methodological background and philosophy which drove this research project, and the methods of data collection employed. Because this is a case study, this Chapter also includes a brief industry analysis to allow a direct comparison with the company studied.

4.1.1 Research Methodological Philosophy and Approach

Saunders, Lewis, and Thornhill's (2012) 'onion' is a useful analogy for the research process, clearly showing the relationship between the different possible choices at each level. Showing these relationships in this way also strengthens the rationalisation of each choice – they have all come from the same, related, quadrant; thus, each choice is justified and validated by the level below it. In addition, this 'onion' concept is still flexible enough to permit changes – layers could be added for example, if some new methodology was devised that required this, or alternatively, the diagram could be simplified, showing only the choices actually used.

In the rationale which follows, each level of the research process identified in Figure 6 is examined in the context of this research, with a comparison of the possibilities which shows clearly why one was chosen in preference to another. This is then summarised in section 3.4 in a Table (Table 6). The final choices added together form the overall methodology for the research, but the Chapter gives the limitations of the choices as well as the rationale, and this also adds to the validity and repeatability of the research programme. This is because at each level, the reason for the choice is given, and in addition, the reasons why the alternatives were considered unsuitable in this specific case.

Figure 6: The Research 'Onion'.



Source: (Saunders, Lewis, and Thornhill, 2012, p. 83)

4.2 Rationale for Chosen Methodology

This research is into an emerging trend or phenomenon, one of those “*phenomena which are regarded* [by some mainstream business and accounting researchers] as *uninteresting noise*” (Fraser, 2014, p. 50) but which actually make up the reality of business. The argument that this research supports is that in the twenty-first century, we need to reach a deeper understanding of the way that people act and learn, and that requires a stronger emphasis on qualitative data and the perceptions of individual. To reach the level of understanding required, the chosen methodology, described below, allows an examination of the phenomenon that allows for the simple fact that it is an ever-changing landscape, but that nevertheless it is possible to look at one single point – a ‘stop the world’ approach – to find out the perception of those involved and compare it to the ‘outside’ view of what is happening. This then contributes to

knowledge by examining the reason for any difference in perception, and to theory by proposing reasons for any difference in perception.

4.2.1 Limitations of chosen methodology

The rationale above provides sufficient justification for the choice – it has fewer limitations than quantitative research and allows for cultural viewpoints. However, the ‘limitation’ of qualitative research is that it does not ‘prove’ anything – but then, it is not intended to (Li, 2013; Harding, 2013). Qualitative research gives the perceptions and ideas of the people involved in the study; it is intended to examine and question the ‘why’ and ‘how’ questions raised (see also section below on ‘case study’).

4.3 Methodology

Research philosophy helps in dealing with nature, development and source of knowledge (Bajpai, 2011). Simply, a research philosophy is defined as a belief regarding the way with which data regarding a phenomenon can be gathered, analysed and utilised. Selecting the appropriate research philosophy is crucial and research must be clear about which paradigm will be helpful in guiding the approach of the researcher (Saunders, *et al.*, 2012). As shown in the research onion (Figure 6) there are three kinds of research philosophies: Positivism, Realism and Interpretivism.

Positivism: This philosophy is based on a perspective that there is a world that has to be described and measured, therefore, its explanation is not easy (Saunders, *et al.*, 2012). This is due to the reason that there are major differences between settings where positivism is utilised by the researchers. A number of variations explains positivism might be equal to the authors who have discussed the research philosophy area. Positivism is based on quantification of observations which leads to the statistical analysis. It is identified that positivism is related to the empiricist view that the

knowledge stems from the experiences of humans. It possesses an atomistic view of the world and consists of discrete, yet observable events and elements which interact in a determined, regular and an observable manner (Collins, 2010).

Realism: It is a research philosophy that describes a social phenomenon and comprises of both non-visible and observable elements that are realistic in nature. This philosophy helps to achieve some objective which accounts for events, also triangulates certain reality perceptions in order to arrive at a good picture of the phenomenon. From the perspective of epistemology, researcher remains a crucial aspect of the objective. Hence, research is completely value free, but the researcher can aim to become aware regarding the value (Easterby, Thorpe and Jackson, 2008)

Interpretivism: It is related to the idealism's philosophical position and it is used for grouping the diverse approaches together that includes phenomenology, hermeneutics and constructivism approaches that tends to reject the view of the research which is present in the world regardless of the consciousness (Saunders, *et al.*, 2012). Interpretivist approach plays an important role for research as it is a social actor that appreciated the differences that are present between individuals (Collins, 2010). This approach is dependent on a naturalistic approach towards collection of data like observations and interviews. Furthermore, secondary research is also considered to be popular with the philosophy of interpretivism (Myers, 2008).

The underlying philosophy for the research is interpretivism with an inductive approach. The data collected is qualitative because, although, according to Fraser (2014) there is a tendency for PhD researchers (outside Europe) into business and accounting to use quantitative methods (Fraser, 2014), as this appears to make publication easier – Fraser cites examples of quality research being turned down by American and Australian journals because the qualitative methods used 'lack theory'

(Fraser, 2014, p. 51), the use of qualitative data can “bring us closer to the ‘truth.’” (Fraser, 2014, p. 49).

As described above, this research provides a ‘snapshot’ of the company examined, and is, essentially a single viewpoint - Thus, human “*provisional knowledge [is] open to continuous correction and development*” (Li, 2013, p. 281). This research is multi-level, multidimensional, and complex, because of the management levels approached, the inclusion of the views of suppliers, and the fact that it is investigating a social phenomenon, which can also be difficult to quantify (Punch, 2009; Saunders, Lewis, and Thornhill, 2012), so qualitative methods were essential.

The methodology uses interpretivism as its philosophy and part of its strategy is an individual case study (Yin, 2013). The case is the Saudi Ceramic Company water-heater division and examines the impact of Frugal Innovation and Reverse Innovation on their products and local supply chain and is described below in Section 4.3.1. Because of the wide-ranging impact of Frugal Innovation and Reverse Innovation, the case study examines three distinct areas of the organisation. These three areas, Macro, Meso, and Micro are described clearly by Dopfer, Foster, and Potts (2004) after proposing and discussing them at the Schumpeter conference in 2002. They are particularly relevant to this study because of the strict hierarchical structure of Saudi Arabia and the power-distance (Lukes, 2005) inherent in Saudi companies. The first, referred to as the macro level, involves the Saudi academics and directors who contribute to economic and business policy development within the Saudi Ceramics Company. The next area, referred to as the meso level involves the senior management of the manufacturing division within the Saudi Ceramic Company.

Finally, the third area, referred to as the micro level, is the organisational managers of production and supply, along the local supply chain.

4.3.1 The Case Study

The case study is of the Saudi Ceramics Company (Saudi Ceramics, 2018), a well-established company in Saudi Arabia, making products for the home market and for export. The specific product range that has been studied in this research is the electric water-heaters produced by Saudi Ceramics. The website lists thirty-five styles and capacities of water-heaters (and one water cooler) (Saudi Ceramics, 2018). These have been developed for resource-constrained customers in the home market and for export to developing economies. In addition, the company is trying to expand its presence in other markets within the Western developed economies. The development of these water-heaters has already included Frugal Innovation, to give resource-constrained customers features they require at a price they can afford. To export these heaters to existing Western markets may require Reverse Innovation, as the target market would be, again, the resource-constrained consumers.

The choice of a single-case study may seem counter-intuitive (Mariotto, Zanni, and Salati Marconde de Moraes, 2014), but is actually a strong and accepted form of study (Gustafsson, 2017; Yin, 2013). It has advantages over a multiple-case study, as it permits the researcher to get closer to the study participants, and thereby gather more detailed data. This helps to meet the research objectives because the data gathered is more unified, and more closely related to the topic. The results and assumptions made are inductive rather than deductive, as the researcher is moving from single individual details out towards a wider application (Mariotto, Zanni, and Salati Marconde de Moraes, 2014) – not to full generalisation but to include additional companies. The

alternative, the multiple-case study, is also a useful tool (Gustafsson, 2017), but in the Saudi Arabian context, a single-case of a Saudi Arabian company trying to expand into export markets to boost the economy of the nation seems particularly apposite – it emphasises the national struggle to diversify and also allows the individual effects of Frugal Innovation and Reverse Innovation to be seen, and, as noted above, allows the researcher to get closer, more detailed data regarding the application within the specific company and product range.

In addition, a single case study allows the researcher to reach full and deeper understanding of the topic, meanwhile permits the researcher to question and explore other theories related to the topic. Overall, single case study means deeper investigation and evaluation especially regarding this thesis (Gustafsson, 2017).

4.3.2 The Semi-Structured Interview

Very broadly, any research which asks individuals to provide answers to questions could be considered as a survey (Groves, *et al.*, 2009), but rather than questionnaires, the form of the research is semi-structured interviews (Kvale, 1996) and observation (Barker, 1980). The data collection through interviews requires a careful analysis of not simply what was said, but also what was meant – arguably, although interviews were carried out in English, this is a multi-lingual research (Holmes, *et al.*, 2013), since the first language of all those involved is Arabic. The choice of English is because it is used as a business *lingua franca* in Saudi Arabia, but any comments or clarifications made in Arabic have been noted and translated in the analysis. The choice of semi-structured interviews rather than fully scripted, structured interviews was made because the aim is to set a ‘conversational’ tone (Heritage, 2013), and to ensure that

the 'open-ended' nature of the questions increases the input from the interviewee and minimises that from the interviewer (Rapley, 2001).

Although there are also disadvantages, it has been suggested that "insiders" may gain more information in an interview (Unluer, 2012), in part because of the 'normalising effect' (Jefferson, 2004). Although the interviewer is not an 'insider' of the Saudi Ceramic Company, the fact that they are being interviewed by a Saudi Arabian interviewer may have this normalising effect to some extent. The analysis of the discourse of interviews (Keegan, 2011) requires care, and an understanding of the culture in which the event takes place. Saudi Arabia has a high power-distance (Lukes, 2005) and the managers and directors are more likely to 'tell' than to 'discuss' (van Dijk, 2008), and this must be allowed for in the analysis.

4.3.3 Data collection

A series of semi-structured interviews of senior managers, directors, and Saudi academics who have contributed to the company's strategies are analysed qualitatively. These were conducted primarily in English, but the occasional sentence, phrase, or word was given in Arabic – often in places where a direct translation would perhaps lose its meaning. This is a challenge when collecting data multi-lingually (Andrews, 2013), because the meaning is the most important aspect of data collected in this way. These interviews were as shown in Table 4, in the levels described above. This should provide a reasonable cross-section of the management structure of the Saudi Ceramic Company.

Table 4: The Interviews for data collection

Level	Consisting of	Number
<i>Macro</i>	Directors, Academic advisors to Directors, Senior Management	5
<i>Meso</i>	Divisional Managers, Policy Makers	5
<i>Micro</i>	Production Managers, Suppliers, Sub-contract managers	8
<i>TOTAL INTERVIEWS</i>		18

Any additional data analysed and discussed in this study has come from observation (Barker, 1980) – although “observation” was not used as a data collection method, this was observation of the work being done, of the non-verbal communications used in the interviews, and observation of the occurrences of the product in the field (or in the ‘wild’, as computer analysts describe it (Schneier, 2000)). This last part of the observation is particularly relevant for Reverse innovative products, because it is an observation of how the customer uses the product, rather than an observation of how it should be used. Both forms of data collection, interviews and observation, have been treated with equal importance, although in terms of quantity, the interviews have provided far more data than the observation.

The semi-structured interviews (Kvale, 1996) followed the interview guides in Appendix I, the idea being that these are the base questions, but the interviewee is encouraged, by the use of prompts and suggestions, to develop their answers to give a broader and more personal view of the situation. The interviews were recorded and transcribed, and on the transcription any notes of non-verbal communication or similar, made during the interview, have been added.

The analytic process involves: (1) analysing the field notes generated during the semi-structured interviews; (2) the data transcripts were indexed to thematic categories using constant comparison of data and cases (Anderson, *et al.*, 2014). These early code structures were then be reviewed and revised until data saturation is reached. This enabled the code and themes to be refined, redefined, merged and retired until the final code and themes are reached; (3) the final data and themes were grouped into categories (Ricks and Harrison, 2014). Therefore, significant time was spent analysing and interpreting the data and a rigorous approach was taken to ensure data credibility, reliability and replicability; (4) the final phase of the analysis involved fitting the categories into the overall framework generated from this research.

4.3.4 Background

The company is based in a developing economy – Saudi Arabia has the world’s largest known oil and gas fields (Roberts, 2004), but these are finite resources, so the economy is being encouraged to diversify into areas that are new. This diversification places the new companies in a position of direct competition with importers from the West, which has made Frugal Innovation and/or Reverse Innovation so important. As discussed below, the Saudi Arabian case needs to be considered as unique; any sense of ‘copying’ or ‘following’ other specific industries or companies from abroad needs to be avoided.

Although the situation should be considered as unique, expansion and diversification of manufacturing, as part of a ‘new economy’ will, perforce, use methods that have been used elsewhere. The research is looking for evidence that the Saudi Ceramic company has made adaptations to those methods – have Frugal Innovation and Reverse Innovation developed differently here to the Indian model described by

Agarwal and Brem (2012), and if so, to describe the way in which it is different. These differences, if any, can then be considered based on their efficacy and overall impact on the expansion into new marketplaces.

4.3.5 Industry Analysis

The manufacturing industry in the KSA is relatively new, although craftsmen have been manufacturing for millennia, they have not use modern techniques until very recently. This ‘industrial revolution’ (The Times (London), 2002) and diversification of the economy is essential if Saudi Arabia is to continue to survive in the twenty-first century. India provides many examples of how the manufacturing industry in a developing economy can grow (Agarwal and Brem, 2012; Zeschky, Winterhalter, and Gassmann, 2014). Saudi Arabia, however, needs to develop an individual stratagem for growth – the Indian successes can be considered, but Saudi industry needs to improve on them for sustainable growth.

The description of the changes in the Saudi Arabian economy as an industrial revolution (The Times (London), 2002) does give an indication of the size and importance of the changes that have taken place and continue to take place – a generation or more of Saudi citizens have grown up relying on Western engineers, Western Products, and Western values, and the Political, Economic, and Social Development of the country is now intended to;

“provide opportunity to all Saudi citizens – unlocking the talent, potential, and dedication of our young men and women” (Government of Saudi Arabia, 2017, p. 1).

The programme of ‘Saudification’, bringing forward home-grown talent to gradually replace expatriate workers is slow, but positive, and to call it an industrial revolution does not overstate the case.

4.3.6 Selecting the Sample for Interviews

The selection of interviewees began by considering who, within SCC or their suppliers and advisors, fell into each category (Macro, Meso, Micro, as defined by Dopfer, Foster, and Potts, (2004). At the Macro level, this was not difficult, as there were seven members of the board, three of whom were chosen by availability, and two advisors to the board, both of whom were available. Thus, at this level, the interviews were representative of the entire company.

The Meso level was less difficult, since only five were identified; those five were mainly directors of agencies of the government (Standards, Metrology, and Quality Organisation; Saudi Export Committee; Saudi Chamber of Commerce) and the remaining two were from within SCC itself, one of the remaining directors who overlapped Macro and Meso due to his position with finance, and a company policy maker who works closely with others in this group and with both the Macro and Micro groups as well.

At the Micro level, company hierarchy charts were used to identify ten possible interviewees, of whom eight were available. Since this number was compatible with the previous two groups, this was accepted as satisfactory. At this level it would have been possible to widen the choice, but since five interviews were held at Macro and Meso levels, eight at Micro level was considered enough.

4.3.6.1 Interview Schedules

Table 5 shows the schedule, which was followed for the data collection interviews, although the dates have been withheld at the request of the participants. The interviews all took place over a short period during the summer of 2018.

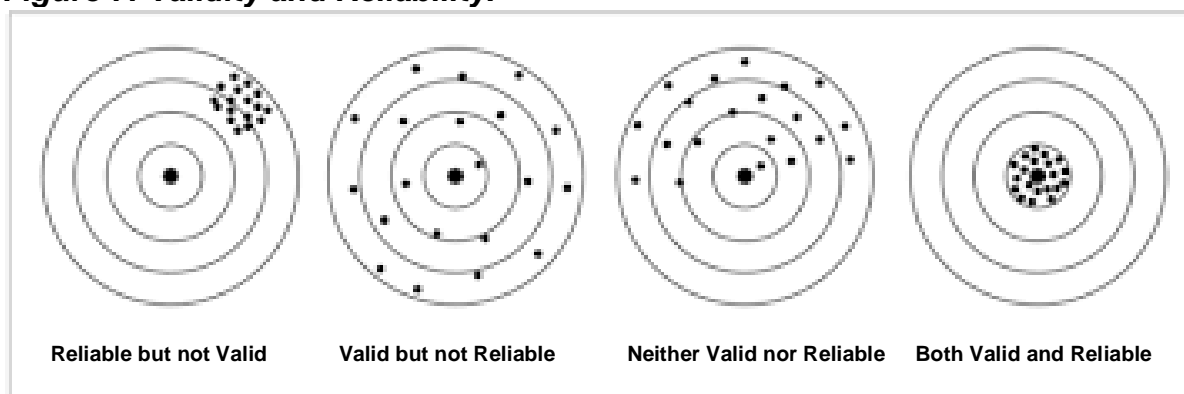
Table 5: Interview Schedule

Provisional date	Position	Person	Level	Time	Location
Summer 2018	Director of Planning and Development Economics	1	Macro	40-60min	Riyadh
	Senior Manager, Industrial relations /Ministry of Saudi Industry	2		40-60min	Riyadh
	Senior Director of Research & Development/ Industry	3		40-60min	Riyadh
	Senior Academic Advisor to the Directors	4		40-60min	Riyadh
	Director of Industrial Development	5		40-60min	Riyadh
Summer 2018	Policy Maker	1	Meso	40-60min	Riyadh
	Director of QA at Saudi standards, metrology and quality organisation	2		40-60min	Riyadh
	Senior director of finance /SISF	3		40-60min	Riyadh
	Senior manager of Saudi export commission	4		40-60min	Riyadh
	Director of Strategy & Business Control at Saudi Chamber of com.	5		40-60min	Riyadh
Summer 2018	Production Manager	1	Micro	40-60min	Riyadh
	Director of R&D	2		40-60min	Riyadh
	Director of Operations	3		40-60min	Riyadh
	Director of Planning & Development	4		40-60min	Riyadh
	Senior Manager Industrial Relations	5		40-60min	Riyadh
	Director of Engineering and Design	6		40-60min	Riyadh
	Director of Finance	7		40-60min	Riyadh
	Director of Procurement & Supply Chain	8		40-60min	Riyadh

4.4 Validity and Reliability

One of the clearest descriptions of the difference between these two concepts is provided by Babbie (2001), which has been adapted for Figure 7. The point he makes is that a clustering together of similar ideas and concepts is reliable, but if every one of them represents a view they have been told to express, it is not valid.

Figure 7: Validity and Reliability.



Source; Adapted from (Babbie, 2001)

Conversely, if the views expressed appear almost random, they may well be valid, but cannot be considered reliable, since it would not be possible to rely on any one of them as being an answer to the question asked. Babbie's (2001) third category, "neither reliable nor valid" indicates a range of perhaps random answers that may also perhaps show a directional bias. In the interviews carried out, the range of views was sufficiently different to be reliable and sufficiently focussed to be valid, and therefore fits into the fourth category in Figure 7.

Another aspect of validity and reliability is the importance of ensuring that the entire research process is transparent – hence it is not just a case of stating that the research philosophy was interpretivism and the approach was inductive; it is necessary to justify those choices with a brief consideration of why they were applicable rather than the other possibilities. By justifying each step in this way any researcher bias is either overcome or brought to the readers' attention, so that if the research were to be repeated in the same manner, there is a strong likelihood that the results would be similar (although not identical).

This last point is actually of great importance when dealing with qualitative data – this is data which is predominantly about perceptions and feelings, so that even if the same participants took part in a repeat of the research it is very likely that their perceptions

and feelings may have change over the intervening time; in fact, if a repeat of this nature was carried out and the results were identical it is highly unlikely that the result would be valid or reliable. Unless an interviewee is reading from a script, they will not give a word-for-word reiteration of their earlier response if questioned again. This is actually one of the strengths of qualitative research, if carried out transparently, because the opinions and perceptions of individuals do not remain constant – but a cross-sectional view at a specific point will give a good indication of the situation at that time.

4.5 Summary

This Chapter has given an overview of the methodology underlying the research (Saunders, Lewis, and Thornhill, 2012), going through the layers of the ‘onion’ (see Figure 6) from ‘philosophy’ to ‘data collection methods’ (see Table 6):

Table 6: The structure of the research programme. A view of what is happening now.

<i>Level</i>	<i>Choice</i>
<i>Philosophy</i>	Interpretivism
<i>Approach</i>	Inductive
<i>Strategy</i>	Case study
<i>Timing</i>	Cross-sectional
<i>Data Collection Methods</i>	Interviews

The Chapter has also given some of the background for the manufacturing industry in Saudi Arabia, and the diversification that is currently taking place. The importance of meaning has been stressed when analysing the data gathered from interviews, and the multi-lingual aspects of the research process have been highlighted.

In addition, the Chapter has shown how and why the research methodology that was chosen and used is complementary to the industrial growth within the Kingdom and is an ideal vehicle for examining the dual phenomena of Frugal Innovation and Reverse Innovation. Although shown to be a suitable methodology and underlying philosophy, the Chapter has also acknowledged that there are other ways in which research into these phenomena could be carried out – acknowledging other possibilities whilst justifying the chosen methods and strategies. The Chapter was drawn to a close with a section discussing the “Validity and Reliability” of the research, carefully explaining the difference between the two concepts and indicating clearly why this particular research is both valid and reliable.

Chapter 5 Findings and Analysis

5.1 Introduction

The data for this research was gathered in three sets of interviews in the Macro, Meso, and Micro levels of the company structure (see Chapter 4) and the thematic analysis of the interview transcripts was carried out with the assistance of NVivo 11 software. To confirm that there was differentiation between the three levels but similarity within each level, the sources were all compared and grouped according to the similarity of the content (see Figure 8) – this diagram confirms that, whatever similarities may occur between different levels, each group of interviews was a separate, homogenous, category.

In addition to the data gathered from interviews, there is secondary data regarding the markets and operational areas of SCC which gives an insight into the relative importance of the marketplaces and therefore of the policies of F&R innovation. The sales figures for SCC have followed a downward trend for two years (annual reports for 2016 and 2017), although early indications suggest that 2018 was a better year, based on the quarterly figures so far released. Despite the trend over those two years confidence within the company has continued to grow, at least in part due to the strength of the export market – which has grown from 10.79% of revenue in 2016 (SCC, 2016) to 12.11% of revenue in 2017 (SCC, 2017a) an increase greater than the total fall in revenue, implying that the export markets are growing faster than the home market is contracting. During 2017 the policy in the home market was to try to overcome product dumping by Chinese and Indian companies, and Frugal Innovation has played a part in this.

Dumping is defined as being the export of products at less than their “normal value” and has always been strongly discouraged by the World Trade Organisation and the relevant parts of the General Agreement on Tariffs and Trade (GATT). Nevertheless, it has often been used by countries with a low-wage economy that are trying to achieve a greater market share. It can only be honestly overcome by ensuring that home-market products are produced at maximum efficiency, and that innovations are resource constrained. Nevertheless, it continues to occur, and local “anti-dumping” measures continue to be needed in many economies, both developed and emerging.

In the case of SCC there has also allegedly been some cases of “passing off”, where an inferior product is promoted by the importers as being “as good as” the original, with the implication that it is made in an overseas subsidiary of the original product (SCC, 2017a). This, unlike dumping, has not impacted on the Saudi Arabian home market, where SCC is a well-respected name and known for the quality of its products. However, the effect that it may have in export markets is difficult, if not impossible, to measure with any accuracy.

In the following subsections, the financial details of SCC are discussed based on the company’s annual reports from 2016 and 2017, and some specific information regarding the water-heater division, noted in the introductory Chapter as the most successful part of the company. This concludes the secondary data, and the subsections which follow from there explain the “clustering” of the data, its structure, and the ways in which it was analysed. The second half of the Chapter is dedicated to presenting the findings and drawing some initial conclusions.

Across the Saudi Arabian marketplace, there have been increases in revenue in Riyadh, Makkah, Medina, and Taif (SCC, 2016; 2017a) despite the decrease in the rest of the country. Since these are the regions which have seen increased investment

in infrastructure this is a logical extension of the “Vision 2030” (Government of Saudi Arabia, 2017) strategy, and has been, at least in part, due to the increase in the product range of construction materials (red brick, ceramic tiles) as well as to the innovations of the water-heater division (SCC, 2017a). Increasing export sales is also expected to expand the economy in general, allowing home market sales to recover over the next five years. The company remains a large company, with a turnover exceeding 1.1bn Saudi Riyals, although the reduction in revenue from the traditional construction materials division has clearly indicated the need for diversification – a need which has been largely supplied by the water-heater division, and their success as an exporter around the world.

5.1.1.1 Water-heater Division Specifics

The water-heater division of SCC sells into more than eighty countries worldwide and is currently the only truly profitable part of the business .The water-heater division also leads the drive to expand export sales (SCC, 2016; 2017a) which the company aims to increase four-fold over the next five years. Since this division is more profitable this increase should benefit the whole company and allow the ceramics and sanitary ware divisions to become more streamlined and profitable.

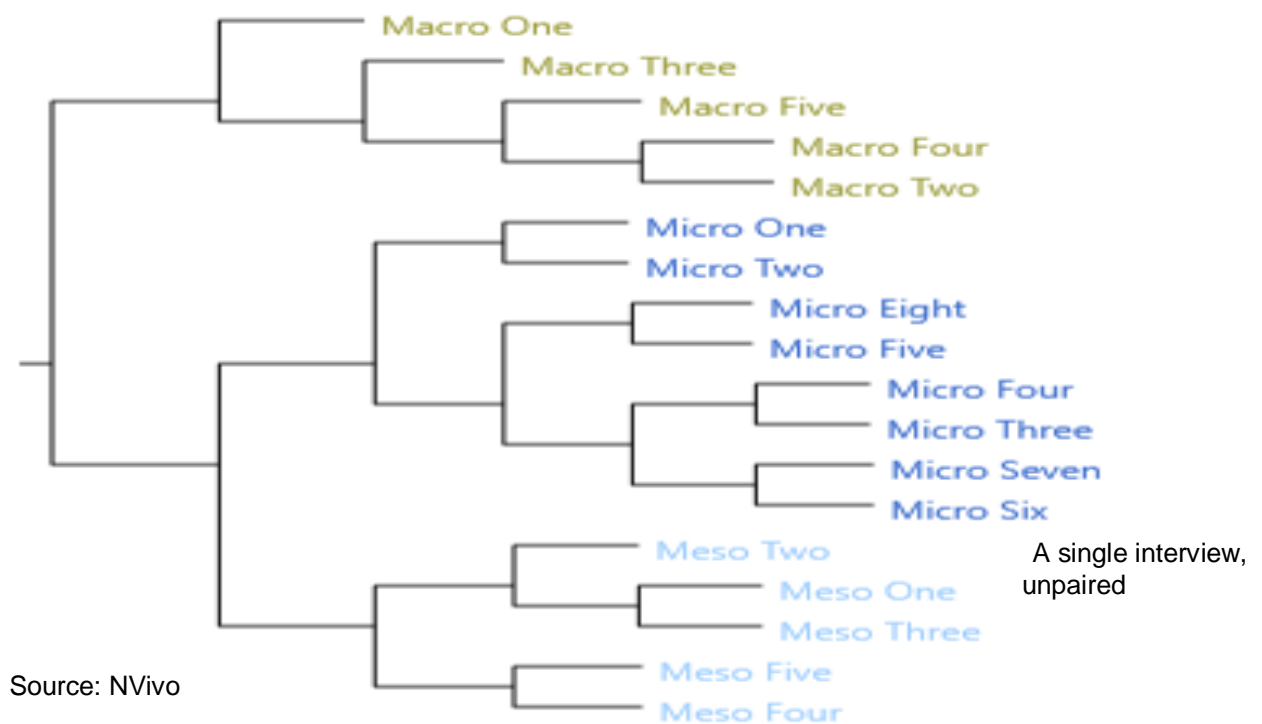
The export sales to Africa and Asia show some growth, but Europe and America are the target areas for new sales (SCC, 2017a), however, a detailed breakdown of the sales figures by country is regarded as confidential information and is therefore not available. The Saudi Ceramic Company is broadly divided into two divisions, although it is a part owner of several ancillary companies that supply gas and raw materials. The two divisions are “Ceramic tiles & sanitary ware” – the original company – and “Water-heaters”. The Ceramic tiles division also manufactures red brick and other

building materials. Because of this two-division structure it is possible to compare the profitability of the two divisions, as shown in the annual report (SCC, 2017a).

The water heater division’s profit for 2017 approaches US\$7M (at \$1=SR3.75), although the overall loss is still substantial. The stated aim of the board is to concentrate on the water-heater division, but to also to improve the sanitary ware, which appears to be a growing market for Africa and Asia (SCC, 2017a).

5.1.2 Clustering and Grouping of data

Figure 8: Sources Clustered by Word Similarity. Three sets of data interviews.



In Figure 8 the whole corpus of data from the interview responses was compared using NVivo software. The data was then arranged in groups (clustered) by word similarity.

This showed several things about the data;

1. The interviews at the “macro” level were clearly different, in terms of their word content, from the other data sets.
2. Each interview within the “macro” was, although similar overall, separate.

3. The two remaining data sets were also sufficiently different to be divided into “meso” and “micro” categories.
4. Within each of these categories, most of the interviews were clustered in pairs. *i.e.* “Micro One” and “Micro Two” were similar to one another, but sufficiently different from “Micro Eight” and “Micro Five” for these two be regarded as a separate “pair” of interviews.

This last point was unexpected – a similarity within each level, with differentiation between “Macro”, “Meso”, and “Micro” was expected, and at point ① on the diagram, the expectation was a division into three groups rather than two. Thereafter, it was expected that the “pattern” in each group would be as at point ②.

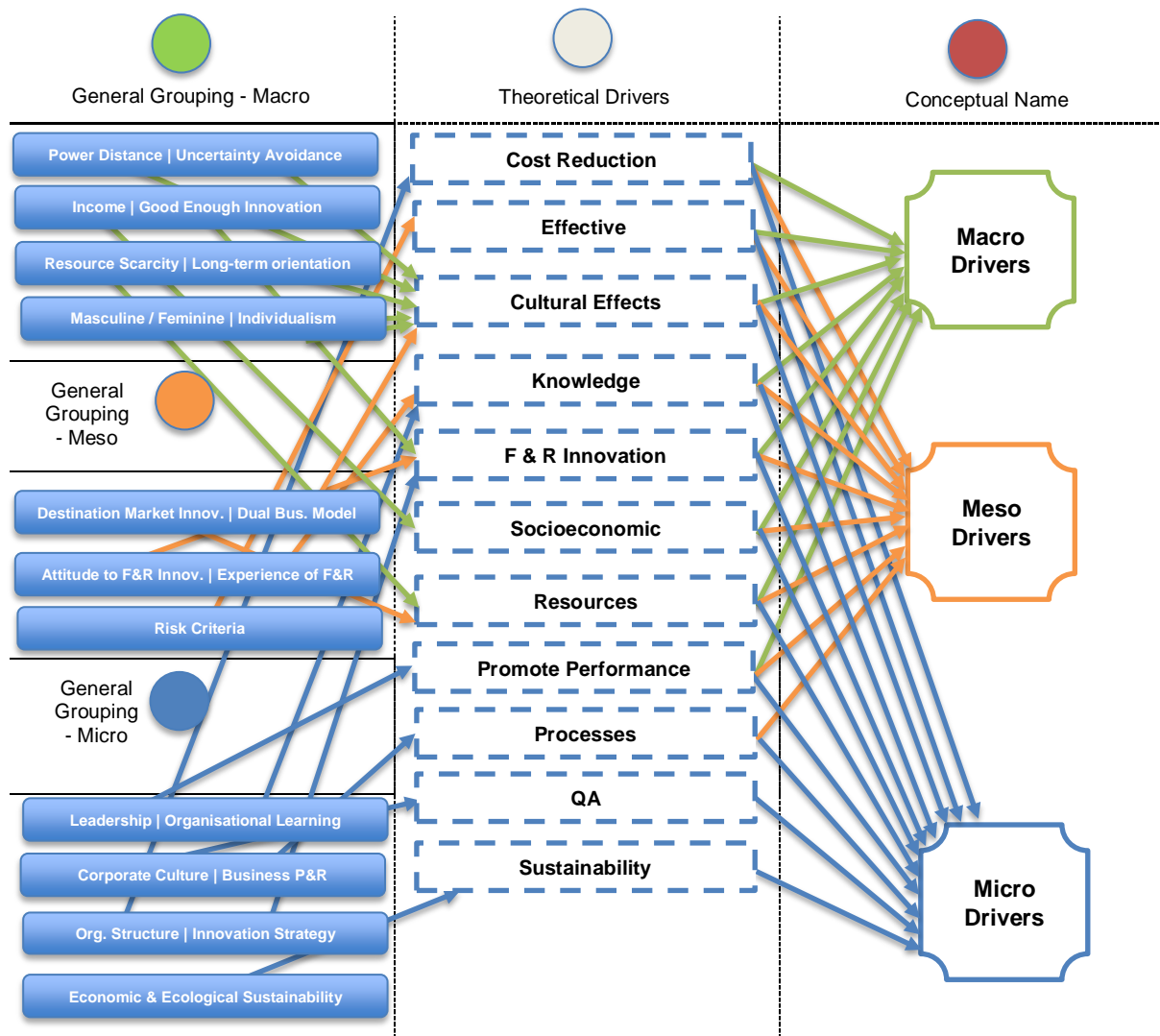
Instead, at point ① there was a division, and then at point ③ there was a sub-division into “micro” and “meso”. Then, instead of separate single interviews as at ② the software found that the textual similarity between interviews was in pairs, as shown at point ④. Thus, although the data is considered to be three groups (Macro, Meso, Micro), it could arguably be seen as two groups (Macro and the remaining data), one of which, described as “the remaining data” had a subdivision into two groups (Meso and Micro). Then, in the Macro group, each interview is different, but in the “remaining data”, the interviews appeared to be paired after sub-division.

The final tests before the detailed analysis began was to find the most commonly used words in the response to the questions.

5.1.3 Data Structure

Figure 9 shows how that data was structured during analysis from the concept of Macro, Meso, and Micro drivers to theoretical drivers, and finally to essential items.

Figure 9: Data Structure - Conceptual to Theoretical to Essential (with simplified links)



5.2 Analysing

The deeper analysis of the interviews at all levels required additional work to be done comparing and cross-referencing the three levels, looking for areas where their opinions either coincided or differed. These points of similarity or difference could then be considered and the reasons for them uncovered. This deeper analysis then led to the discussions that follow in Chapter 6, and from that to the conclusions and recommendations in 6.6. The findings begin with the definition of Frugal Innovation and Reverse Innovation from the data, and a comparison of that with the working definitions given in Chapter 2. The findings are then discussed level by level and item

by item leading to the initial conclusions which are discussed and developed in Chapter 6.

5.3 Findings

The initial findings are divided into three levels (Macro, Meso, and Micro), and within those divisions into sub-divisions such as “Socioeconomic Factors”. These factors for each level are displayed in Figure 10 and the associated Table (Table 7). In the Macro level there are eight sub-divisions, in the Meso level, there are ten, and in the Micro level there are eleven. It is interesting to note that the Micro level was the only level where “sustainability” was directly mentioned by any interviewee. The relative importance of each area at each level is also apparent from Figure 10, and this is discussed below in each sub-section and again in the analysis. The Micro level interviews were generally of longer duration, hence the increased number of mentions in Table 7, but the relative number is still clear from the figure.

Figure 10: Display of Coding Matrix

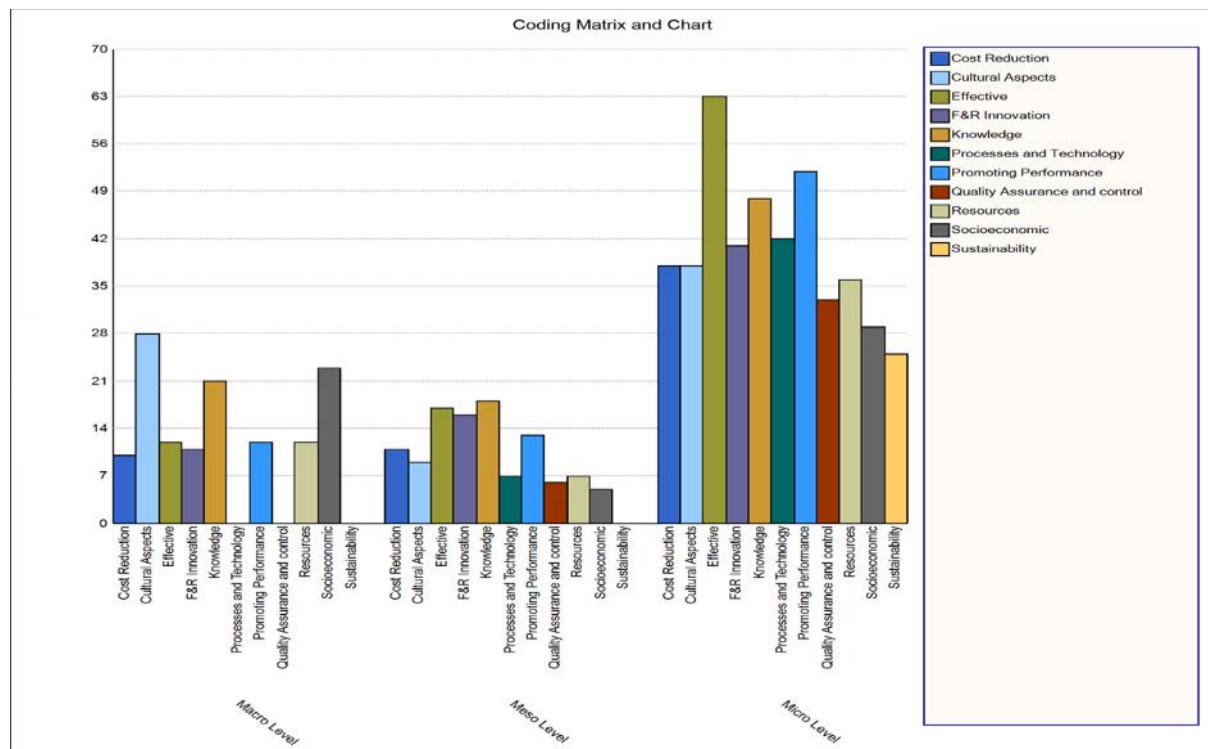


Table 7: Coding Matrix

Level	Cost Reduction	Cultural Aspects	Effective	F&R Innovation	Knowledge	Processes and Technology	Promoting Performance	Quality Assurance and control	Resources	Socioeconomic	Sustainability
Macro	10 (8)	28 (1)	12 (4)	11 (7)	21 (3)	0	12 (4)	0	12 (4)	23 (2)	0
Meso	11 (5)	9 (6)	17 (2)	16 (3)	18 (1)	7 (7)	13 (4)	6 (8)	7 (7)	5 (9)	0
Micro	38 (6)	38 (6)	63 (1)	41 (5)	48 (3)	42 (4)	52 (2)	33 (9)	36 (8)	29 (10)	25 (11)

This is a matrix table for figure 10. Numbers in brackets show the ranks of the level factors.

The relative shape of the graphs in Figure 10 is of interest, because there is relatively less difference in shape between Meso and Micro levels than there is between Meso and Macro levels. There is a possible indication that the upper echelons of management have less in common with the lower levels of management than is the case with the “middle management”. In other words, the high “power-distance” of the country (Hofstede, 1981) may be becoming evident here, with the Macro level of management having a very different view of how the company operates compared to the view of those actually responsible for the day-to-day operation. At the same time, the convergence of the Micro and Meso level views may be a positive indicator of organisational change creeping up through the organisation. Although change in Saudi Arabia usually needs to be “top down”, there have been indications that, as the workforce becomes “Saudified” the traditional power distances are becoming less apparent, and that some changes are occurring from the “bottom up”.

5.3.1 Frugal Innovation and Reverse Innovation defined by the Interviewees

During the interview process the participants were asked questions designed to ensure that their understanding of Frugal Innovation and Reverse Innovation was in general agreement with the accepted definitions of the terms (see pp. 27-32). The

definitions of the terms as stated by the participants are detailed on pages 101-103, but they were for the most part clear and concise as well as accurate, although it did appear at first as though there may have been some confusion at the Macro level between the terms “Reverse Engineering” and “Reverse Innovation”. Fortunately, the full answers to the questions at this level (see Section 5.3.2) revealed that these managers were actually well-aware of the difference. As a result of this data, the working definitions for the two terms based on the data, are as follows below.

5.3.2 Macro Level Findings

A brief summary of the Macro level findings is shown here in **Error! Reference source not found..** The three levels of interviews were analysed separately, and a Table is presented for each analysis.

Table 8: Summary of Findings. Macro Level Data

Factors (Macro Level Data)	Findings
Socioeconomic factors	Accepted by senior management as one of the driving factors in Saudi Arabia. High power-distance → resistance to innovation Need to sell to resource constrained customers → driver of innovation
Resources	Resources impact on → Profitability → Quality → Cost-reduction No mention of sustainability
Promoting Performance	Seen as essential (company culture) → continuous improvement
Knowledge	Move in economy from oil based to knowledge based. Knowledge of customers drives innovation
Frugal Innovation & Reverse Innovation	F&R → Innovation that does not upset the <i>status quo</i> Also considered as “Innovation by the back door”
Effective	Equivalent to both efficiency and business progress → makes innovation acceptable
Cultural Aspects	Always “top-down” not “bottom-up” → reduces innovation ← Changing slowly
Cost Reduction	Only accepted through increased efficiency

5.3.2.1 Socioeconomic Factors

From the initial examination of the data it was apparent that Socioeconomic factors within Saudi Arabia were accepted at the macro level of interviews as being one of the major drivers within the industry regarding innovation of any kind. Here an initial statement in one of the macro level interviews is considered in relation to the other interviews, and it was clear from the analysis that the opinion expressed in the first interview was essentially similar to the opinions expressed in the remaining four interviews.

The statement that

“Our country is characterised by high uncertainty preference, where there is high uncertainty avoidance and countries are required to maintain inflexible code of behaviour and belief and where there is very low tolerance of unorthodox thoughts and behaviours”.

From the first interview is supported by the views of the other participants at this level, and by a more general analysis of these aspects of the national culture (Hofstede, 1981). This can be seen as one of the main drivers of behaviour, and innovation is a form of behaviour. Thus, at the highest level of management in Saudi Arabia there is perhaps a “built-in” resistance to innovation, since it involves uncertainty. It follows from this, that if innovation can be pursued in a manner that has little or no risk (*i.e.* Frugal or Reverse Innovation), then that will be the preferred management option at the highest level.

Although this inference is important and is discussed further in the analysis that follows this section, the socioeconomic factors of business with respect to Frugal Innovation and Reverse Innovation was one of the most mentioned and most important of all the identified areas in the Macro level interviews – it appears that, to senior management making up the macro level, the driving force of any acceptable innovation is the

socioeconomic factors. In all the macro level interviews a desire was expressed to sell the product to resource constrained customers, with an underlying reliance on the *status quo*, perhaps identified in this statement from the fourth interview in the series:

“the people in the country tend to consider the hierarchical order. Every member of the country has its own place without any further reason.”

And this from the second...

“However, I think that the initiatives by the government can actually be having positive impact on the overall socioeconomic environment of the country as people would be getting more oriented towards small and medium business setups”.

...showing the expectation of a continued improvement of socioeconomic conditions at all levels of society.

5.3.2.2 Resources

Resources were not the second-most important issue at Macro level that was the socioeconomic factors discussed above – these sub-sections are in Reverse alphabetical order, not order of importance. Nevertheless, resources were mentioned by the senior management sufficiently often for them to be considered important. Resources were discussed by this group as being important because of their impact on profitability, quality and cost-reduction, but sustainability was not even mentioned indirectly. This may be for many reasons, and without a direct question on the subject it is difficult to speculate, but as far as can be generalised, interviews at the macro level are with establishment figures, and in the Saudi Arabian context, these are very conservative in their viewpoint, neither expecting nor tolerating change – one could almost say that sustainability (in its broadest sense) is a “given”, it is change that is resisted (within the limits discussed above) this may seem a strange conclusion to make about an oil-based economy, but “sustainability” for these establishment figures

is the sustainability of their wealth and position. This general view is behind some of the statements made in these interviews, such as:

“Frugal Innovation and Reverse Innovation in the business and particularly in SCC is not easy though but we have managed to shift our manufacturing concerns based on the consumer preference and where we can also use the resources at maximum level”

...so, the concentration appears to be using resources, rather than conserving resources, and this reflects the idea that stability, the *status quo*, cannot and will not be upset by innovation, even when it is low-risk innovation such as Frugal Innovation and Reverse Innovation.

However, when presented with the *fait accompli* of a water-heater that is profitable because of the innovations, the tolerance is increased. These senior figures may be largely trying to ensure that their wealth and social position remains unchanged and may be uninterested in an innovation that “saves work” or “conserves electricity/water”, but when presented with an innovation that increases sales and profitability will become interested investors. The customer’s perception of the innovation of the product may therefore be very different to the Macro level perception of it; if the senior management can be convinced that resources are being used more efficiently, they will accept the change readily, even though the sales promotion may emphasise the water saving or electric saving qualities of the product.

5.3.2.3 Promoting Performance

In the macro level interviews, promoting performance was equally important as resources, discussed above. This is performance of the business or within the business, with this level of management looking to optimise income and maximise sales without increasing production costs. This, like both preceding factors, was said to be different in Saudi Arabia...

“at [the] macro level, there are different aspects that have their influence on the innovation processes”

...but nevertheless, within the company there is a culture of improvement – performance bonuses and promotions are built-in and encouragement is given for efficiency and general improvement, a similar process to “Total Quality Management” (Feigenbaum, 2002), but not so strongly based on the company culture (Gimenez-Espin, Jiménez-Jiménez, and Martínez-Costa, 2013). The macro level interviewees stressed overall that the aim of the company was to

“develop... affordable products with less complexities and good functionalities and low frills. SCC is also emphasizing on selling its products to European countries which are considered to be developed ones.”

This company aim requires the promotion of performance – both workforce and the product.

5.3.2.4 Knowledge

Among the macro level interviewees, knowledge was one of the three most important issues, in terms of being most discussed – *“SCC is required to keep its focus on the consumer preferences along with the factors discussed and highlighted in detail by the research”* without the knowledge of the market and the customers’ needs progress is impossible, and even remaining stable is jeopardised. To the extent that the discussion reflected the views of the company directors and advisor’s knowledge was actually one of the most important factors at all three levels, macro, meso, and micro (see Figure 10 and Table 7). This fits with the idea that the Saudi economy is beginning a move toward being “knowledge-based” from its existing position of “oil-based”, which is a strongly positive idea for the country as oil resources dwindle.

In fact, the importance of knowledge was stressed in many ways by the interviewees at this level. Market knowledge, customer knowledge, product knowledge, material

knowledge and knowledge of resources were all mentioned here, and the umbrella of knowledge necessary for company expansion was clear.

5.3.2.5 Frugal Innovation & Reverse Innovation

Because the entire interview series was intended to discuss Frugal Innovation and Reverse Innovation, it could perhaps have been expected to be the most mentioned and most important factor. Of course, these were mentioned in all three levels of interviews, but were very far from being the most important in any of them. At the macro level Frugal Innovation and Reverse Innovation was seen as a means of innovation that would not upset the *status quo* or unbalance the economy of either the company or the country. This alone makes it important, and in a broadening economy such as that of Saudi Arabia that importance should not be underestimated – although not the most mentioned subject in the macro level interviews, Frugal Innovation and Reverse Innovation, when mentioned, was clearly of great import, because Saudi Arabia is a country where *“there is no quick acceptance to innovation”*, meaning that in effect, this is innovation “by the back door”;

“Frugal Innovation and Reverse Innovation in the business and particularly in SCC is not easy though but we have managed to shift our manufacturing concerns based on the consumer preference”.

However, it is acknowledged that...

“both Frugal Innovation and Reverse Innovation processes are widely used in developing and developed countries”.

...and that...

“Innovation is critical for both competitive advantages and economic growth for nations and companies”.

The implication that innovation is essential even for a very conservative country such as Saudi Arabia is an important consideration for this research project, and clearly the top level of management is fully aware of the need.

5.3.2.6 *Effective*

“Effective” was selected as a representation of both efficiency and business progress because it occurred so frequently in both usages. It was the fourth most important factor mentioned in macro level interviews, and it was made clear several times that unless a suggestion was “*Effective*” it had no place in SCC, and that...

“Innovation is critical for both competitive advantages and economic growth for nations and companies; huge market size, high growth rates, interest rates and workforce in developing countries ensure the economic stability of the countries and signify that all the factors are taken under keen consideration during the production and manufacturing of products”.

...a clear summation of the ways in which certain aspects need to remain effective as well as innovative.

5.3.2.7 *Cultural Aspects*

At the macro level, the cultural aspects were the most important factor regarding innovation, the first comment on the subject being during the first interview...

“Our country is characterised by high uncertainty preference, where there is high uncertainty avoidance and countries are required to maintain inflexible code of behaviour and belief and where there is very low tolerance of unorthodox thoughts and behaviours. Here we are blessed with people who are inherent impulse to be hard working and busy. Punctuality and precision of the specification and where there is no quick acceptance to innovation”.

This view of Saudi Arabian society and culture was fully supported by the others interviewed, but particularly emphasised in interview three...

“Saudi culture is observed to be collectivist society which is also identified in the long-term commitment towards the members in a family, group or extended family or any relationship. You must have also noticed that loyalty is the main factor in collectivist society, therefore it would not be wrong in saying that Saudi culture is based on loyalty where everyone is seems to be responsible for the other and this is the reason a good and healthy relationship is also prevalent in the society”.

In all interviews, the influence on Frugal Innovation and Reverse Innovation of the strongly structured, hierarchical nature of Saudi Arabian society was clear. This was said to be a major force for good in industry, since there is rarely any argument about an employee's status, position, or standing within the company or society itself. The clearest statement of this aspect of the culture was...

“the people in the country tend to consider the hierarchical order. Every member of the country has its own place without any further reason”.

However, it was also clear that, although this rigid adherence to culture was “good for business” because it ensures the smooth running of the companies, it was also a negative influence on Frugal Innovation and Reverse Innovation because...

“With respect to the Frugal Innovation, it is observed that the high level of power distance within the business functions restricting the people to get more involved”

...where innovation of some kind had already been described as essential, and “low-risk” innovation was the preferred option.

The clear implication was that most innovation in Saudi Arabia was likely to be “top down” from management rather than “bottom up” from the workforce. It seems likely that this rigidity reduces levels of innovation overall but is also arguably the reason that Frugal Innovation and Reverse Innovation are accepted, as these are mainly seen as lower risk and more easily controlled by management.

5.3.2.8 Cost Reduction

In the Reverse alphabetical order used, cost reduction comes last, but also, perhaps strangely, it is also last in terms of quantity. The macro level interviews displayed little interest in cost reduction in production. There was emphasis on the efficient use of resources, which does reduce costs, but the direct “cost reduction” was the province of the lower echelons of the management hierarchy.

5.3.3 Meso Level Findings

Having completed the presentation and review of the data collected from the highest levels of management at SCC, the discussion now moves to the “middle management” of the company. At this level, two new factors were discussed; “Quality Assurance and Control” and “Processes and Technology”. The reason for the introduction of these new factors is considered in the discussion below. As above, the factors are presented in Reverse alphabetical order. This was particularly helpful here because of the very noticeable change in the order of relative importance between these two levels. As noted above and below, the difference in outlook between the Meso and Micro levels was much less than the difference in outlook between the Meso and Macro levels.

Table 9: Summary of Findings. Meso Level Data

Factors (Macro Level Data)	Findings
Socioeconomic factors	Seen as a factor in other markets but not at home → “no poor people in OUR country”
Resources	Keep processes running but efficient → just accepted as “there”
Quality Assurance and Control	Quality Assurance most important at this level → innovation must not affect quality
Promoting Performance	F&R in SCC → promote sales and employee performance
Processes & Technology	Affect profits → driver of innovation
Knowledge	Without customer knowledge there is no business, so no innovation
Frugal Innovation & Reverse Innovation	Essential for Saudi Arabia → not behind, but must stay ahead → only F&R readily accepted innovation types
Effective	Unless innovation is effective, profit is lost
Cultural Aspects	More social mobility at this level
Cost Reduction	Innovation → cost reduction, but maintain quality

5.3.3.1 Socioeconomic Factors

At the meso level, this was the least mentioned (*i.e.* least important) factor in the interviews. It was only seen as a factor in other markets, not at home, since the home market sales were covered as a matter of course;

“we are making products that are not only satisfying the needs of local customers, but our international markets are also covered. In addition, I think it is not restricted to big organisations”

The implication was that most of the “resource constrained” customers were from overseas markets. Whilst that is not fully the case, it must be considered that this is a “middle management” layer that is in some cultures (such as Saudi Arabia) still seen as “out of touch” with the economic realities of the less well-off (Bhaskaran and Sukumaran, 2007) (*i.e.* there may be a feeling that there cannot be any poor people in our country).

5.3.3.2 Resources

Again, this was not one of the major factors at this level of interviews. Procurement of resources was dealt with at either a higher or a lower level – in this group the concentration seemed to be on the “here and now”, keeping the processes running at a level that could be expanded in time of need, but which was efficient at the present level. Resources, human or otherwise, appeared to be a “given” at this level, simply accepted as being there.

5.3.3.3 Quality Assurance and Control

Although this factor had not been mentioned at the macro level, and was only mentioned briefly at this level, there was an indication that there was a variation in opinion and viewpoint across the middle-management. Compare the two quotations below, from a “policy maker” and the quality assurance director;

“We have some quality checks and we are required to make sure that our product manufacturing mechanism is not at all violating the environmental and social responsibility conservation”

*“we [*i.e.* SCC] do not compromise our quality standards for both [*innovation methods*] in local and in international market[s]. We have our own internal quality control system that does not allow the final product to be presented without scrutiny”.*

These apparently opposing views are difficult to reconcile but were apparent in several interviews at this level. This may have been due to the mix of interviewees at this level – those with any connection to quality assurance (QA) rated quality far more importantly than those connected with policy or marketing. Thus, since “policy” is the remit (broadly) of the Macro level, and “marketing” of the Micro level, it is logical that “quality” is the remit of the Meso level, but where there is overlap (as in these quotations) there will necessarily be disagreement.

5.3.3.4 Promoting Performance

The first of the “top four”, the fourth most mentioned factor in the meso level interviews. All those interviewed suggested that the company structure and culture was geared around promoting and rewarding performance. The view of the interviewees was that the Frugal Innovation and Reverse Innovation methods adopted by SCC were helpful in the promotion of sales performance, and that employees were also encouraged to perform well in the production areas.

“also emphasize on Reverse Innovation along with Frugal which help them in developing product by reducing costs and achieving economies of scale as well”

It seems that the Meso level of management at SCC are using both types of innovation to gradually improve company performance, and incrementally produce a situation where innovation is accepted in the national as well as the company culture.

5.3.3.5 Processes and Technology

An area not mentioned at the macro level, processes and technology were seen by this group as one of the factors which affected the profitability of the company. Although not in the “top four” like the previous factor, processes and technology were important, although...

“it is more oriented towards using technological aspects in getting customer’s information in detail along with the changes in production processes”.

This comment does indicate the importance of technology in marketing as well as production – social media are a good way of gaining new customer information, particularly their preferences and needs, as can be seen from this comment...

“technologically advanced processes that not only lead to better customer information and minimizing overall costs as well”.

This combined use of technology to increase customer information and minimise overall costs was clearly attractive to this level of management, partly because of the idea that it increases knowledge – discussed below. The relationship with Frugal Innovation and Reverse Innovation comes due to the...

“fact that destination market innovation is a developing concept”.

5.3.3.6 Knowledge

Knowledge was the single most-important factor mentioned in the meso level interviews. Put simply, without *“information and knowledge about other markets and customers”* there is no business. This coincides with the ideas propounded by Gallarotti (2013) that Saudi Arabia is actively seeking a “knowledge economy”, with promotion and position being preferred on those whose knowledge in specific areas can boost the entire economy as well as being profitable to the company for which they work. Grasping the importance of knowledge is one of the first essential steps in this transformation, and the middle level of management at SCC appears to have taken this step. A comment that supports this view is one that shows the importance of knowing about innovations strategies;

“According to my understanding collaboration and innovation is the major emphasis of the companies today which is greatly supported by the destination market innovation strategy”.

5.3.3.7 *Frugal Innovation & Reverse Innovation*

This was expected to be important – the questions were based on the individual interviewee’s views on Frugal Innovation and Reverse Innovation – and it was the third most mentioned. The first person interviewed at the meso level said;

“Well, [with confidence] ...my overall experience [of] Frugal Innovation and Reverse Innovation, [is that] the Saudi industry is no way behind any other developed nation... through the development of products... according to the needs and preferences of the customers”.

...a point which was also made by the second interviewee;

“We are using Frugal Innovation in Saudi industry in an effort to develop our product that is actually covering all the other factors as well, such as customer preference and needs of the market. This does not entail that we are not focusing on tapping into new markets, but we are also making our way to new market and product development as well”.

There was also an insistence that Frugal Innovation and Reverse Innovation did not, and would not, allow a compromise on the quality of the company’s products. Where the macro level interviewees implied that Frugal Innovation and Reverse Innovation were the only methods likely to be accepted in Saudi Arabian business, at the meso level it was seen as a starting point which would permit further innovation in the future.

5.3.3.8 *Effective*

The second-most mentioned factor, effectiveness of operation, marketing, innovations, and the product itself were all indicated by this group as being essential to the future of SCC. Even Frugal Innovation and Reverse Innovation were only necessary because...

“we are continuously looking for better options through which we can reduce the costs and make our processes more efficient in terms of their effectiveness”.

In other words, unless the processes were “effective” there was no profitability in the product. Although this is true in any business, it was clear that the middle-management

at SCC had a firm grasp on the reality and importance of ensuring that every level of the business was effective.

5.3.3.9 Cultural Aspects

Although this factor was vitally important to the macro level interviewees, it was far less important at the meso level. There are many possibilities that could explain this, but the greater social mobility of this level of management is almost certainly one of the most important. Where the upper echelons of management are secure in their view that the *status quo* will not change, and that cultural aspects should therefore be strengthened and celebrated, at the meso level the idea that culture was changeable or malleable, allowing these managers to increase their status or position, was palpable. That said, there was one comment that combined both views;

“Saudi Arabia is highly characterised by [a] dual labour market where Saudi nationals are [in] higher paying public sector jobs and non-Saudi’s are in lower paying private sector jobs”

5.3.3.10 Cost Reduction

In fifth place at this level, cost reduction was discussed mainly in terms of processes, technology, and resources. These three areas were seen as potential cost-reduction centres, with cost-reduction also being equated to higher profitability. This management level has a remit to ensure the profitability of the products, thus it is not surprising that cost-reduction was one of the areas on which they concentrated their efforts.

“we are putting efforts to maintain the competitiveness... we are continuously looking for better options through which we can reduce the costs”

5.3.4 Micro Level Findings

The final group of interviews were with the micro level of management – those involved directly in the production, promotion, sale and development of the products of SCC.

There were a greater number of interviews at this level, and most of them were longer in duration than those at meso or macro levels. As a consequence, it can be seen from Figure 10 and its associated Table that these interviews provided a greater quantity of data, but the factors discussed below can still be compared in terms of relative importance. At this level, the only “new” factor discussed was the first in the list below – sustainability.

This is discussed first because of the reverse alphabetical order adhered to, however it is an important point, since it is an apparent indication of the change in attitude that is creeping upwards through Saudi Arabian society; the younger generations have accepted that the world’s supplies of oil and gas are diminishing, and that, if they wish to live full, productive lives and remain in their home country, sustainable growth is the only way that this can occur. Since this level of management is, naturally, made up of the younger members of management, this is an encouraging sign that this attitude will permeate upwards as they are promoted to the next level.

Table 10: Summary of Findings. Micro Level Data

Factors (Macro Level Data)	Findings
Sustainability	Innovation needs sustainability → society needs sustainability
Socioeconomic factors	Frugal Innovation → resource constrained customers
Resources	Resources need Innovation and sustainability
Quality Assurance and Control	Quality → essential drives innovation
Promoting Performance	Get the best from employees, not the most
Processes & Technology	Linked to performance and profitability driven by innovation
Knowledge	Knowledge drives quality drives innovation
Frugal Innovation & Reverse Innovation	Reduces production costs → easy to introduce
Effective	If innovation is effective, it aids quality, profitability and knowledge
Cultural Aspects	Social mobility highest at this level → drives innovation
Cost Reduction	Driven by innovation

5.3.4.1 Sustainability

Although sustainability was only considered as a factor in the micro level interviews, it was the least important compared to the other factors (see Figure 10). Despite this, it was mentioned at least once by every participant, three examples being;

“Frugal/Reverse Innovation have helped the company’s sustainability through innovating its processes through bringing improvement in environment and investing in high-tech machines for minimizing the wastes and recycling and returning of products along with transporting raw materials” ...

“The Saudi Ceramic Company is continuously seeking new opportunities through in-depth market research and methodological analysis and I think this the way through which Frugal Innovation is making the company’s products more sustainable” ... and

“Frugal Innovation has facilitated in ensuring the sustainable quality through using the resources in best possible manner”.

From these examples it is clear that this is an important issue for this level of the company’s management – all can see the long-term importance of remaining sustainable; the company will continue to operate, jobs will continue to exist, wages will continue to be paid, and the environment will be protected (although the order of importance varied). The idea that future generations should “inherit” the sustainability was clear.

5.3.4.2 Socioeconomic Factors

Mentioned slightly more frequently than “sustainability”, socioeconomic factors appears to be of the same relative importance as it was for the meso level (see Figure 10). In the micro level interviews, socioeconomic factors were also equated with “resource constrained” customers and markets;

“the Frugal Innovation in Saudi ceramic company is considerably focused on resource constrained customers which is undoubtedly best option for the company in an effort to save time and extra costs and avoid wastage as well” ...

and;

“in this regard, Frugal Innovation processes have actually facilitated us in grabbing the attention of the local needs of the customers. Yes...the resources constrained customers have given a push to be aligned with the market preferences”.

This second mention was made when discussing the local, company and national cultures and their effects on the socioeconomic needs of the population.

5.3.4.3 Resources

Eighth out of eleven at micro level, Figure 10 shows that resources were of the same relative importance as they were at the meso level, where resources were also in eighth position (out of ten). In some cases, sustainability, Frugal/Reverse Innovation, and resources were associated...

“Frugal Innovation and Reverse Innovation can bring more sustainability as they are mainly based on removing complexities, using resources more efficiently and incorporating such methods that are community and environmentally friendly as well”

The clear grasp of these aspects at this micro level of the company’s management is a very positive impression, particularly since it was not confined to one single interview, with other participants saying similar things, such as...

“the Frugal Innovation is adopted, and it serves as a path towards efficient production methods. We are now more capable of estimating the demands and consumer preferences, using resources more effectively along with reducing costs”.

Overall this is an encouraging trend in the lower management of SCC, since it reflects the importance of Frugal Innovation and Reverse Innovation as one of the methods for ensuring that resources are used efficiently and sustainably.

5.3.4.4 Quality Assurance and Control

Quality Assurance (QA) and control were an important issue at the micro level, as it is perceived as part of the company’s ethos – the first interviewee said that the main corporate culture present was a commitment to *“quality standards and excellence in innovation”*, and the fourth said that although it was still important to minimise costs,

SCC is *“more concerned of keeping the same quality standards”*. This attitude was present in every attitude, and when the participants were asked about changing suppliers to obtain cheaper raw materials, a typical response was this one from the fifth interview;

“No... never... I would not appreciate to this idea of acquiring cheaper raw materials and on low quality, where the USP of our company is based on maintaining high quality standard products”.

This was an area of total agreement, with quality prioritised over price by every person interviewed.

5.3.4.5 Promoting Performance

At the micro level, this was the second-most important factor. Here it was stressed by all that the company was committed to getting the best out of employees, rather than getting the most from them. One participant said;

“SCC believes in the development and learning of the employees, we ensure that we have got highly skilled workforce and they do not restrict their career to a single path... we do provide complete career progression to our employees”.

This was an idea echoed by every interviewee, that employees should be placed into areas where they would be performing best, so that both the company and the employee benefit – the company with improved efficiency and the employee with a career path, not simply a job.

This need to promote performance was also linked to innovation and innovative practices at the heart of the company’s processes;

“And I will also like to mention here that through the adoption of innovative techniques our overall work is turned out to be more efficient and less time consuming”.

5.3.4.6 Processes and Technology

“Processes and Technology” was not quite as important as “Promoting Performance”, being in the fourth position. There was seen to be a link between the two factors, since

improved processes often lead to improved performance, but the main direction of the comments made was...

“The inclination towards innovative processes of the company and shift towards Frugal/Reverse Innovation has turned out to be very effective for the overall financial stability and profitability of the company”.

This insistence that improving processes and introducing technology was linked to stability, sustainability, and profitability, was found in every interview. In fact, there were clear links to all of the “top four” factors (*“Effective”, “Promoting Performance”, “Knowledge”, and “Processes and Technology”*), and the management at the operational (micro) level were committed to bringing these factors even closer together.

5.3.4.7 Knowledge

Saudi Arabia is pushing forward their need to be a “knowledge economy”, and both this and a commitment to quality were apparently influenced by the organisational learning strategy of SCC, where...

“Through personal development and training of employees working with SCC, the company ensures that the aim of Organisational learning is achieved. In relation to Frugal/Reverse Innovation, the employees are learning the new ways of business processes and the company also makes sure that the people working have complete knowledge/information”.

The need to know facts and data was more than evident – it was a necessity of the business. This view of the importance of “knowledge” to the company also ties-in to the idea that *“Promoting Performance”* is essential.

5.3.4.8 Frugal Innovation & Reverse Innovation

Although this was in fifth position, and not in the “top four”, it was expected to be an important topic in the discussions. It was here that the participants most strongly advocated the company’s methods, with one saying;

“Frugal Innovation has facilitated in ensuring the sustainable quality through using the resources in best possible manner”.

One of the participants also expressed the positive view that...

“The company always seeks new innovative ways of examining... new resources/raw material and... innovations to optimize processes of production and present ground-breaking and unique solutions... [and] this has definitely changed the traditional way of production towards being more efficient and flawless in every department”

...and that this attitude and strategy had, in itself, been instrumental in *“reducing the costs of production”*. Whereas in the higher echelons of the company Frugal Innovation and Reverse Innovation were perhaps viewed as a *“necessary evil”*, or as perhaps the only innovation possible in a conservative company in a conservative country, in the micro level F&R innovation was viewed as one of many possible ways of innovating, and that innovation keeps the company afloat. Nevertheless, the overall view was that F&R innovation were the best solution;

“after shifting towards frugal/reverse innovation, the company is capable enough of competing in local market with full swing and through reverse innovation; it has become possible to grab the attention of international markets as well”.

5.3.4.9 Effective

Like the other factors discussed at the micro level, the links to other areas were clear.

One of the clearest examples of why *“Effective”* is important (and linked) is seen in the statement;

“There are multiple ways through which Frugal/Reverse Innovation have made the products and processes more sustainable, such as using resources/ raw material more effectively, opting such processes that are environmentally friendly, removing complexities, minimizing costs and providing value for money to its consumers”.

In the interviews at this level the *“Effective”* use or application of everything was seen as being important, with *“effective”* and *“efficient”* being treated as near synonyms, and being important because efficient employees are likely to be happy, and happy

employees are always more productive, and the innovations introduced have improved efficiency further

5.3.4.10 Cultural Aspects

The last two in the listing, “*Cultural Aspects*” and “*Cost Reduction*” were considered equally important, being in joint sixth place. A look at Figure 10 indicates that, at this level, “*Cultural Aspects*” were relatively less important than at macro level and relatively more important than meso level. Here, the view of senior management that culturally Saudi Arabia has a rigid structure, and that this structure should not be disturbed is re-echoed, although there was slightly more flexibility at the micro level. It has been stated above that the lack of importance of “*Cultural Aspects*” at the meso level may be due to the greater social mobility at that level – thus, it has most importance to the two levels of management which are most settled or fixed in terms of social mobility. Two examples that support this view from the Micro level interviews are;

“The company put great emphasis on community and environment that is why we focus on such business processes that are more environmentally friendly and also focuses on development of community and environment as a whole”.

And;

“here in SCC employees are provided with support and encouragement to grow professionally without compromising their personal life”.

5.3.4.11 Cost Reduction

This, like “*Cultural Aspects*”, was in joint sixth position, nevertheless, efficiency and cutting the costs of production also formed a part of the culture of SCC, but had been assisted in part because...

“Frugal Innovation is adopted, and it serves as a path towards efficient production methods. We are now more capable of estimating the

demands and consumer preferences, using resources more effectively along with reducing costs”

...now, because of the increased competition from China and India, although it was still important to minimise costs, SCC is *“more concerned of keeping the same quality standards”*.

In fact, this is a difficult choice if forced on individual managers, but it is helpful that SCC has a policy to the effect that quality comes before price. Because of this, it is seen that it only becomes an issue when discussing the competition from China and India, and that even then, careful attention must still be paid to maintaining quality ...

“well I am not denying that other countries such as China and India have captured industries and hence, we are equally working on bringing in more improvements”.

5.4 Conclusions from the data

The research set out to create a framework of drivers and barriers to Frugal Innovation and reverse innovation at each management level. The initial indications are that the data collected and analysed is sufficient to meet this aim, with the fairly clear delineations between the striations of the management levels. This is discussed in greater depth in the next Chapter, but the initial conclusions are that the drivers and barriers to Frugal Innovation and reverse innovation have been clearly defined at each management level, which makes it possible to create a suitable framework. In addition, the similarities and differences between the three management layers have also been discussed, and the possible changes that appear to be taking place have been put into context. These differences and similarities are potentially important, because they may be an indication of the way in which Saudi Arabia and other MENA countries may develop and change over the coming decades. This, of course, is one of the many unknowns, but the indications from this research are fairly positive.

In section 5.3.1.2 the method of selling the technology back to Europe was detailed, although the bottom section of Figure 12 may explain this more clearly. The standard product was altered to ensure low water consumption and low power consumption, but less expensive – so everything inessential was removed. The product was then checked to ensure that it still met the European standards of the original product made with European technology. The major driver initially was the export sales to Africa and the MEA, but once this market was established the company concentrated on expanding its sales area to Europe and North America. The incentive for this was the discovery that the division was more profitable than the traditional part of the company and had potential for growth.

The data has also allowed the research objectives to be met. This is discussed in more depth in section 6.1.2 but the preliminary conclusions in the three research objectives follow – each objective is restated in the first paragraph of the sub-section which relates to it. The research questions themselves are answered and discussed in Chapter 6.

5.4.1 Drivers and Barriers to Innovation

The first objective was to analyse the drivers and barriers to Frugal Innovation and Reverse Innovation at the three management levels. The data has provided a list of drivers and barriers for each management level, with contextual differences. This permits the achievement of the first objective. The drivers and barriers at the Macro level were mainly cultural, and the structure of Saudi Arabian society is mirrored in the ideas presented by this management level. In the Meso level, the drivers and barriers identified were connected mainly to risk and business objectives, since this management level appeared to welcome and embrace change. Finally, at the Micro level of management there was a distinct feeling that change should be resisted, and

the strongest emphasis was on sustainability. As a result, the drivers included leadership, and the barriers included cultural perceptions of innovation.

Table 11: A brief summary table of both drivers and barriers to F&R innovation at the three management levels examined.

LEVEL	DRIVERS	BARRIERS
MICRO	<ol style="list-style-type: none"> 1. Sustainability 2. Innovation Strategy 3. Business Processes and Resources 4. Organisational Learning 5. Organisational Structure & Culture 6. Corporate Culture 7. Leadership 	<ol style="list-style-type: none"> I. Economics II. Use of power/resources III. Cultural perception of innovation IV. Cultural perception of business processes and resources V. Management commitment
MESO	<ol style="list-style-type: none"> 1. Risk Criteria 2. Attitudes Towards F&R Innovation 3. Experience of F&R Innovation 4. Destination Market Innovation Strategy 5. Dual Business Models 	<ol style="list-style-type: none"> I. Misunderstanding of concept II. Market size III. Customer demand IV. Management commitment
MACRO	<ol style="list-style-type: none"> 1. Culture – Power Distance 2. Culture – Individualism 3. Culture – Feminine Vs Masculine 4. Culture – Uncertainty Avoidance 5. Culture – Long-term Orientation 6. Socioeconomic Factors – Income 7. Resource Scarcity 8. Good Enough Innovation 	<ol style="list-style-type: none"> I. Tradition – same yesterday, same today, same tomorrow II. Fear of upsetting government III. Need to be certain IV. Affordability of product V. Misunderstanding of concept VI. Management commitment

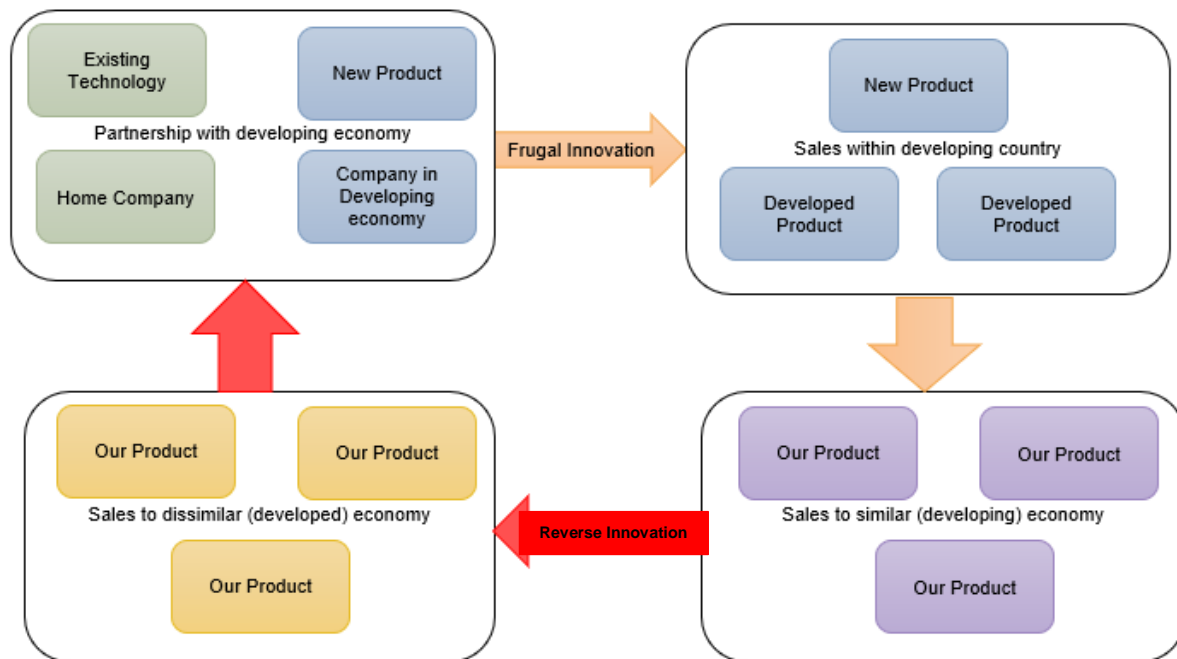
5.4.2 The Relationship between Frugal Innovation and Reverse Innovation at SCC

The second objective was to analyse the nature of the relationship, if any, between Frugal Innovation and Reverse Innovation in the Saudi Ceramic Electric Water-heater Division. In the KSA, innovation of any kind has rarely been accepted by business,

who, for cultural reasons, have always been extremely conservative in their views. Although the region has a long history of trade and commerce, the modern economy has been built on oil. It has long been said that innovation is essential to market growth (Drucker, 2015), and even that *“its role in the development and coordination of the market is inalienable”* (Tohidi and Jabbari, 2012, p. 535). Despite this, Saudi Arabian companies are only now beginning to accept innovation.

The data gathered suggests reluctance to accept innovation, unless it is shown that it does not “go against tradition”. Frugal Innovation and Reverse Innovation are related, in Saudi Arabia, because they meet this criterion to a greater or lesser degree and are therefore becoming acceptable to companies in the KSA. In one sense, SCC is at a disadvantage for the application of innovation because it is a large company. According to Petkovska (2015), SMEs are more likely to have the flexibility needed to innovate than large companies. On the other hand, the water-heater division is run as if it were a separate small company, and the technology used in all the water-heaters was originally from European (Bosch, for example), so the acceptance of Frugal Innovation and Reverse Innovation, once accepted at the Macro level, has been a useful tool for expansion. The usual or accepted relationship between Frugal Innovation and Reverse Innovation is shown below in Figure 11.

Figure 11: The accepted relationship between Frugal Innovation and Reverse Innovation



The information in Figure 11 is simplified in the timeline at the bottom of Figure 12, but the relationship gathered from data (see p. 89) is clear – Frugal Innovation into similar economies but with slightly better GDP, then Reverse Innovation to sell back to the very dissimilar economies of Europe but concentrating on those with the smallest GDP.

As noted earlier, this is exactly what SCC water-heater division has done in a classic example of Reverse Innovation. The growth of sales, particularly in Eastern Europe, and the fact that the company no longer relies on further input from western partners are clear indicators that both Frugal Innovation and Reverse Innovation are being successfully applied within SCC, and the culturally sensitive framework and definitions will allow this success to be followed in other MENA countries.

5.4.3 Applying SCC experience in other developing economies

The third objective was to identify ways through which companies in developing economies could manage successful Frugal Innovation and Reverse Innovation. SCC

has made a drive to export, to both developing countries and back to the developed countries where the technology originated. In doing so, their own experience is invaluable; when selling to a developing economy, they are aware of the possibility of having their own technology used in the way that they have used Western technology, and when selling back to a developed economy can make use of their own experience of resource constrained buyers.

5.5 Summary

In this Chapter it has been shown how the results fitted with the research objectives but has not shown how it has been used to answer the research questions. The research questions are the basis of the discussions in the following Chapter.

This Chapter has looked at the relative importance of different factors to different levels of management (Figure 10, Table 7) and the “global links” that occur between them. It has also allowed a summary of the interviews to be presented, in a way that permits direct comparison. The direct comparisons made are discussed in depth in the following Chapter, but some of the factors which became apparent included the ways in which management from each level perceived Saudi Arabian society, and the importance of global business. The clustering and grouping of the data, and the comparison of the interviews has demonstrated the thoroughness of the data collection process and identified the clear separation of the three levels involved.

In the conclusions it has also been noted that there are perceivable and positive changes occurring within the management structure of SCC which reflect the changes in outlook which may also be occurring throughout the entire MENA region. There are clear and profound differences between the Macro and Micro level views, but less so between Micro and Meso. It is believed that this indicates a slow “bottom up” change in the way that businesses are run, and trade is viewed – hence the importance, at the

lowest level, of sustainability. Nevertheless, Saudi Arabia remains a very traditional and conservative country, so any changes which take place will not happen “overnight” – and it also goes without saying that not all changes are automatically for the better; very often traditional ways prove to be better than the new.

Chapter 6 Discussions

6.1 Introduction

This Chapter examines the research questions in the light of the findings and analysis as well as the links between the research questions and the literature review. In these discussions the Chapter also considers the different views or approach of each of the defined levels of management within SCC and explains the contribution to knowledge or practice which this research has brought. After a general discussion of the answers to the two research questions, the Chapter ended by a summary of all the above points.

The combination of the literature reviewed, and the data gathered, makes it possible to provide an answer to the research questions, but it also essential to open the Chapter with a discussion of the aims and objectives of the research, as it is also essential that these have been met, and to explain how they have been met.

6.1.1 Research Aim revisited

“The main aim of this research is to develop a Frugal Innovation and Reverse Innovation driver’s framework in the developing economy context”.

From the literature reviewed and the data collected, it has been possible to develop a suitable framework, and this may be found in section 6.5 Framework of Drivers for Frugal Innovation and Reverse Innovation in a Developing Economy.

6.1.2 Research Objectives reflection

- To analyse the macro/ meso/ micro drivers and/or barriers to Frugal Innovation and Reverse Innovation and the extent to which these are applicable to developing economies like Saudi Arabia (see Table 11).

- This objective was met in the macro level interviews, where the drivers identified are mainly cultural, and it was made clear that in a rigidly hierarchical context such as Saudi Arabia, Frugal Innovation and Reverse Innovation may be the only acceptable innovation available.
- It was also met at the meso level, where there is perhaps slightly more social mobility, so that cultural factors were much less important, and that at this level management appeared to be more open to other forms of innovation, with the drivers being business oriented.
- Finally, it was also met at the micro level management, where once more drivers seemed centred around the more conservative view that the only acceptable forms of innovation were those that did not upset the *status quo* – hence the emphasis on sustainability.
- To analyse the nature of the relationship, if any, between Frugal Innovation and Reverse Innovation in the Saudi Ceramic Electric Water-heater Division.
 - There was found to be a clear relationship between these types of innovation at SCC – they were seen by senior management as the only acceptable ways of innovating, by the middle management as the preferred way, and by the lower management as the easiest.
 - The Frugal Innovation and Reverse methods were seen as complementary by all management levels.
- To identify the ways through which companies in developing economies could manage successful Frugal Innovation and profitable Reverse Innovation
 - Companies in other developing economies could profitably make use of these techniques by following the example set by SCC – who have made certain that these techniques are suitable, particularly for expansion into a resource constrained marketplace.

6.2 Research Question One

1. *How does the product development and associated innovation in Frugal – Reverse Innovation impact on the need to increase product competitiveness?*

This first question was answered clearly by the data, and although not asked directly, was behind several of the interview questions at each level, as reducing product retail cost impacts on profitability, volume of sales, customer perception of the product,

product quality assurance, choice of suppliers, and choice of raw materials. Each of these areas was discussed at every management level, and the views were broadly similar, as the following sub-sections reveal.

6.2.1 Macro Level Data

First of all, it was made clear at this level that “innovation” was a concept which found only reluctant acceptance culturally;

“Here we are blessed with people who are inherent impulse to be hard working and busy. Punctuality and precision of the specification and where there is no quick acceptance to innovation... Frugal Innovation and Reverse Innovation in the business and particularly in SCC is not easy though but we have managed to shift our manufacturing concerns based on the consumer preference and where we can also use the resources at maximum level”.

Despite this cultural resistance, this management level did accept that...

“both Frugal Innovation and Reverse Innovation processes are widely used in developing and developed countries” ...

... as means of improving the product whilst reducing the cost, and also that...

“Innovation is critical for both competitive advantages and economic growth for nations and companies”.

This presents the macro level management with a conundrum, since there is a clear recognition for the need for innovation, and of the fact that it is used elsewhere, the difficulty being that “*there is no quick acceptance to innovation*”. In addition, the macro level management had observed...

“the people in the country tend to consider the hierarchical order. Every member of the country has its own place without any further reason. Different levels within the organisations are observed to be exhibiting the inherent concentrated epidemics and inherent inequality. With respect to the Frugal Innovation, it is observed that the high level of power distance within the business functions restricting the people to get more involved”.

This implies that most of the innovation must be “top down” from the management, rather than “bottom up” from the workforce or product users. This probably reduces the level of Frugal Innovation and Reverse Innovation that occurs.

However, there was a clear understanding that the prime objective of SCC was to remain in business, and that requires profitability and sales. This means that cost reduction is only one of...

“the factors [that] are taken under keen consideration during the production and manufacturing of products.”

... without directly answering the unspoken question: “how do you reduce costs, maintain quality, and still sell product?” In summary, this management level was clear that innovation was essential, but difficult, and that R&D without Frugal Innovation and Reverse Innovation would be more expensive. The top level of management accepted the need, could see the difficulties, but generally passed the “field decision” of “how?” to the operational managers below them.

In this sense, the top-level management did not provide much evidence on the way in which the need to reduce the cost impacted on R&D in the areas of Frugal Innovation and Reverse Innovation, except to emphasise the idea that, in Saudi Arabia, any form of innovation was likely to meet cultural resistance across the entire industry. This, therefore, has not directly answered the research question, but has “prepared the ground”, since the consensus was that it was, nevertheless, essential to innovate.

6.2.2 Meso Level Data

The second person interviewed at this level “set-out-the-stall” for the company in general – discussing QA within SCC, and speaking from the company point of view rather than that of the Saudi standards metrology and quality organisation, he stated that...

“No matter what... whether its Frugal or Reverse Innovation, we [i.e. SCC] do not compromise our quality standards for both in local and in international market. We have our own internal quality control system that does not allow the final product to be presented without scrutiny.”

...confirming that SCC products are all QA checked, and are of the same standard and quality, regardless of the marketplace in which they are sold.

This emphasis on quality and no compromise clearly means that reducing costs by using inferior materials is false economy – a point being emphasised by W. Edwards Deming more than thirty years ago (Deming, 2000). In the case of SCC, acceptance of this fact has forced management and R&D to concentrate on cost savings through innovation instead. One interviewee emphasised that a company in SCC’s position should be innovative, but must never compromise on quality...

“The quality of the products is not compromised along with the materials used for the production of the final products”

... a view clearly supported by a colleague, who said...

“No matter what... whether its Frugal or Reverse Innovation, we [i.e. SCC] do not compromise our quality standards”.

Thus, at this level, the management are concentrating on quality above cost, but since there is an accepted need for innovation, their preferred route is innovation in a form that is likely to use existing parts in a new way, which would be Frugal Innovation.

Essentially, at this level, the data shows that the product development and associated innovation in Frugal – Reverse Innovation impacts on the need to increase product profitability, because if a completely new, cheaper water-heater was designed using existing stock parts from the current range (Frugal Innovation) it would still need to be profitable, so profit must be built-in at every stage. If, conversely, innovation allowed parts from a different product range to be used in the water-heaters, it would be Reverse Innovation, but the same need for profitability would be present. The quality

of the company's product is seen as one of their USPs, and although at this level "sustainability" was not a directly mentioned theme, stability was seen as essential if the company was to continue profitably. The overall impact of Frugal Innovation and Reverse Innovation on reducing product cost appears positive here, the reaction being against using cheaper raw materials, not against innovation.

6.2.3 Micro Level Data

The micro level of management at SCC's water-heater division were also clear that some form of innovation is essential. In fact, ...

"innovation is our excellence, which can also be said as our USP, so yes we keenly consider innovation as our competitive advantage as well in the industry. Specifically, for the local market demands and particularly water-heater market, we focus on Frugal Innovation"

... a view which supports and strengthens the ideas already put forward by the higher management levels. One major reason for adopting this approach was given the development time for new products, reduced to...

"around 4-6 months and then we introduce... the developed product to the market".

Clearly, if the R&D time for a new product is reduced, the overhead costs of that product have been reduced. Thus, the impact of accepting Frugal Innovation must be that it reduces product cost without the need to compromise on quality. In fact, Frugal Innovation and Reverse Innovation were seen in a very positive light by management at this level, with one participant saying...

"in this regard, Frugal Innovation processes have actually facilitated us in grabbing the attention of the local needs of the customers. Yes...the resources constrained customers have given a push to be aligned with the market preferences"

... an important aspect for a company where the management state that...

“we are providing our products and serving our customers with higher quality while maintaining the standards of our processes”.

In answering the first research question, the comments and statements from this management level are unambiguous; Frugal Innovation has the positive impact of reducing product development costs without affecting quality. This makes it the ideal vehicle for promoting the company’s ability to fulfil customer needs at an affordable price and for avoiding the loss of reputation and sales that could be brought about by compromising on the quality of the original raw materials used by SCC. Reverse Innovation was viewed slightly differently, although potentially it could lead to the same end result. Taking another company’s product as a starting point would not find support but taking the product of another division and changing it to produce a water-heater would be seen as good, ethical Reverse Innovation, that saved money by reducing R&D costs, but maintained quality.

In the view of these managers, if Frugal or Reverse Innovation were not used, then the increased R&D costs would make adaptations unprofitable. The impact that these innovations have on ensuring profitability is the idea that, although they were aware of the need for innovation, resources were limited to what is currently available.

The views of the three levels of management at the SCC agree with the results of other research into Frugal Innovation within developing economies. It does, however, indicate that Reverse Innovation is not necessarily viewed in the same way in Saudi Arabia as in other developing economies. Several other studies (including Agarwal and Brem, 2012; Agarwal, Brem, and Dwivedi, 2019; Bencsik, Machová, and Tóth, 2016; Drummond, 2012) have suggested that these types of innovation are the best way forward for developing economies. They are not without risk – Christensen (1997) pointed out that investing in technology can even cause “great” companies to fail, and

Simula, Hossain, and Halme, (2015) posed the question “where does Frugal Innovation go from here?” – suggesting that it is not the panacea that some supporters contend.

However, in general, the literature and the SCC management views coincide. Frugal Innovation and Reverse Innovation allow companies in developing economies to compete more readily with the multi-national corporations (MNC) from the developed countries by maintaining product profitability even after R&D changes to the product. In Saudi Arabia specifically, where much industry has been dominated by overseas MNCs (Government of Saudi Arabia, 2017), and where conditions are rapidly modernising (Al Omran, 2017), any form of innovation which allows local firms to compete in world markets must be seen as a positive step. The research question is clearly answered – the need to reduce product retail cost impacts positively on product development because Frugal (and, to a degree, Reverse) innovation as part of the research and development process is cost effective. R&D is essential, and innovation is also essential, but through the use of Frugal Innovation and Reverse Innovation, R&D costs are minimised, and the sales field is maximised, thus providing a double-positive result for the company. The difficulty seems to be that Reverse Innovation has not been fully understood – SCC management made very few remarks specifically on this, and there was perhaps a feeling that the ethical basis of Reverse Innovation, like Reverse engineering, were somehow in question. This has been explained above (p. 40) as being for cultural reasons, and because of a mistaken conflation of the two terms.

What this study has added is a culturally sensitive definition of Reverse Innovation that helps to remove this artificial barrier in other parts of industry in Saudi Arabia, and by demonstrating that the impact of Frugal Innovation and Reverse Innovation on

improving profitability is generally positive – it allows the company to do more with less – has shown a way in which the Macro and Meso management could overcome the cultural barriers. These barriers have been shown to be real, particularly at the higher levels of management, and yet also fairly easy to overcome, once a full understanding of the increased sales and profits that they can bring has been brought to the attention of those concerned. There are also indications that, as the Micro level managers are promoted to the next level, and so on, things will continue to improve and modernise.

6.3 Research Question Two

2. *What is the effectiveness of resource constrained innovation in promoting firm performance?*

This second question was also not asked directly, but, like the first question was implicit in the interview questions. “Resource constrained” innovation can include both Frugal Innovation and Reverse Innovation since its main directive thrust is innovation which does not cost the company very much financially or in terms of R and D. The views of each level of management had both similarities and differences, as the subsections show. The positive answer to the first research question is also relevant to this question, since it was established that some kind of innovation is needed, and that Frugal Innovation and Reverse Innovation can both reduce R&D time, and therefore cost.

6.3.1 Macro Level Data

Performance was equated to growth by the higher echelons of management at SCC, and that includes the best use of resources;

“we pay our full attention to the needs and demands of the customer... economic stability, growth and development has its considerable impact... Frugal Innovation and Reverse Innovation in the business and particularly in SCC is not easy though but we have managed to

shift our manufacturing concerns based on the consumer preference and where we can also use the resources at maximum level”

In addition, spending money unnecessarily is seen negatively, despite the fact that...

“Innovation is critical for both competitive advantages and economic growth for nations and companies; huge market size, high growth rates, interest rates and workforce in developing countries ensure the economic stability of the countries”

... nevertheless, socioeconomic forces remain the main internal drivers in any economy, as one participant noted:

“However, the influence of socioeconomic components is difficult to overlook considering the fact that these components are the main driving aspects for any of the country’s economic growth and overall stability”

He then listed several of the factors, such as market size, and per capita income, that directly affected the sales policies of companies such as SCC, allowing them to

“develop... affordable products with less complexities and good functionalities and low frills. SCC is also emphasizing on selling its products to European countries which are considered to be developed ones”.

In addition to these ideas presented in the Macro level interviews about the cost-effectiveness of innovation, also see the discussion of their thoughts in the previous Chapter (pp. 105-106; 110-112; 116) which emphasised their view that the cost of innovation was a major consideration. Thus, it is clear that by using innovation but minimising the cost of that innovation, the senior management believe the performance of the company can be improved. For the first time, real support was shown for Reverse Innovation. In the first research question it was not clear that the management at any level had truly grasped the meaning of the concept of Reverse Innovation – it seemed to be viewed like “Reverse engineering”, whereas here it becomes clear that they are aware that it is, in fact, innovation which creates “less complexities” in the product – the definition from the data that also accords well with

part of the literature review. When considering the products of the SCC water-heater division, the original technology is all European, which has then been made less-complex to create cheaper designs for the KSA market, which then creates a product that will also be competitive in developed economy markets, making it a viable product through which to improve the performance of the company, as evidenced by the financial data that the division is the only profit-making part of the company (see section 5.1.1).

6.3.2 Meso Level Data

One participant in particular gave a very concise definition of these concepts;

“Frugal Innovation mainly focuses on designing solutions particularly for lower income market segments and Reverse Innovation mainly focuses on development of new products in growing and emerging markets that are later on modified for sale in developed nations”

...showing that he had an absolute grasp of the concepts involved. He then expanded the international basis by stating that for both the ‘home’ and the ‘international’ markets demand quality;

“No matter what... whether its frugal or reverse innovation, we [i.e. SCC] do not compromise our quality standards for both in local and in international market. We have our own internal quality control system that does not allow the final product to be presented without scrutiny.”

At the same time, there were, perhaps, some ways in which sufficient quality could be maintained;

“The main risk we are exposed to is to align our all business processes and functions up to the quality standards and not to get involved in any kind of manufacturing concerns that leads to violate the social responsibility and environmental factors. On the other hand, the risk aspect may have its impact on Frugal Innovation and reverse innovation in a way that there might be some processes of eliminating complexities that can be exposed to risk conditions”

In other words, the international market needs products which do the same job, but with less complexity, thus allowing them to be made at a lower cost, whereas the local

market simply requires products that cost less, regardless of how complex they may be internally. In fact, there is some evidence that products for the local market need to be more complex and “advanced” even when aimed at resource constrained customers. This has been partly discussed above in section 6.3.1, but in essence, the European technology must be simplified to make the product affordable in the home market, but since the local buyers want a “premium” product (*i.e.* even the cheapest SCC water-heater has level of prestige for the buyer within the MEA), it must remain present in a sufficiently original form. For the products “sold back” to Europe this is much less important to the buyer, who simply wants an efficient but affordable product, and to whom the SCC name and logo have no particular association with quality and luxury.

In both cases, however, the implication was that only by controlling expenditure could innovation help the company to grow. Thus, this level of management was also clear that “resource constrained” innovation must actually have a positive effect on the performance of SCC. The importance that the Meso level attached to the cost of innovation can also be seen in the previous Chapter (see pp. 116-117, and p. 118). Like the Macro level, they emphasised that the cost of innovation is a factor to be considered before deciding which type of innovation should be chosen. There was a clear feeling that F and R innovation were both cost-effective for SCC.

6.3.3 Micro Level Data

One of the key concepts at the micro level was that Frugal/Reverse Innovation required good leadership from employees as well as management, and this is present in SCC, and that...

“of course, Frugal/Reverse Innovation has added value to this entire business scenario by making it more customer oriented and with less errors”.

There was consensus on this point – resource constrained innovation has added value to the business. Once this is accepted at every management level it is a short step to ensuring that it is implemented.

It is also interesting that this was the only management level which considered “sustainability” as a separate but important issue. They saw the need for every aspect of the business to be sustainable, and that included sustainable innovation – innovation which does not cost more than it saves, and which helps to make other processes equally sustainable. If sustainability is a keyword for the company, resource constrained innovation is the best way towards attaining that goal. In other contexts, it is usual to consider resource constrained customers, but if sustainability is the target, then this idea can be applied equally to the company resources and doing so is likely to have a positive effect.

In addition to the overall sustainability, the Micro level managers were also certain that the cost of innovation must be minimised (see pp. 120-123), and that, in general Frugal Innovation was low-cost innovation (see pp. 123-124). Since the aim at this level is ensuring that product is sold, the fight to control costs, particularly the overhead costs of R and D and of innovation, was regarded by the participants as essential (see p. 105). The final retail price is made up of fixed costs and variable costs, and the reduction of fixed costs (overheads) is a management aim in every business (Boddy, 2011).

As with the first research question, the unequivocal support for resource constrained innovation from all management levels gives the second research question a positive answer – a positive answer that is also supported by the literature reviewed. When considering the emerging markets, Zeschky, Winterhalter, and Gassmann (2014) were clear that these had potentially large customer numbers and would potentially

accept innovative products – at the right price. Thus, in their view, as well as that of von Zedtwitz, *et al.*, (2015) since it is necessary to constrain the price of the product, it makes some economic sense to constrain the cost of innovation.

The idea that innovation is about developing the company's capabilities, promoted by Batra, *et al.*, (2015) is an essential difference in attitude between the developing economies and the developed economies (Drummond, 2012), but is an area of agreement for all management levels at SCC. Ray and Ray (2010) and Sharma and Iyer (2012) state that resource constrained innovation is essential for growth and sustainability, and this is supported by the data from Saudi Arabia.

6.4 Contribution of this Research

The following contributions are a summary of what the research has added through answering the research questions, and from meeting the objectives set out in the first Chapter. From a Saudi Arabian viewpoint, this research has contributed to the knowledge and practices of Frugal Innovation and Reverse Innovation. In relation to the latter, there appeared at first to be some level of confusion over its meaning, but in the later results the true meaning was developed – the confusion at first seemed to be that “Reverse Innovation” was being conflated with “Reverse engineering”, and since the latter is viewed (culturally) as unethical, bordering on theft, it would not be discussed. However, once the idea that “Reverse Innovation” simply involved making the product less complex, and using simpler alternatives, in order to increase its appeal in advanced markets, the discussion “took off”. This, effectively, delineates the first contribution of the research – it has raised the level of awareness of the meaning of Reverse Innovation in the context of Saudi Arabia, and provided a culturally sensitive definition which should be of use to other parts of Saudi Arabian industry.

Another contribution of the research is that it has shown that even a large company that already sells product around the world can benefit from Frugal Innovation and Reverse Innovation – the management at SCC are among the first in the kingdom to utilise these methods, and since the introduction of Frugal Innovation and Reverse Innovation, the water-heater division has grown strongly. SCC is not a small, struggling company in a developing economy – although sales in its traditional arm have dropped, the company revenue is still around 1,140,000,000 Riyals – it is a large, strong company in a developing economy, which, rather than allowing a decline in the sale of its traditional product, has used its size and position to create a new market niche. Nevertheless, despite its position in the industry in general and particularly in the Middle East and North Africa (MENA), there was clear evidence that it would and does benefit from the acceptance of both Frugal- and Reverse-innovation methods in order to continue to grow. Although specific financial information was regarded by SCC as being too confidential for publication, section 5.1.1 does indicate the extent to which this is true.

Thus, it is believed that other companies in developing economies (in the MENA and elsewhere), both large and small, could benefit from studying these two innovation types in great depth, and that the information uncovered and written here will tend to help them with that process. The process followed by SCC being to accept the technological help from the developed economies, apply some Reverse, but mainly Frugal Innovation to sell the products in the home market and the local export markets where the company name and logo are known, and accepted as a sign of quality. When that market is established, the next stage is to apply more Reverse Innovation to create a version of the product that is competitive in the countries from which the technology was originally taken.

6.4.1 Direct Contributions

Although there may be limitations on the ability to generalise from this research, it should be remembered that SCC will directly benefit from the research, and the framework of drivers for Frugal Innovation and Reverse Innovation will be helpful to any company which finds itself in a similar position to SCC, and as the Saudi Arabian economy grows and stabilises, this could be a large number.

This framework (see Figure 12) is perhaps the biggest direct contribution, because it does not prescribe a way of doing business but provides a supporting skeleton for improving business in a developing economy. This skeleton, or scaffolding if you prefer, is a loose collection of ideas about the use of Frugal Innovation and Reverse Innovation that will permit these concepts to be used despite some types of local opposition.

In the twenty-first century, sustainability has become the key word. Any process which is not indefinitely sustainable must be changed. If it can be changed through Reverse or Frugal Innovation, it is likely to be more sustainable, thus the work could also contribute towards sustainability in modern business, if this aspect is followed sufficiently closely.

6.5 Framework of Drivers for Frugal Innovation and Reverse Innovation in a Developing Economy

A supporting framework must, by definition build from the ground upwards. Attempting to support a structure by scaffolding from the top is likely to be unsuccessful. Therefore, although the research has dealt with the management levels from the top down, the actual framework that it suggests needs to be applied from the bottom up. Thus, the drivers discovered at the micro level need to come first, and to be given more weight than those discovered at the meso and macro levels. The framework as

visualised for this research is shown in Figure 12. This has developed from the idea that for SCC water-heaters the primary market in the future will be the export market, although at present the home and export markets are fairly even (for this division (SCC, 2017a)).

Essentially, the framework requires the identification of drivers in a specific instance, the identification of barriers in the same instance, and then overcoming each barrier, ensuring that the drivers remain stronger than the barriers. As stated above, this framework is specific for SCC but also suitable for any other company in a similar position.

6.6 Summary

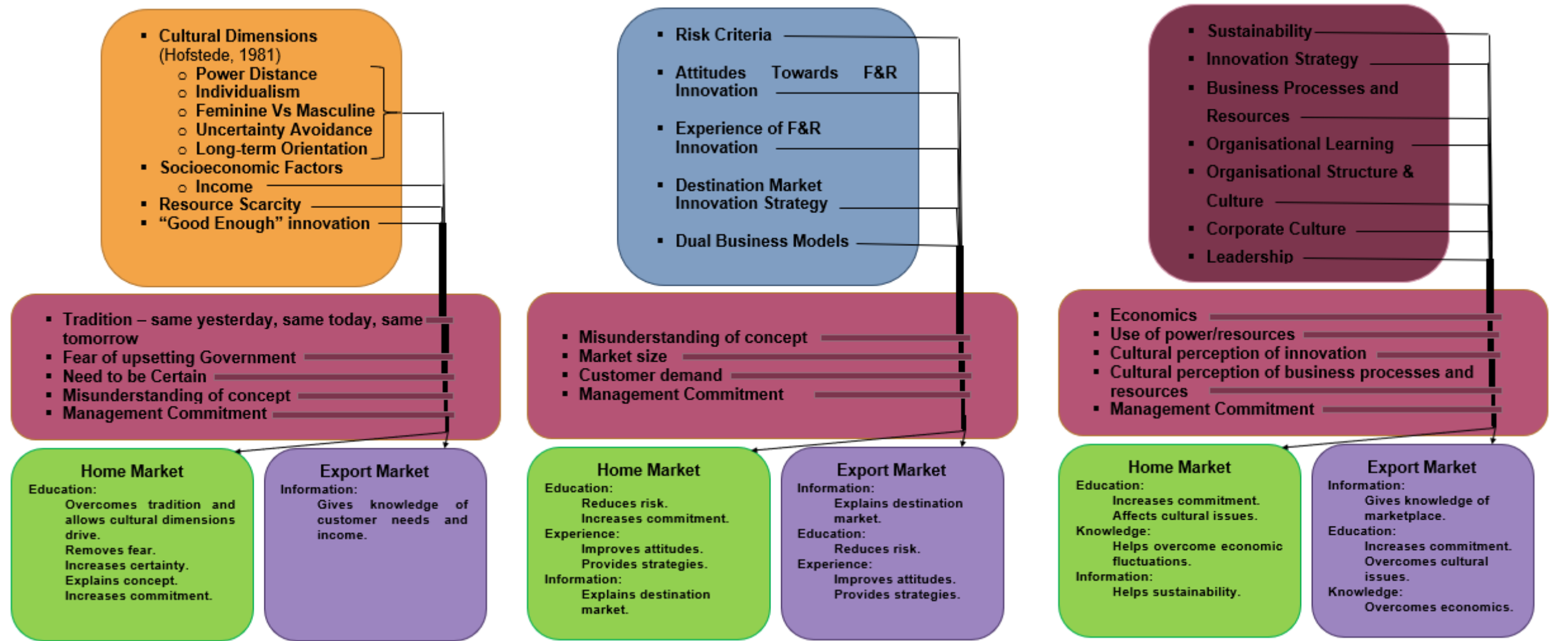
This Chapter has discussed in depth the data gathered regarding the water-heater division of SCC. The Chapter began by revisiting the aims, objectives and research questions, and then giving clear answers to the research questions for each level of the survey and corroborating these answers against the literature available. This has made it possible to identify the contributions of the research, generally and specifically.

The last half of this Chapter has refined and reorganised the proposed framework of drivers for Frugal Innovation and Reverse Innovation in a developing economy. This updated framework has emphasised some of the difficulties facing management in Saudi Arabian companies, as well as some of the essential changes that may be necessary before any kind of innovation becomes truly acceptable to industry in Saudi Arabia, in part because of the structure of the Saudi Arabian culture in Hofstede's (1981) five dimensions. The recommendations for applying the framework and the identified drivers is in the following Chapter.

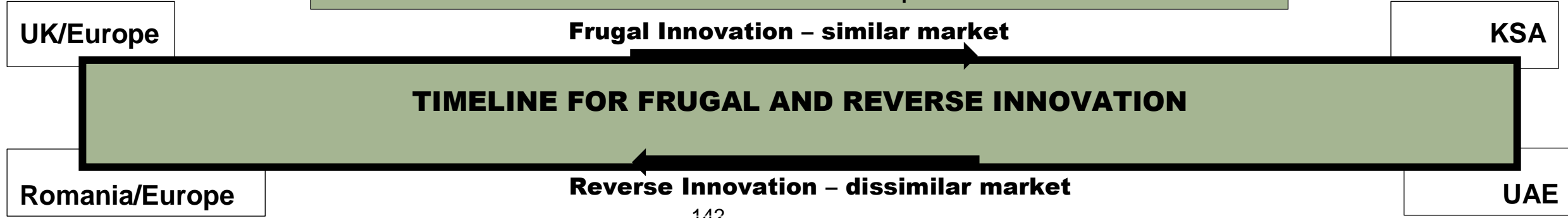
Figure 12: (Overleaf) The Simplified Framework of Drivers and Barriers to F&R Innovation in a Developing Economy and F&R Innovation Timeline.



Identify and overcome the Barriers – the Drivers must exceed the Barriers



Concentrate on the needs of the most profitable market



Chapter 7 Conclusions

7.1 Introduction

The work began with the premise that, since development and growth are driven by innovation (Petkovska, 2015), in a developing economy, innovation is an essential feature. This led to the conclusion that innovation in the country needed to be supported by a strong framework considering the drivers at three levels within a particular industry sector, the macro, meso, and micro levels which were defined accordingly. Although the study was carried out within the water-heater division of the Saudi Ceramic Company the conclusions reached may be transferrable to other industries and indeed to other developing economies. This is because care has been taken to ensure that the proposed framework is robust but flexible, which makes it more transferable from one case to another.

The water-heater division of the Saudi Ceramic Company was also chosen for its position as an exporter to world markets (see p. 151) and a company already making innovations profitable for the main company. The barriers to innovation that have been determined (Table 11) are specific to the case, but are also generic in many developing countries, however, overcoming the barriers will always be case specific, because what works in one company in one country may not be efficacious in another firm or another place.

7.2 Practical Recommendations for the Application of the Framework

The proposed framework in Figure 12 can be applied, not only by SCC, but also by any other company in a similar situation in a developing economy. The following comments on each of the drivers explains how they could be applied.

7.2.1 Frugal Innovation & Reverse Innovation Drivers – Sustainability

The importance of sustainability in general has been touched on above, but it is, perhaps, the most important of all possible drivers of innovation. During the last hundred years, humans have begun to realise that damaging the environment in order to live better in the short-term has long-term consequences that are unethical and unsupportable (Zsolnai, 2006). This has led to a situation where, in any business which wishes to be seen as ethical and responsible, the foundation for any business framework must be sustainability.

The fact that this issue was only raised at the micro-level was surprising, although it could also be seen as encouraging. This management level will supply the future managers in the meso and macro levels, so their grasp of the need to ensure that the business is, above all, sustainable, economically and environmentally, should help to build a very broad and strong foundation for the framework that has been constructed by this research.

7.2.2 Frugal Innovation & Reverse Innovation Drivers – Innovation strategy

Innovation of any kind requires an innovation strategy from the company. The company may decide, for example, that the only kind of innovation that they find acceptable is Frugal Innovation (or any of the other specific types) – conversely, the company may decide that any innovation is good innovation, or even that none is necessary. However, since most businesses accept the need for innovation, that last option is unlikely.

In a developing economy there are, perhaps, more resource constrained customers than in a developed country, but more importantly, the companies themselves are often resource constrained – they may have big loans from overseas banks or

companies, for example, or find themselves unable to attract the best engineers, even from their own country. This will mean that the budget for innovation and R&D is likely to be minimal, so that any company strategy regarding innovation needs to state outright that innovations must be aimed at saving money, or the very most spending the minimum amount. . Both Frugal Innovation and Reverse Innovation could fit this requirement, and as noted above, Reverse Innovation in particular is about simplification, and the removal of complexities, which will often allow the product to be made at less cost.

These two innovation concepts have played an essential role in SCC already, allowing the company to exploit the technology brought from Europe to create products for three markets – the home market, the local export market where the company is already well known, and the European/American market where customer needs are substantially different, and where SCC is not known as a prestigious name.

7.2.3 Frugal Innovation & Reverse Innovation Drivers – Business processes and Resourcing

Innovative business processes are intended to make the entire business more efficient, and one of the accepted approaches is Enterprise Resource Planning (ERP) (Baleta, *et al.*, 2019; Matende and Ogao, 2013). This needs to be part of the framework in a developing economy, because it addresses all the issues raised regarding innovation and production, including sustainability. In order to incorporate an ERP into the business the management, at every level, have to consider every aspect of resourcing and production, including possible effects on climate change (Baleta, *et al.*, 2019).

Under the heading of business processes and resourcing come all the aspects of the “circular economy”, including the theory that, wherever possible the by-products of one process are regarded as resources for another process. Thus, a participatory ERP scheme needs to be more than just “company-wide” – it must encompass the whole industry, and if possible, the entire economy. It is then able to reduce waste and improve efficiency even in the home (Baleta, *et al.*, 2019).

The research has indicated that, at the Micro level, the idea of ERP is getting a level of acceptance that is very positive. The Micro level management accept the need for sustainability, both economically and environmentally, and that resource planning is a concrete step in that direction. In turn, this acceptance will form the basis of a bottom-up change in perception as the higher levels observe that it works well and costs nothing – in fact, in the long-term view, it saves money – and as a result start to widen the scope of the ERP into other divisions and other industries.

7.2.4 Frugal Innovation & Reverse Innovation Drivers – Organisational learning

Clearly, this is connected to the other aspects of the framework introduced so far. In fact, it could be considered as one of the “binding agents” holding the framework together. Unless the organisation as a whole is learning how to be more efficient and sustainable, then individual divisions of the company will not share a coherent policy. Integration in this way is a solid part of the framework of drivers – unless all the drivers drive in the same direction, progress is unpredictable. This leads naturally to the next supporting arms of the framework, the structure and culture of the organisation.

7.2.5 Frugal Innovation & Reverse Innovation Drivers – Organisational structure and culture

In the KSA, as in many developing economies, organisations tend to follow what may be regarded as a “traditional” structure. The general situation is that they are “top-down” in all respects, and this usually leads to an organisational culture where management are confrontational and assertive. The resulting levels of competitiveness within the organisation are generally not conducive to streamlining and efficiency. It follows from this that in a developing economy, where innovation is essential for survival and growth, an organisational culture needs to be developed that accepts a “bottom up” approach, where improvements begin from the ideas of the workforce and permeate upward to the board of directors.

This is not an easy section of the framework to implement, but it is an important part if sustainability is to be one of the aims. Any structure which becomes “top heavy” is unstable and therefore unsustainable in the long term.

7.2.6 Frugal Innovation & Reverse Innovation Drivers – Corporate culture

Corporate culture as a part of the framework of drivers only makes sense if it follows changes to the organisational culture. In fact, it seems unlikely that corporate culture can be changed unless the structure and culture of the organisation have already been changed. There may be a tendency for a corporation to consider itself above the general considerations of sustainability or ecology (or even law, in some instances), but this is another facet that can only be changed from the bottom up, never from the top down.

This is why it is also directly linked to the final category in the micro-drivers, which follows. Nevertheless, the need to change or control the corporate culture of

successful companies in a developing economy is essential, as it has been shown repeatedly that complacency will not lead to success for the company or the national economy.

7.2.7 Frugal Innovation & Reverse Innovation Drivers – Leadership

The last of the micro-drivers, but by no means the least important. Leadership training and courses for the micro-level management will help them to change each of the other aspects listed; they will become more aware of the difficulties inherent in the traditional corporate culture, the faults incorporated in a top down organisational structure, the need to change organisational culture and instigate learning processes, and finally to appreciate the real need for sustainability in resources and efforts.

The idea that integration is essential for business growth is also part of the leadership paradigm – good leaders can work together and working together is the essence of integration. In turn, although management and leadership are not the same thing (Marrin, 2011), it has long been held that the best managers are those who are also leaders (Adair, 2009). In a developing economy, it therefore makes perfect sense for the micro-level managers to receive extensive leadership training so that, in the future, they will be successful leaders at the meso- and macro-level of management.

7.2.8 Frugal Innovation & Reverse Innovation Drivers – Risk criteria

Each industry sector has its own specific risks as well as the general business risks faced by all. Nevertheless, unless the management at the meso level have a clear understanding of the risk criteria that apply to an industry, company, or project any attempt at innovation is likely to be unsuccessful. Hence the incorporation into the framework of a specific platform for risk criteria.

In the discussions and analysis, risk criteria specific to SCC's water-heater division were identified by some participants, and risk management (RM) is an accepted part of any business – either in the traditional form of “silo” Risk Management or the more modern Enterprise Risk Management – and the aim is to include the RM policies in the framework of drivers for Frugal Innovation and Reverse Innovation. One aspect of RM that is particularly relevant in a developing economy is sustainability so that integrating the various aspects listed into a single framework will make the whole stronger and more robust.

7.2.9 Frugal Innovation & Reverse Innovation Drivers – Attitudes towards Frugal/Reverse Innovation

In the literature research was examined that indicated that personal attitudes and beliefs were a strong indicator regarding the adoption of innovation (Talukder, 2012), so inculcating suitable attitudes is an educational challenge for middle management. Unless a sufficient level of acceptance of the principles of Frugal Innovation and Reverse Innovation is present, it is apparent that they will only be applied “half-heartedly”, if at all.

It is therefore essential that the framework design includes the provision of education for management and staff on the importance of innovation in sustainable business. This educational aspect is also essentially a practical, or “hands-on”, education, so that ultimately management attitudes towards innovation will be strongly linked to the next listed item, their experience of innovative practices.

7.2.10 Frugal Innovation & Reverse Innovation Drivers – Experience of Frugal/Reverse Innovation

This framework of drivers must be viewed as, above all, a practical way of encouraging and implementing the various kinds of innovation discussed into multiple areas of business in developing economies. To this end, cooperation with companies from any industrial sector who have demonstrated a clear ability to innovate needs to be encouraged. It is strongly linked to the educational support discussed in the preceding section – educating management to have a better attitude toward innovation will prove more successful if it can be combined with giving them experience of innovation in practice.

The analysis and discussion of the data suggests that there was an awareness of the need for innovation of some kind, but that there was still a level of inexperience, and also in some cases of confusion between, for example, Reverse Innovation and Reverse engineering. By giving management of this level the chance to actually experience innovation in action these difficulties may be overcome.

7.2.11 Frugal Innovation & Reverse Innovation Drivers – Destination Market Innovation Strategy

This level of the framework may appear to be of relative unimportance, because of the priority given to sustainability and innovation strategy in general. However, this is not the case – it is essential that any strategy for innovation must consider the destination market of the goods to be manufactured and sold. The “perfect” product could be sold in any market at a price that anyone could afford. Real products, however, are often “market specific” and the innovation strategy required to make or improve the product may also depend on the marketplace.

The management must have the facility to learn every detail of the marketplace where the product is to be sold – are the customers “resource constrained”? or are the product to be sold to customers who are not interested in the price as long as the product does more and has more functions than any of the alternatives? These two extremes may require a different approach, but they certainly need the management to research and investigate.

7.2.12 Frugal Innovation & Reverse Innovation Drivers – Dual Business Models

An aspect that was discussed in the Meso level interviews was the dual business model. In the Saudi Arabian context, this was seen as very important (see p. 114) because of the cultural differences when compared to Western markets. However, running two apparently incompatible business models in order to sell in two markets has often led to business failure (Casadesus-Masanell and Tarzijan, 2012) – but not always. In some cases, and these are often found in developing economies, it is necessary to separate the business models depending on the marketplace (Markides and Charitou, 2004). The business should not simply adopt a dual business model because they are selling in two disparate markets, and as with all business, it is often better to simplify than to increase complexity.

The framework needs to include the tools that management need to decide whether a dual business model approach is appropriate, and Figure 13, a decision making tool proposed by Markides and Charitou (2004, p. 24) is one of the possible methods available – but, as with other drivers at the meso level it is clear that a deep knowledge of the marketplace and of innovation is essential, which is why in every sub-section the emphasis is on education, understanding, and knowledge. Once the decision has been made to adopt either a dual business model or a single business model, it must

be applied whole-heartedly, although it should also be reviewed if any of the business parameters change.

In the decision chart (Figure 13) “separation strategy” is the application of the dual model, and “integration strategy” is the application of the single model. In SCC’s case, there is a low strategic relatedness, because the two markets are very dissimilar. The conflict between the applied innovation and the existing business is high (for cultural and destination market reasons), so that in the matrix, SCC would fall into box A, justifying the application of the dual business model. In a different company or a different product sector, the result may be different – for example, in the Asian, African, and Middle East markets, SCC considers these as similar to the home market, so the “home” business model would be adopted.

Figure 13: The decision chart for dual business models.

Nature of conflicts between the established businesses and the innovation	Serious	A Separation Strategy	B Phased Integration Strategy
	Minor	D Phased Separation Strategy	C Integration Strategy
		Low Strategic Relatedness (different markets)	High Strategic Relatedness (similar markets)
		Similarity between the established business and the innovation	

Source: (Markides and Charitou, 2004, p. 24)

7.2.13 Frugal Innovation & Reverse Innovation Drivers – Culture

‘Culture’ is a word with a very broad meaning, and it has been argued that everything that we see and do is part of our culture (Stephen and Edwards, 2018), but the following five sections examine the five dimensions of culture (Hofstede, 1981) and the way that, in Saudi Arabia, they may impact on the way that innovation is perceived.

7.2.13.1 Culture – Power Distance

Lukes (2005) explains that countries with a high “power distance”, such as Saudi Arabia tend to develop management systems that work the same way – decisions are made at the top and filter down. This power distance reduces the likelihood of innovation at a “grass-roots” level, which means that it is essential that management in Saudi Arabia develop a philosophy of innovation at every level. This cannot happen overnight, but a steady programme of encouragement by the senior managers should make it occur.

7.2.13.2 Culture – Individualism

Saudi Arabia, like many Middle Eastern countries is a largely collectivist society – individualism is not, generally, seen as a positive trait. This is another factor which tends to mitigate against innovative practices, simply because suggesting new ways of doing things is likely to bring a reputation as a “trouble-maker”. Despite this, it is essential that Saudi Arabia encourages a more individualist approach to this aspect of business. This, like any of the cultural changes suggested, is seen as a macro-driver, because only the government and the highest management can instigate such a change.

7.2.13.3 Culture – Feminine vs Masculine

Although there have been changes in recent years (women driving, and voting) Saudi Arabia remains a “masculine” culture – using Hofstede’s (1981) analysis, this means that people “live in order to work”, and managers are expected to be decisive and assertive. Conflicts are overcome by the strongest party winning. This also tends to lessen the general perception of innovation as being positive, the people in Saudi Arabia are, generally, opposed to change of any kind.

7.2.13.4 Culture – Uncertainty Avoidance

Saudi Arabia scores very highly on uncertainty avoidance. This means that they are not tolerant of new ideas, and a rigid code of belief and behaviour is enforced. It has been suggested that in cultures with a high level of uncertainty avoidance there is a deep emotional need for rules (even rules which never seem to work), and although people are prepared to work hard, they seek security and as a result are very resistant to innovation. This was seen in the data collected and the answers given, but at the same time, the management were also aware of the need for innovation.

7.2.13.5 Culture – Long-term Orientation

Saudi Arabia scores very low in terms of long-term orientation, but this needs some explanation – the country does look forward to the future (Government of Saudi Arabia, 2017), but nevertheless, heritage and history are more important. The religion reflects the seeking of an absolute, unalterable, truth, and the people have respect for tradition and tend to let the future take care of itself – *Insha’Allah* (if God wills it, it will be so). Strangely, this is one aspect of the culture which does bring some innovation, because there is a tendency to focus on quick results, which can be achieved through innovation.

7.2.14 Frugal Innovation & Reverse Innovation Drivers – Socioeconomic

Socioeconomic status (SES) is often linked to health conditions in surveys around the world, and the census and statistical figures by which SES is measured is often a function of government. However, as AlOmar, Parslow, and Law (2018, p. 791) point out;

Measures of SES exist for many countries, however not for Saudi Arabia

In fact, health studies in Saudi Arabia in the past have normally used “family income” as the standard measure of SES – “*Measure of the socio-economic status was based on the family income, since in Saudi Arabia this is the most potent indicator which affects living standards*” (al Frayh, 1990, p. 267). Consequently, family income was the only SES factor discussed during the survey process for this study.

7.2.14.1 Socioeconomic – Income

The participants in the interviews all clearly expressed some level of agreement with al Frayh (1990), but also suggested that business is not only affected by the SES of its customers, but in developing countries it also has an effect on the SES of its customers, via its employees. As a result, consensus indicated that family income was a major driver for innovation in a developing economy. The argument being that, by innovations which make the product cheaper, more product is sold, which increases general prosperity, leading to more demand for the product.

AlOmar, Parslow, and Law (2018) measured SES by Governorate and suggested four “classes”: “Affluent”, “Upper-Middle”, “Lower-Middle”, and “Deprived”, with very little of the country (geographically or in population) fitting in the fourth class. However, as the country moves away from an oil-based economy it is more important than ever that business stays in-touch with the needs of its customers.

7.2.15 Frugal Innovation & Reverse Innovation Drivers – Resource Scarcity

One of the interviewees at the macro level said;

the use of wealth generated from the natural resources has actually helped in reducing the factor unemployment and played its part in balancing inflation as well (interview 1 of 5, Macro Level).

Saudi Arabia has massive mineral resources, and as the move is made away from the diminishing resource of oil these other materials will be increasingly important (Government of Saudi Arabia, 2017), and SCC has the advantage of needing to import almost none of its required resources. This, too, should mitigate in favour of innovation, since the company will wish to minimise costs by using existing resources in new ways, reducing waste and making the by-product of process A into the raw material for process B.

7.2.16 Frugal Innovation & Reverse Innovation Drivers – Good Enough innovation

“Good Enough Innovation” is a relatively new concept (Zeschky, Winterhalter, and Gassmann, 2014; von Zedtwitz, *et al.*, 2015) which requires the invention of products that combine a positive social impact with economic viability, and as a driver for other forms of innovation it fits well with both the needs of a developing economy and the specific cultural factors present in Saudi Arabia. It almost implies “innovation without innovation” – perfect for a culture with a high power-distance, low levels of individualism and a strongly masculine approach to uncertainty avoidance with its emphasis on the importance of the past rather than the future. Good enough innovation could be an ideal tool to get innovation moving in Saudi Arabia.

7.3 Summary of the Research Contribution

The main contribution of this research has been to provide a viable framework (Figure 12) which would work for any company in the Saudi Arabian context who wish to

increase their export trade. The framework can also probably be adapted to suit the conditions of companies in other developing economies. In addition, as discussed in the previous Chapter, provided a culturally sensitive definition of the concept of Frugal Innovation and Reverse Innovation, which in turn potentially raises the awareness of industry across the Kingdom.

Another contribution of this study is that it demonstrates to developing economies that it is possible to accept technology and guidance from a more advanced country without having to remain reliant on that country – most of the studies examined looked at the introduction of these innovation types from the viewpoint of how they could benefit the advanced economy, not the emerging one. SCC have taken European water-heater technology, and although initially making a product very similar to its inspiration, have developed their own way of using that technology to produce their own product that meets the specific needs of local customers. After that, they have made a product that is acceptable to the needs of Europeans at a competitive price – selling the product back to its inventors.

Within the SCC context, the research has contributed to existing practice by providing a clear definition of Frugal Innovation and Reverse Innovation that had previously been misunderstood by some parts of the higher management. In addition, since innovation is a new concept for most Saudi Arabian companies, it has demonstrated that a well-known and prestigious company, SCC, has not only accepted the need for innovation, but have applied it within a profitable new division. This should act as a stimulus for other companies in the country, both large and small, to take steps towards introducing innovative practices.

7.4 Conclusion and Recommendations for Further Research

The main conclusion is that even in a culture with high levels of uncertainty avoidance, low levels of individualism, and a high “power-distance” businesses cannot thrive and develop without some kind of innovation. This in turn raised the question of ensuring that the introduction of innovation was not so alien a concept that it actually caused business failure. To this end, a framework was developed that is intended to support innovative practices without the need for deep cultural changes affecting every part of society. By doing this, it should be possible for an innovative business culture to operate in parallel with the existing national culture without damaging either.

What was also very clear from the data collected is that the cultural aspects were the strongest consideration for the Macro level of management, and quite strong at the Micro level, but less strong for the Meso level management – perhaps because this is the most “socially mobile” level with some who have come up from the Micro level and others who expect to move up to the Macro level. This seems unlikely to be a purely Saudi Arabian phenomenon, and it is likely to be found in most developing economies where there is still a strong class stratification, or cultural system where the rulers have absolute power. This slow, long-term change from bottom up may increase the social equality of poorer countries and allow them to become internationally competitive.

In terms of recommendations it is necessary to carefully consider all of the factors (cultural, social, and economic) of both the company and the country where it is intended to apply the framework. It is intended to be flexible, and too rigid an application could create additional problems. If possible, changes should be made incrementally on the basis of the continuous improvement cycle (Deming, 2000) as this can help to prevent any situations where change occurs too quickly. Of course, that may not be possible in every instance but if a major change must be implemented

then it must be emphasised that this is done with care and after careful consideration of all of the factors in the specific case.

That said, the completion of the study does lead to a general recommendation. Since innovation is the basis for all trade growth, it is essential that companies in the developing economies do not allow themselves to “miss out” on growth opportunities by refusing to accept the need to innovate – whether that be innovation that saves power or resources or innovation that brings a world-wide change of behaviour. It has to be emphasised to these companies in developing countries that are trying to compete with mass produced market dumping from China, India, or similar economies, that true innovation is not expensive. True innovation is about finding ways to turn your disadvantages into a positive asset that allows you to compete on (almost) level terms.

7.5 Limitations and Future Research

These two subsections detail the perceived limitations of this research and highlight the areas which this research has either not covered, or has only covered briefly – areas, in other words, which would perhaps benefit from closer examination.

7.5.1 Limitations

As with any research, this research has some limitations. The first of these regards generalisation of the results – the results of this research apply in the context of SCC. It may be, and probably is, possible to apply them via analogy to other companies and other industries in Saudi Arabia and in other developing economies, but a) the cultural setting of Saudi Arabia is very different to the cultural setting of, say, Mexico, and b) SCC has an advantage over many companies because it has such a wide range of operations from mining clay for ceramics through to the production of electronic controllers for its water-heaters and coolers. Whilst SCC’s range of operations perhaps

make it easier to apply this research to other companies, it must be remembered that it was only conducted within the water-heater division.

Another reason why it may not always be possible to apply this research in other places is the nature of Saudi Arabian society. Saudi Arabia is an absolute Monarchy, and society in general is extremely hierarchical and patriarchal (Al-Gahtani, Hubona, and Wang, 2007), and as a respondent in this research put it;

“the people in the country tend to consider the hierarchical order. Every member of the country has its own place without any further reason”.

This may lead to a situation where innovation simply does not occur, because of the tendency to follow existing ways of doing things without questioning whether it is the best way (or even the right way).

For these reasons, it may be considered that this research has only limited applications, but it would be better to say that it could have a wider application, provided allowance is made for social and cultural conditions within Saudi Arabia. Looking at it in this way does reduce the limitations, but it must be emphasised again that applying this research to a broader category of production would need to examine all of the local factors extant in the proposed application

7.5.2 Future Research

The limitations of this research project are the areas where it has proved inconclusive, or where items specific to SCC have been considered, and it is these areas that could benefit from further or future research. There are two distinct categories here; future research would perhaps consider whether or not it is possible to determine a formula which would indicate to company management the best innovation strategy for their specific company and location – where cultural, social, and economic factors are

analysed in a way that gives an answer to the effect that for “company A” in “country Z” which is at “stage X” of development, the ideal strategy would be Frugal, Reverse, Good Enough, or some other form of innovation. Effectively designing a decision-making tree for innovation strategy.

Conversely, further research into the specific problem of introducing the concept of innovation to extremely traditional Saudi Arabian companies could indicate an approach which was acceptable at all three management levels. Further research would also be recommended in each specific case examined, even if a formulaic structure has been achieved. Having defined the difference between the two concepts it becomes clear that in this subject area, introducing Frugal Innovation and Reverse Innovation into companies operating within developing economies, there is plenty of room for both future and further research. The examples given in the definitions above being a small part of the total possibilities.

Research may also be called for into ways of “teaching innovation” in developing economies. Although there are, as yet, no quantitative data on the subject, there does seem to be an idea in SMEs in developing economies that only big, well-financed and strongly resourced companies can afford to innovate. So, for example, a survey across Saudi Arabia to ascertain whether or how strongly this kind of opinion is found in SMEs could be used to change opinion and convince at least some of the companies that the opposite is true – only big, well-financed and strongly resourced companies can afford not to innovate. It is the small, under-funded and resource constrained companies that must learn to innovate to survive.

Thus, the main limitations of the study can be turned into strengths; it is specific not generic, meaning that other companies can, and should, carry out their own research. The idea that the research is limited because it only examines the water-heater

division of one Saudi Arabian company should be reconsidered in the light of the fact that this division of SCC is a good example of diversification, and diversification is a necessary process for many developing economies that are trying to become competitive but sustainable.

7.6 Conclusion

Despite the limitations listed above, and the perceived need for additional research, this research project has been successful, both for SCC and the Kingdom of Saudi Arabia. The views of the three management levels (Macro, Meso, and Micro (Dopfer, Foster, and Potts, 2004)) have been instructive, since they uncovered some misunderstandings, which allowed the culturally sensitive definition to be made, and also showed that there does appear to be a willingness for Saudi Arabian management to accept and embrace innovation in its resource-constrained forms. This is a good starting point for the country to diversify and sustainably increase its economy, and the other indications of change which have been observed are also very positive. It is also believed that the framework developed will be helpful to other companies in Saudi Arabia, and other countries in the MENA region.

References

- Adair, J. (2009). *Leadership and Motivation*. London: Kogan Page Limited.
- Adams, R., Tranfield, D., & Denyer, D. (2011). A taxonomy of innovation: configurations of attributes in healthcare innovations. *International Journal of Innovation Management*, 15(2), 359-392. doi:10.1142/S1363919611003192
- Agarwal, N., & Brem, A. (2012). Frugal and reverse innovation - literature overview and case study insights from a German MNC in India and China. In B. Katzy, T. Holzmann, K. Sailer, & K. D. Thoben (Ed.), *Proceedings of the 2012 18th International Conference on Engineering, Technology and Innovation* (pp. 1-11). Munich: IEEE. doi:10.1109/ICE.2012.6297683.
- Agarwal, N., Brem, A. and Dwivedi, S. (2019). Frugal and reverse innovation for harnessing the business potential of emerging markets – The case of a Danish MNC. *International Journal of Innovation Management*, 24(1), np. doi:10.1142/S1363919620500097.
- Akhtar, P., Khan, Z., Rao-Nicholson, R., & Zhang, M. (2019). Building relationship innovation in global collaborative partnerships: big data analytics and traditional organizational powers. *R&D Management*, 49(1), 7 - 20. doi:10.1111/radm.12253
- Al Frayh, A. (1990). The effect of socio-economic status on birth weight in Saudi Arabia. *Family Practice*, 7(4), 267-269. doi:10.1093/fampra/7.4.267
- Al Omran, A. (2017, September 1). Saudi Arabia edges more women into work. *FT*, p. online. Retrieved April 08, 2018, from <https://www.ft.com/content/c55d6cf4-8cd3-11e7-9084-d0c17942ba93>
- Al-Gahtani, S. S., Hubona, G. S., & Wang, J. (2007). Information technology (IT) in Saudi Arabia: Culture and the acceptance and use of IT. *Information & Management*, 44(8), 681-691. doi:10.1016/j.im.2007.09.002
- Albert, M. (2019). Sustainable frugal innovation-the connection between frugal innovation and sustainability. *Journal of Cleaner Production*, 237, p. 117747. doi:[10.1016/j.jclepro.2019.117747](https://doi.org/10.1016/j.jclepro.2019.117747) .
- AlOmar, R. S., Parslow, R. C., & Law, G. R. (2018). Development of two socioeconomic indices for Saudi Arabia. *BMC public health*, 18(1), 791-801. doi:10.1186/s12889-018-5723-z
- Altman, P., & Engberg, R. (2016). Frugal innovation and knowledge transferability. *Research-Technology Management*, 59(1), 48-55. doi:[10.1080/08956308.2016.1117323](https://doi.org/10.1080/08956308.2016.1117323)
- Anderson, J., & Markides, C. (2007). Strategic innovation at the base of the pyramid. *MIT Sloan Management Review*, 49(1), 83.
- Andrews, J. (2013). "It's a very difficult question isn't it?" Researcher, interpreter and research participant negotiating meanings in an education research interview. *International Journal of Applied Linguistics*, 23(3), 316-328. doi:10.1111/ijal.12039
- Avelino, F., & Kunze, I. (2009). Exploring the transition potential of the ecovillage movement. *European Conference on Sustainability Transitions: Dynamics and Governance of Transitions to Sustainability: Dynamics and Governance of Transitions to Sustainability*. Amsterdam.
- Baker, T., & Nelson, R. E. (2005). Creating something from nothing: resource construction through entrepreneurial bricolage. *Administrative Science Quarterly*, 50, 329-366. doi:[10.2189/asqu.2005.50.3.329](https://doi.org/10.2189/asqu.2005.50.3.329)

- Baleta, J., Mikulčić, H., Klemeš, J. J., Urbaniec, K., & Duić, N. (2019). Integration of energy, water and environmental systems for a sustainable development. *Journal of Cleaner Production*, 215(April), 1424-1436. doi:10.1016/j.jclepro.2019.01.035
- Barau, A. S., & Al Hosani, N. (2015). Prospects of environmental governance in addressing sustainability challenges of seawater desalination industry in the Arabian Gulf. *Environmental Science and Policy*, 50, 145 - 154. doi:10.1016/j.envsci.2015.02.008
- Barker, K. N. (1980). Data collection techniques: observation. *American Journal of Health-System Pharmacy*, 37(9), 1235-1243. doi:10.1093/ajhp/37.9.1235
- Batra, S., Sharma, S., Dixit, M. R., & Vohra, N. (2015). Strategic orientations and innovation in resource-constrained SMEs of a developing economy. *The Journal of Entrepreneurship*, 24(1), 17-36. doi:10.1177/0971355714560052
- Bencsik, A., Machová, R., & Tóth, Z. (2016). Cheap and clever – symbiosis of frugal innovation and knowledge management. *Problems and Perspectives in Management*, 14(1), 85-93. doi:10.21511/ppm.14(1).2016.10
- Bhaskaran, S., & Sukumaran, N. (2007). National culture, business culture and management practices: Consequential relationships? *Cross Cultural Management: An International Journal*. doi:10.1108/13527600710718831
- Bhattacharyya, O., Wu, D., Mossman, K., Hayden, L., Gill, P., Cheng, Y., . . . McGahan, A. (2017). Criteria to assess potential reverse innovations: opportunities for shared learning between high- and low-income countries. *Globalization and Health* (13), 1-8. doi:10.1186/s12992-016-0225-1
- Bicen, P., & Johnson, W. H. (2015). Radical innovation with limited resources in high-turbulent markets: the role of lean innovation capability. *Creativity and innovation management*, 24(2), 278-299. doi:10.1111/caim.12120
- BMIlab. (2017, December 06). *How China Creates the Strongest Innovation System*. Retrieved July 02, 2019, from BMI-Lab: <https://bmlab.com/blog/2017/11/29/how-china-creates-the-strongest-innovation-system>
- Boddy, D. (2011). *Management: An Introduction*. London: Pearson Education.
- Brown, J. S., & Hagel, J. (2005). From push to pull: the next frontier of innovation. *The McKinsey Quarterly* (3), 83-91.
- Camisón-Zornoza, C., Lapedra-Alcamí, R., Segarra-Ciprés, M., & Boronat-Navarro, M. (2004). A meta-analysis of innovation and organizational size. *Organization Studies*, 25(3), 331-361. doi:10.1177/0170840604040039
- Casadesus-Masanell, R., & Tarzijan, J. (2012). When one business model isn't enough? *Harvard Business Review*, 90(1-2), 132-137.
- Christensen, C. M. (1997). *The Innovator's Dilemma: When new technologies cause great firms to fail*. Cambridge, MA: Harvard Business School Press.
- Coccia, M. (2006). Classifications of innovations survey and future directions. *Working Paper Ceris-Cnr, W.P. N° 2/2006*. Torino, Italia: Ceris-Cnr, Italia & Max-Planck Institute of Economics, Germania.
- Colledani, M., Silipo, L., Yemane, A., Lanza, G., Bürgin, J., Hochdörffer, J., . . . Belkadi, F. (2016). Technology-based product-services for supporting frugal innovation. *Procedia CIRP*, 47, 126 - 131. doi: 10.1016/j.procir.2016.03.093
- Corsi, S., Di Minin, A., & Piccaluga, A. (2014). Reverse innovation at spheres: a case study in China. *Research-Technology Management* 57(4), 28-34. doi:10.5437/08956308X5704215

- Crisp, N. (2014). Mutual learning and reverse innovation—where next? *Globalization and Health* 10(1), 1-4. doi:[10.1186/1744-8603-10-14](https://doi.org/10.1186/1744-8603-10-14)
- Crossan, M. M., & Apaydin, M. (2009). A multi-dimensional framework of organizational innovation: a systematic review of the literature. *Journal of Management Studies*, 47(6), 1154-1191. doi:10.1111/j.1467-6486.2009.00880.x
- Dellermann, D. (2017). Going East: a framework for reverse innovation in SMEs. *Journal of Business Strategy*, 38(3), 30-39. doi:10.1108/JBS-02-2016-0014
- Deming, W. E. (2000). *Out of the Crisis* (1 ed.). Boston: SPC Books.
- Domnina, S. V., Savoskina, E. V., & Shekhova, N. V. (2016). On innovative decisions in the investment-construction cycle. *Procedia Engineering*, 153, 741 - 746. doi:10.1016/j.proeng.2016.08.236
- Dopfer, K., Foster, J., & Potts, J. (2004). Micro-meso-macro. *Journal of Evolutionary Economics*, 14(3), 263-279. doi:10.1007/s00191-004-0193-0
- Drucker, P. F. (2015). *Innovation and Entrepreneurship* (Classic ed.). Abingdon: Routledge.
- Drummond, A. (2012). Research on developing economies: challenges are always opportunities. *Global Strategy Journal*, 1(2), 48-50. doi:10.1111/j.2042-5805.2011.01026.x
- Edwards, T., & Tempel, A. (2010). Explaining variation in reverse diffusion of HR practices: Evidence from the German and British subsidiaries of American multinationals. *Journal of World Business* 45(1), 19-28. doi:[10.1016/j.jwb.2009.04.001](https://doi.org/10.1016/j.jwb.2009.04.001)
- Emo, W. (2015). Teachers' motivations for initiating innovations. *Journal of Educational Change*, 16(2), 171-195. doi:10.1007/s10833-015-9243-7
- Feigenbaum, A. V. (2002). Total Quality Management. In J. J. Marciniak (Ed.), *Encyclopaedia of Software Engineering*. London: John Wiley & Sons.
- Feola, G., & Nunes, R. (2014). Success and failure of grassroots innovations for addressing climate change: The case of the transition movement. *Global Environmental Change* 24(Jan), 232-250. doi:[10.1016/j.gloenvcha.2013.11.011](https://doi.org/10.1016/j.gloenvcha.2013.11.011)
- Fisher, M. (2006). Income is development: kickstart's pumps help Kenyan farmers transition to a cash economy. *Innovations* 1(1), 9-30. doi:[10.1162/itgg.2006.1.1.9](https://doi.org/10.1162/itgg.2006.1.1.9)
- Fraser, K. (2014). Defeating the 'paradigm wars' in accounting: A mixed-methods approach is needed in the education of PhD scholars. *International Journal of Multiple Research Approaches*, 8(1), 49-62. doi:10.5172/mra.2014.4299
- Gallarotti, G. M. (2013). Smart development: Saudi Arabia's quest for a knowledge economy. *International Studies (Social Sciences at WesScholar)*, 49(1), 47-60.
- Gimenez-Espin, J. A., Jiménez-Jiménez, D., & Martínez-Costa, M. (2013). Organizational culture for total quality management. *Total Quality Management & Business Excellence*, 24(5-6), 678-692. doi: [10.1080/14783363.2012.707409](https://doi.org/10.1080/14783363.2012.707409)
- Government of Saudi Arabia. (2017). *Saudi Arabia and Political, Social, and Economic Development*. Riyadh: saudiembassy.net. Retrieved from https://www.saudiembassy.net/sites/default/files/WhitePaper_Development_May2017.pdf
- Govindarajan, V. (2012). A Reverse-Innovation Playbook. *Strategic Direction* 28(9), 120-124. doi:[10.1108/sd.2012.05628iaa.008](https://doi.org/10.1108/sd.2012.05628iaa.008)
- Govindarajan, V., & Ramamurti, R. (2011). Reverse innovation, emerging markets, and global strategy. *Global Strategy Journal*, 1(1), 191-205. doi:10.1111/j.2042-5805.2011.00023.x

- Govindarajan, V., Trimble, C., & Nooyi, I. K. (2012). *Reverse Innovation: create far from home, win everywhere*. New York: Harvard Business School Press.
- Green, H. E. (2014). *Nurse Researcher*, 21(6), 34-38. doi:[10.7748/nr.21.6.34.e1252](https://doi.org/10.7748/nr.21.6.34.e1252)
- Groves, R. M., Fowler, F. J., Couper, M., Lepkowski, J. M., Singer, E., & Tourangeau, R. (2009). *Survey Methodology*. Hoboken N.J.: Wiley.
- Gulf Base. (2018, October 15). *Saudi Ceramics Co. - SCERCO*. Retrieved October 15, 2018, from Gulf Base Market Information Trading Co.: <https://www.gulfbase.com/profile-summary-saudi-ceramics-co-scercoc-51>
- Gupta, A. K., & Wang, H. (2009). The rise of global champions: impact of country, industry & company effects. *Indian Journal of Industrial Relations*, 45(1), 115 - 126.
- Gupta, B., & Thomke, S. (2018). An exploratory study of product development in developing economies: evidence from medical device testing in India. *R&D Management*, 48(4), 485 - 501. doi:10.1111/radm.12324
- Gustafsson, J. (2017). *Single case studies vs. multiple case studies: A comparative study*. Halmstad: Halmstad University.
- Hadengue, M., Marcellis-Warin, N., & Warin, T. (2015). Reverse Innovation and Reverse Technology Transfer: From made in China to discovered in China in the pharmaceutical sector. *Management International* 19(4), 49-69. doi:[10.7202/1043076ar](https://doi.org/10.7202/1043076ar)
- Halme, M., Linderman, S., & Linna, P. (2012). Innovation for inclusive business: intrapreneurial bricolage in multinational corporations. *Journal of Management Studies* 49(4), 743-784. doi:[10.1111/j.1467-6486.2012.01045.x](https://doi.org/10.1111/j.1467-6486.2012.01045.x)
- Harding, J. (2013). *Qualitative Data Analysis from Start to Finish*. London: SAGE Publications.
- Hargreaves, T., Hielscher, S., Seyfang, G., & Smith, A. (2013). Grassroots innovations in community energy: The role of intermediaries in niche development. *Global Environmental Change* 23(5), 868-880. doi:[10.1016/j.gloenvcha.2013.02.008](https://doi.org/10.1016/j.gloenvcha.2013.02.008)
- Harris, M., Weisberger, E., Silver, D., Dadwal, V., & Macinko, J. (2016). That's not how the learning works – the paradox of Reverse Innovation: a qualitative study (updated). *Globalisation and Health*, 12(1), 36-42. doi:10.1186/s12992-016-0175-7
- Hart, S. L., & Christensen, C. M. (2002). Driving innovation from the base of the pyramid. *MIT Sloan Business Review*, 44(1), 51-56.[no doi]
- He, X., & Zhang, J. (2018). Emerging market MNCs' cross-border acquisition completion: Institutional image and strategies. *Journal of Business Research*, 93, 139 - 150. doi:10.1016/j.jbusres.2018.04.014
- Held, D., & McGrew, A. (2003). The great globalisation debate: an introduction. In D. Held, & A. McGrew, *The global transformations reader: an introduction to the globalization debate* (2nd ed., pp. 1-50). Malden: Polity.
- Heritage, J. (2013). Language and social institutions: the conversation analytic view. *Journal of Foreign Languages*, 36(4), 2-27.
- Hobday, M. (2005). Firm-level innovation models: perspectives on research in developed and developing countries. *Technology Analysis and Strategic Management* 17(2), 121-146. doi:[10.1080/09537320500088666](https://doi.org/10.1080/09537320500088666)
- Hofstede, G. (1981). Culture and organisations. *International Studies of Management & Organizations*, x(4), 15-41.
- Hofstede, G. H., & Hofstede, G. J. (2005). *Cultures and Organisations* (2nd ed.). London: McGraw-Hill.

- Holmström Lind, C., Kang, O., Ljung, A., & Forsgren, M. (2018). MNC involvement in social innovations: the issue of knowledge, networks and power. *Critical perspectives on international business*, doi:10.1108/cpoib-09-2017-0060
- Hossain, M. (2017). Frugal innovation: a systematic literature review. *Technology in Society (SSRN Electronic Journal)*(January). doi:10.2139/ssrn.2768254
- Hossain, M. (2018). Frugal innovation: A review and research agenda. *Journal of Cleaner Production*, 182(May), 926-936.doi:10.1016/j.jclepro.2018.02.091
- Hossain, M., Simula, H., & Halme, M. (2016). Can frugal go global? Diffusion patterns of frugal innovations. *Technology in Society* 46(August), 132-139.doi:[10.1016/j.techsoc.2016.04.005](https://doi.org/10.1016/j.techsoc.2016.04.005)
- Hunt, S. D., & Madhavaram, S. (2012). Managerial action and resource-advantage theory: Conceptual frameworks emanating from a positive theory of competition. *Journal of Business & Industry Marketing*, 27(7), 582-591. doi:10.1108/08858621211257356
- Immelt, J., Govindarajan, V., & Trimble, C. (2009). How GE is disrupting itself. *Harvard Business Review* 87(10), 56-65.
- Jang, J.-W., De, A., Vontela, D., Nirmala, I., Ghosh, S., & Iyengar, A. (2018). Threshold-defined logic and interconnect for protection against reverse engineering. *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems*, 1 ff. doi:10.1109/TCAD.2018.2887056
- Jefferson, G. (2004). "At first I thought": A normalizing device for extraordinary events. In G. H. Lerner (Ed.), *Conversation Analysis* (pp. 131-167). Amsterdam: John Benjamin.
- Keegan, S. (2011). Workshop review: analysing the language of interviews. *Qualitative Market Research: An International Journal*, 14(1). 1-8. doi:[10.1108/qmr.2011.21614aaf.002](https://doi.org/10.1108/qmr.2011.21614aaf.002)
- Keeley, L., Walters, H., Pikkell, R., & Quinn, B. (2013). *Ten Types of Innovation: The Discipline of Building Breakthroughs*. New York, NY: John Wiley & Sons.
- Klein, K. J., & Knight, A. P. (2005). Innovation implementation: overcoming the challenge. *Current Directions in Psychological Science*, 14(5), 243-246.doi: [10.1111/j.0963-7214.2005.00373.x](https://doi.org/10.1111/j.0963-7214.2005.00373.x)
- Kock, A., Heising, W., & Gemünden, H. G. (2015). How ideation portfolio management influences front-end success. *J Prod Innov Manag* 2015, 32(4), 539-555. doi:10.1111/jpim.12217
- Konovalova, T., & Jatuliavičiene, G. (2015). Innovation development perspectives in a hotel industry by example of Radisson hotel chain in Ukraine. *Regional Formation & Development Studies*, 15(1). doi:10.15181/rfds.v15i1.981
- Kvale, S. (1996). *InterViews*. Thousand Oaks, CA: Sage.
- Kyriakides, R. (2006). *The Energy Age*. London: Genersys.
- Länsisalmi, H., Kivimäki, M., Aalto, P., & Ruoranen, R. (2006). innovation in healthcare: a systematic review of recent research. *Nursing Science Quarterly*, 19(1), 66-72. doi:10.1177/0894318405284129
- Lazonick, W. (2004). Indigenous innovation and economic development: lessons from China's leap into the information age, *Industry and Innovation*, 11(4), 273-297. doi:10.1080/1366271042000289360
- Li, Z. (2013). Natural, practical and solid contexts of e-learning: A critical realist account for learning and technology. *Journal of Computer Assisted Learning*, June 29(3), 280-291.

- Lim, C., & Fujimoto, T. (2019). Frugal innovation and design changes expanding the cost-performance frontier: A Schumpeterian approach. *Research Policy*, 48(4), 1016-1029. doi:[10.1016/j.respol.2018.10.014](https://doi.org/10.1016/j.respol.2018.10.014)
- London, T., & Hart, S. L. (2004). Reinventing strategies for emerging markets: beyond the transnational model. *Journal of International Business Studies*, 35(5), 350-370. Retrieved from <http://www.jstor.org/stable/3875199>
- Longhurst, N. (2012). The Totnes Pound: a grassroots experimental niche. In A. Davies (Ed.), *Enterprising Communities: Grassroots Sustainability Innovations*. Bingley: Emerald.
- Lu, Q. (2000). *China's leap into the information age: Innovation and organization in the computer industry*. Oxford: Oxford University Press.
- Lukes, S. (2005). *Power: A Radical View* (2nd ed.). Houndsmill: Palgrave Macmillan.
- Mannan, S., Nordin, S., Rafik-Galea, S., & Rizal, A. (2017). The ironies of new innovation and the sunset industry: Diffusion and adoption. *Journal of Rural Studies* 55(October), 316-322. doi:[10.1016/j.jrurstud.2017.07.015](https://doi.org/10.1016/j.jrurstud.2017.07.015)
- Markatou, M. (2011). Innovation and knowledge creation in Greece: an analysis based on patent data. *Journal of Innovation and Business Best Practice*, 2011(2011), 10. doi:10.5171/2011.205033
- Markides, C., & Charitou, C. D. (2004). Competing with dual business models: A contingency approach. *The Academy of Management executive*, 18(3), 22-36. doi:[10.5465/AME.2004.14776164](https://doi.org/10.5465/AME.2004.14776164)
- Marrin, J. (2011). *Leadership*. Chichester: John Wiley & Sons.
- Matende, S., & Ogao, P. (2013). Enterprise resource planning (ERP) system implementation: a case for user participation. *Procedia Technology*, 9, 518-526. doi:10.1016/j.protcy.2013.12.058
- Mourtzis, D., Bitte, F., Bernard, A., & Belkadi, F. (2016). Technology-based product-services for supporting frugal innovation. *Procedia CIRP*(47), 126-131. doi:[10.1016/j.procir.2016.03.093](https://doi.org/10.1016/j.procir.2016.03.093)
- Nevejan, C. (2016, July 31). *Frugal Innovations Around the World*. Retrieved July 02, 2019, from Open Education Resources, <https://tudelft.openresearch.net/page/15976/frugal-innovations-around-the-world>
- Pansera, M. (2013). Frugality, Grassroots, and Inclusiveness: New Challenges for Mainstream Innovation Theories. *Conference Proceedings: GLOBELICS International Conference on "Innovation and Development: Opportunities and Challenges in Globalisation"* (pp. 1-24). Hangzhou, China: GLOBELICS.
- Pansera, M., & Owen, R. (2015). Framing resource-constrained innovation at the 'bottom of the pyramid': Insights from an ethnographic case study in rural Bangladesh. *Technological Forecasting & Social Change*.92(March),300-311. doi:[10.1016/j.techfore.2014.10.004](https://doi.org/10.1016/j.techfore.2014.10.004)
- Peng, M. W., Lebedev, S., Vlas, C. O., Wang, J. C., & Shay, J. S. (2018). The growth of the firm in (and out of) developing economies. *Asia Pacific Journal of Management*, 35(4), 829 - 857. doi:10.1007/s10490-018-9599-3
- Peng, M., & Vlas, C. (2017). Diffusion of a twentieth-century innovation. *Academy of Strategic Management Journal*(16), 172-174.
- Peng, S. Z., Xu, Y. F., & Lin, Q. X. (2009). *The great revolution of Shanzhai economy: The innovation comes from imitation*. Taipei: Showwe Information Co Ltd.

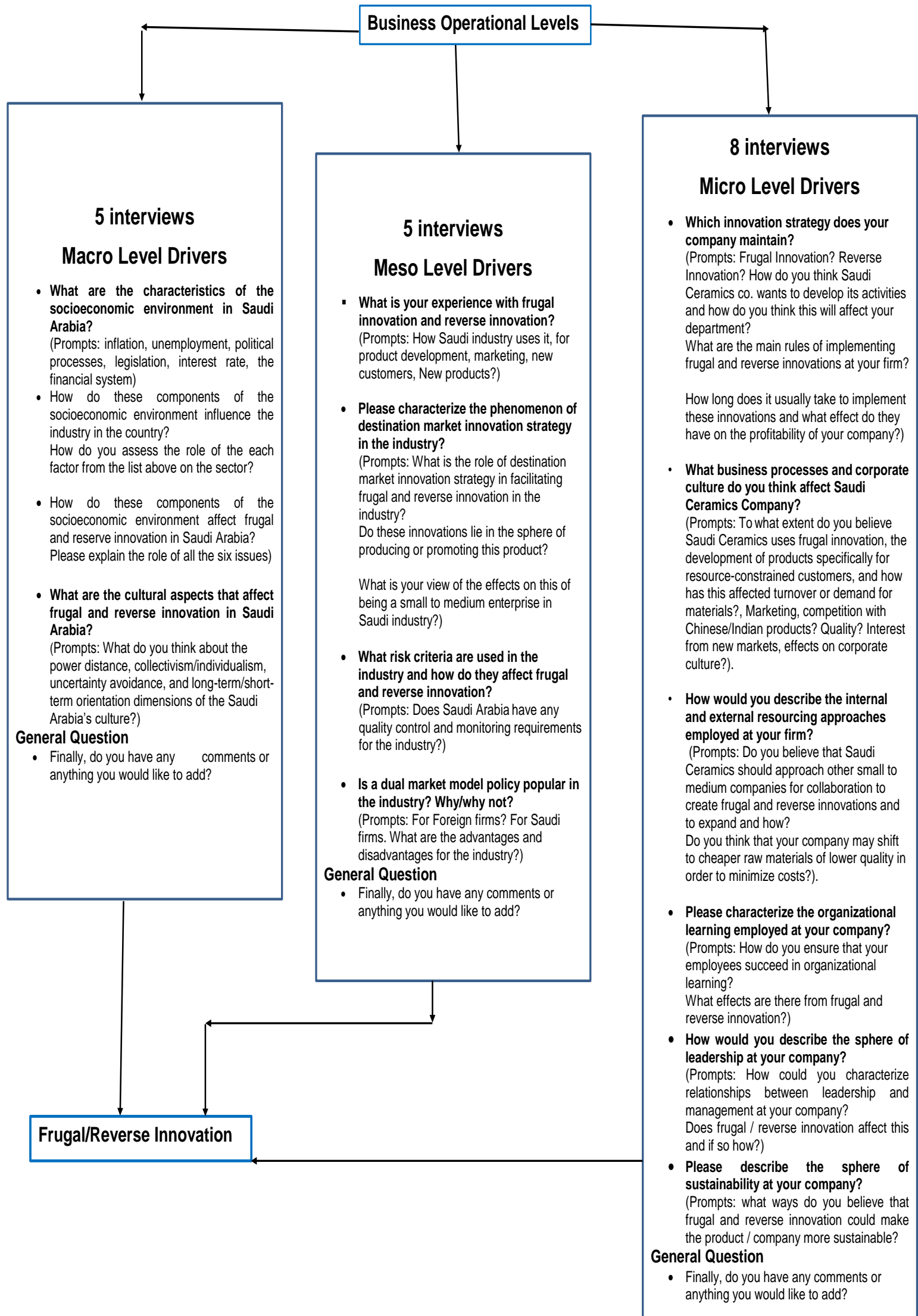
- Petkovska, T. (2015). Role and importance of innovation in business of small and medium enterprises. *Економски Развој - Economic Development*, 17(1-2), 55-74.
- Pisoni, A., Michelini, L., & Martignoni, G. (2018). Frugal approach to innovation: State of the art and future perspectives. *Journal of Cleaner Production*, 171, 107 - 126. doi:10.1016/j.jclepro.2017.09.248
- Prahalad, C. K., & Mashelkar, R. A. (2010). Innovation's holy grail. *Harvard Business Review*(88), 132-141.
- Prahalad, M. K. (2004). *The fortune at the bottom of the pyramid: Eradicating Poverty through profits*. Upper Saddle River, NJ: Pearson Education.
- Radjou, N., Prabhu, J., & Ahuja, S. (2012). *Jugaad Innovation*. New Jersey: Jossey-Bass.
- Radojević, N. (2015). Reverse innovation reconceptualised: much geo-economic ado about primary market shift. *Management International* (19), 70-82. doi:[10.7202/1043077ar](https://doi.org/10.7202/1043077ar)
- Ramzy, M., & Zaki, C. (2018). Do environment regulations matter for EU-MENA trade? *Applied Economics*, 50(39), 4197 - 4221. doi:10.1080/00036846.2018.1441519
- Rapley, T. J. (2001). The art(fulness) of open-ended interviewing: some considerations on analysing interviews. *Qualitative Research*, 1(3), 303-323. doi:[10.1177/146879410100100303](https://doi.org/10.1177/146879410100100303)
- Ray, P., & Ray, S. (2010). Resource-constrained innovation for developing economies: the case of the Indian telecommunications industry. *IEEE Transactions on Engineering Management*(57), 144-156. doi:[10.1109/TEM.2009.2033044](https://doi.org/10.1109/TEM.2009.2033044)
- RESA. (2016). *About Saudi Arabia: Education*. Retrieved May 19, 2016, from Royal Embassy of Saudi Arabia, Washington, DC: <https://www.saudiembassy.net/about/country-information/education/>
- Roberts, P. (2004). *The End of Oil*. London: Bloomsbury.
- Rogers, E. M. (2010). *Diffusion of Innovation*. Chicago, IL: Simon and Schuster.
- Rosca, E., Arnold, M., & Bendul, J. C. (2017). Business models for sustainable innovation - an empirical analysis of frugal products and services. *Journal of Cleaner Production*, 162(Special), S133-S145. doi:10.1016/j.jclepro.2016.02.050
- Said, E. W. (1979). *Orientalism*. New York, NY: First Vintage Books (Random House).
- Said, E. W. (1994). *Culture and Imperialism*. New York, NY: First Vintage Books (Random House).
- SAMIRAD. (2018). *Profile of Saudi Arabia: Ministry of Communications and Information Technology*. Retrieved April 07, 2018, from Saudi Arabian Market Information Resource and Directory (SAMIRAD): <http://www.saudinf.com/main/c6d.htm>
- Saudi Ceramics. (2018). *Saudi Ceramics Water Heater*. Retrieved March 28, 2018, from Saudi Ceramics: <https://www.saudiceramics.com/en/water-heaters.html>
- Saunders, M., Lewis, P., & Thornhill, A. (2012). *Research Methods for Business Students* (6th ed.). Harlow: Pearson.
- SCC. (2016). *Annual report*. Riyadh: SCC.
- SCC. (2017a). *Annual report*. Riyadh: SCC.
- SCC. (2017b). *Water Heater Catalogue*. Riyadh, Riyadh, Saudi Arabia: SCC.
- Schneier, B. (2000). *Secrets and Lies: Digital Security in a Networked World*. New York, NY: Wiley Computer Publishing.

- Sehested, C., & Sonnenberg, H. (2010). *Lean Innovation: A Fast Path from Knowledge to Value*. New York, NY: Springer.
- Sereenonchai, S., Arunrat, N., Peixi, X., & Xue, Y, Y. (2017). Diffusion and adoption behaviour of environmentally friendly innovation: sharing from Chinese society. *International Journal of Behavioral Science* (12), 90-109. doi:[10.14456/ijbs.2017.14](https://doi.org/10.14456/ijbs.2017.14)
- Seyfang, G., & Longhurst, N. (2016). What influences the diffusion of grassroots innovations for sustainability? Investigating community currency niches. *Technology Analysis & Strategic Management* (28), 1-23. doi:[10.1080/09537325.2015.1063603](https://doi.org/10.1080/09537325.2015.1063603)
- Sharma, A., & Iyer, G. R. (2012). Resource-constrained product development: Implications for green marketing and green supply chains. *Industrial Marketing Management* (41), 599-608. doi:[10.1016/j.indmarman.2012.04.007](https://doi.org/10.1016/j.indmarman.2012.04.007)
- Shibin, K. T., Dubey, R., Gunasekaran, A., Luo, Z., Papadopoulos, T., & Roubaud, D. (2018). Frugal Innovation for supply chain sustainability in SMEs: multi-method research design. *Production Planning & Control*, 29(11), 908 - 927. doi:10.1080/09537287.2018.1493139
- Shina, R. (2013). Reverse Innovation: A gift from developing economy to developed economy. *Business Perspectives and Research* (2), 69-78. doi:[10.1177/2278533720130106](https://doi.org/10.1177/2278533720130106)
- Simula, H., Hossain, M., & Halme, M. (2015). Frugal and reverse innovations - Quo Vadis? *Current Science*.109(9), 1567-1572.
- Smith, A. (2006). Green niches in sustainable development: the case of organic food in the United Kingdom. *Environment and Planning, C* 24(3), 439-458. doi:[10.1068/c0514j](https://doi.org/10.1068/c0514j)
- Soni, P., & Krishnan, T. R. (2014). Frugal Innovation: aligning theory, practice, and public policy. *Journal of Indian Business Research*, 6(1), 29 - 47. doi:10.1108/JIBR-03-2013-0025
- Sood, A., & Tellis, G. J. (2005). Technological evolution and radical innovation. *Journal of Marketing*, 69(3), 152-168. Retrieved from <http://www.jstor.org/stable/30162062>
- Sousa-Zomer, T. T., & Cauchick-Miguel, P. A. (2019). Exploring business model innovation for sustainability: an investigation of two product-service systems. *Total Quality Management & Business Excellence*, 30(5 - 6), 594 - 612. doi:10.1080/14783363.2017.1317588
- Stephen, C., & Edwards, S. (2018). *Young Children Playing and Learning in a Digital Age*. Abingdon: Routledge.
- Talukder, M. (2012). Factors affecting the adoption of technological innovation by individual employees: An Australian study. *Procedia - Social and Behavioral Sciences*(40), 52-57. doi: [10.1016/j.sbspro.2012.03.160](https://doi.org/10.1016/j.sbspro.2012.03.160)
- The Times (London). (2002, March 12). On the brink of a third industrial revolution; Saudi Arabia. *The Times*, p. 8. Retrieved March 28, 2018, from http://dd6lh4cz5h.search.serialssolutions.com/?ctx_ver=Z39.88-2004&ctx_enc=info%3Aofi%2Fenc%3AUTF-8&rft_id=info%3Aasid%2Fsummon.serialssolutions.com&rft_val_fmt=info%3Aofi%2Fmt%3Akev%3Amtx%3Ajournal&rft.genre=article&rft.atitle=On+the+brink+of+a+third+ind
- Tiwari, R., & Herstatt, C. (2012). Assessing India's lead market potential for cost-effective innovations. *Journal of Indian Business Research*, 4(2), 97-115. doi:10.1108/17554191211228029

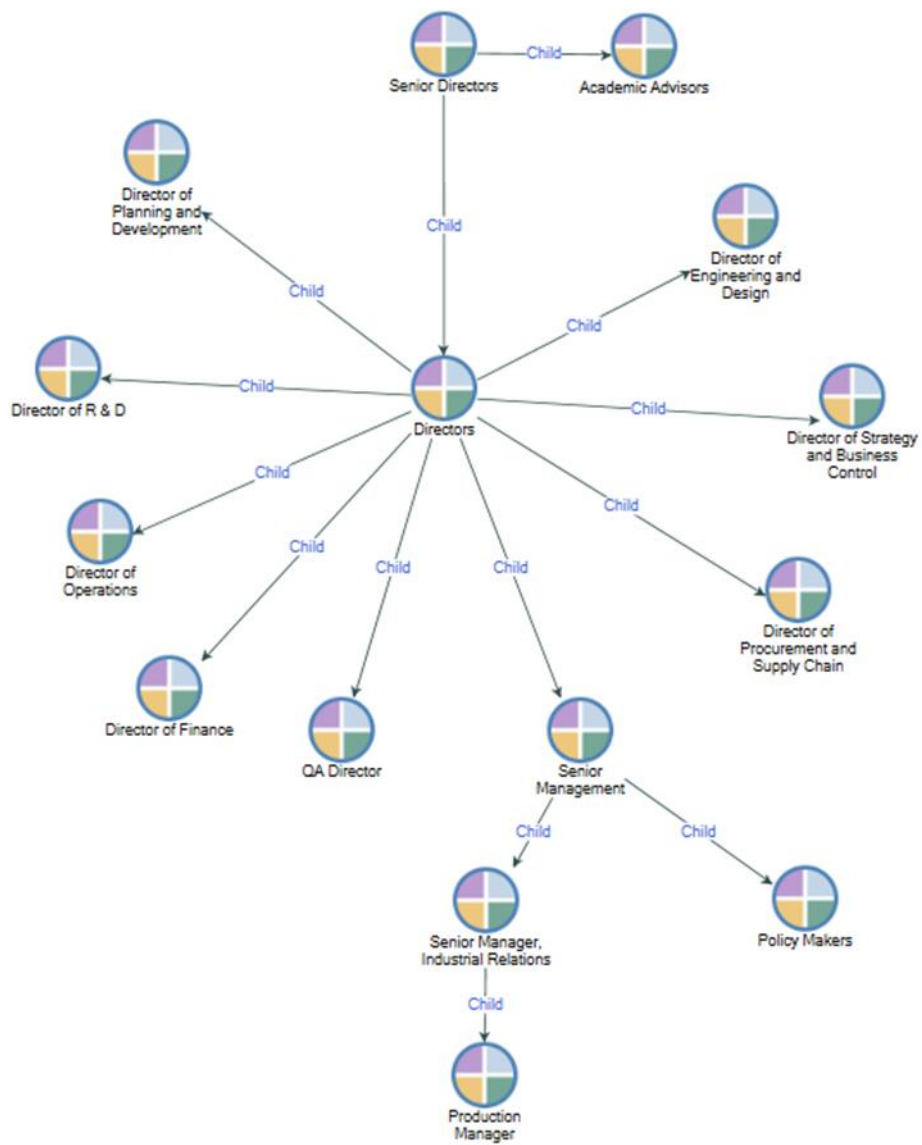
- Tohidi, H., & Jabbari, M. M. (2012). The important of innovation and its crucial role in growth, survival and success of organizations. *Procedia Technology*, 1, 535-538. doi:10.1016/j.protcy.2012.02.116
- UN. (2016). *Country classification*. Retrieved from United Nations: https://www.un.org/en/development/desa/policy/wesp/wesp_current/2014wesp_country_classification.pdf
- UN Documents. (2013). *Our Common Future, Chapter 7: Energy: Choices for Environment and Development*. Retrieved October 15, 2016, from UN Documents Gathering a body of global agreements: <http://www.un-documents.net/ocf-07.htm>
- Unluer, S. (2012). Being an insider researcher while conducting case study research. *The Qualitative Report*, 17(29), 1-14.
- van Dijk, T. A. (2008). *Discourse and Power*. Basingstoke: Palgrave MacMillan.
- von Zedtwitz, M., Corsi, S., Søberg, P. V., & Frega, R. (2015). A typology of reverse innovation. *Journal of Product Innovation Management*.32(1), 12-28. doi:[10.1111/jpim.12181](https://doi.org/10.1111/jpim.12181)
- Winter, A., & Govindarajan, V. (2015). Engineering reverse innovations. *Harvard Business Review* 93(7), 81-89.
- Xu, N., & Xu, Y. (2016). Research on the key success factors of reverse innovation of the latecomer engineering and technical services enterprises. *Journal of Science & Technology Policy Management*, 7(1), 58 - 76. doi:10.1108/JSTPM-04-2015-0015
- Yin, R. K. (2013). *Case Study Research: Design and Methods* (5th ed.). Thousand Oaks, CA: Sage Publications Inc.
- Yu, D., & Hang, C. C. (2010). A reflective review of disruptive innovation theory. *International Journal of Management Reviews*, 12, 435-452. doi:10.1111/j.1468-2370.2009.00272.x
- Zeng, M., & Williamson, P. J. (2007). *Dragons at your door: How Chinese cost innovation is disrupting the rules of global competition*. Boston: Harvard Business School Press.
- Zeschky, M. B., Winterhalter, S., & Gassmann, O. (2014). From Cost to Frugal And Reverse Innovation: Mapping the field and implications for global competitiveness. *Research-Technology Management (RTM)*, 57(4). doi:10.5437/08956308X5704235
- Zhu, F., Zou, S., & Xu, H. (2017). Launching reverse-innovated product from emerging markets to MNC's home market: A theoretical framework for MNC's decisions. *International Business Review* 26(1), 156-163. doi: [10.1016/j.ibusrev.2016.06.003](https://doi.org/10.1016/j.ibusrev.2016.06.003)
- Zsolnai, L. (2006). Extended stakeholder theory. *Society and Business Review* 1(1), 37-44. doi: [10.1108/17465680610643337](https://doi.org/10.1108/17465680610643337)

Appendices

Appendix I – The Interview Plan



Appendix II - Hierarchical map of directors and management



Appendix III – Ethical Approval Form



Application for Ethical Review – Staff and Postgraduate Research Students

1. Study Title and Key Dates

1.1 Title
UNCOVERING THE RELATIONSHIP BETWEEN FRUGAL AND REVERSE INNOVATION: A CASE STUDY OF SAUDI CERAMICS COMPANY
1.2 Key Dates
Date of submission: 13 th June 2018
Version Number: Version 5
Ethics Committee Reference Number: BAL/2018/E501/ Alshammari
Intended Start Date of Data Collection: May 2018 Projected Finish Date of Data Collection: August 2018

2. Applicant Details

2.1 Principal Investigator	
Name: Awwad Alshammari	Title /Role /Course of study: PhD Student
Department: Strategy Enterprise & Innovation	Faculty: Portsmouth Business School
Telephone: 07578936373	Email: up790310@myport.ac.uk
2.2 Supervisor (if Principal Investigator is a student)	
Name: Prof David Pickernell	Title /Role: Professor of Small Business and Enterprise Development / First Supervisor
Department: Strategy Enterprise & Innovation	Faculty: Portsmouth Business School

Telephone: 02392844184	Email: david.pickernell@port.ac.uk
Names and email of any other supervisors:	
Name: DR XIAOTI (RAYMOND) HU	Title /Role: Lecturer / Second Supervisor
Telephone: 023 9284 4167	Email: xiaoti.hu@port.ac.uk
2.3 Others involved in research including students and/or external collaborators (name, organisation/course, role in this research)	
N / A	

3. Details of Peer Review

The research work has been reviewed by both supervisors and the major review panel. This process has provided me with valuable academic information, support and direction. This has included clarifying the focus of the research on the existence, impact and relationship between frugal innovation and reverse innovation in a case study organisation. Academic support has been provided in the form of supervision sessions in which feedback and analysis have been given in relation to the early draft chapters of the thesis. The academic direction provided included methodological advice, principally in employing a primarily qualitative, interview based research design.

4. Funding Details

As the research has the potential to provide results that may benefit the wider Saudi economy, the government of Saudi Arabia is funding for the entire research. A letter confirming this is attached as an appendix.

5. Research Sites/Locations

The primary research will be conducted onsite at Saudi Ceramics Company in Riyadh, Saudi Arabia. Since the fieldwork is taking place outside of the UK, I will ensure that I follow the instructions in the University's fieldwork guidance about my being "subject to the laws of the location [Saudi Arabia] in which the fieldwork takes place" (UoP, 2017, p. 7). I have already begun the advanced

planning in anticipation of beginning the primary research, by following the 'Fieldwork Checklist' and 'Risk Assessment' guidance issued by UoP. Furthermore, I will adhere to all relevant health and safety procedures of Saudi Ceramics Company.

6. Insurance/indemnity Arrangements

I am a student sponsored by the government of Saudi Arabia. Therefore, I have full insurance coverage at all Saudi locations during interviews and all data collection. This is in compliance with the University's policy on overseas travel.

7. Study Aims and Objectives/Hypothesis

7.1 Research Aims

Informed by frugal innovation and reverse innovation, the main aim of this research is to design a frugal innovation and reverse innovation management framework.

7.2 Primary Objective

- To analyse drivers of and/or barriers to frugal innovation and reverse innovation in Saudi Arabia.
- To examine the extent to which frugal innovation and reverse innovation are applied in Saudi Arabia.
- To carry out a comparative critical analysis of the nature of the relationship, if any, between frugal innovation and reverse innovation within Saudi Ceramic's Electric Water Heater division.
- To evaluate the impact of resource constrained innovation on the performance of Saudi Ceramic's Electric Water Heater division.

7.3 Secondary Objective(s)

- To investigate types of resource constrained innovation other than frugal innovation and reverse innovation in the case study organisation.

- To identify the ways through which the companies in economically developing countries manage the transition of successful frugally innovated products to profitable reverse innovation in economically developed countries.
- To investigate the ways through which cost reductions affect product development in frugal innovation and reverse innovation.

8. Study Summary

8.1 Justification/Summary of Study (no more than one side)

Evidence from the literature indicates that if companies in economically developing countries/emerging markets are able to develop and maintain a substantial correlation between frugal innovation and reverse innovation, it will enable them to improve their global presence, capture more market share, improve economic performance, sustain business growth, and create new opportunities for new products launch (Govindarajan, 2012; Govindarajan and Trimble, 2012; Mukerjee, 2012; Radjou *et al.*, 2012; Immelt *et al.*, 2009). Although previous studies maintain that most firms' "bottom of the pyramid" strategies failed because they underestimated the gaps between consumers in developed countries and new kinds of consumers at the bottom of the pyramid of developing countries (Angot and Ple, 2015; Angot *et al.*, 2015; Leavy, 2014; Arasaratnam and Humphreys, 2013). Consequently, a number of studies have called for empirical investigation of frugal innovation and reverse innovation within the context of low-income countries (cf. Zedtwitz *et al.*, 2015; Brem and Ivens, 2013; Vinall, 2012; Anand and Monin, 2009). These studies assert that understanding frugal innovation and reverse innovation are mechanisms that may enrich a firm's strategic positioning and possibly lead to increased market share. In light of this, the present research aims to respond to these calls by critically analysing the relationship between and impact of frugal innovation and reverse innovation in the case study organisation in order to develop a resource constrained management framework applicable for use in economically developing countries/emerging markets.

Existing research indicates that producing comparatively low cost, affordable, robust and good enough quality products is also in the interest of low-income consumers living in economically developed countries (Inigo and Albareda, 2016; Rai, 2015). The present research will further

synthesise extant research findings on frugal innovation and reverse innovation in illustrating the interrelationships between the two concepts, approaches and processes. In addressing gaps in the knowledge, the research will explore a range of indicators crucial for the development of frugal innovation and reverse innovation within the context of Saudi Ceramics Company, the case study organisation.

The present research seeks to extend existing literature on frugal innovation and reverse innovation by using the data from its empirical research, together with findings from the literature to develop a resource constrained innovation management framework for use in economically developing countries/emerging markets. Evidence from the literature indicates that ensuring good enough product quality, at a competitively low cost so that consumers are empowered through affordability are likely to feature significantly in the management framework. In addition, in order to generate an innovation flow from an economically developing nation such as Saudi Arabia to economically developed countries, the literature suggests that there has to be an attitude that views limited resources as advantageous to innovation. The research will explore attitudes towards and experiences of resource constraints and innovation in Saudi Arabia, as well as the social and environmental/ecological effects of innovation and whether grassroots innovation is a significant component in resource constrained innovation. In analysing the extent of frugal innovation and reverse innovation in the Saudi manufacturing sector, the research will be advancing the literature, as existing studies are primarily case-based (Hossain, 2017).

Saudi Arabia is unique in a number of ways that justifies its selection as the location for this study's empirical research. It has the world's largest reserves of natural oil and gas, which has been the primary source of the country's strong economic growth. However, these natural resources have a finite lifespan and the Saudi economy has to diversify in order to continue its economic growth. In addition and related to its reliance on oil revenues, Saudi Arabia has a growing employment crisis, particularly amongst its young population. In addition, national culture factors such as high power distance and restrictions on Saudi women's participation in the workforce may exert negative impacts on the country's innovation capabilities. Most research on frugal innovation centres on India and there is a dearth of literature on resource constrained innovation as a whole, not just in Saudi Arabia, but in the MENA region as a whole. Thus, by focussing on Saudi Arabia, the research

will be opening up frugal innovation and reverse innovation to an as yet, under-studied geographical area.

8.2 Anticipated *Ethical Issues*

Autonomy and Non-maleficence – The autonomy in the research is described as the free consent and freedom of the respondent to provide response to the questions according to their will and no pressure is exerted on them to tamper with the result. The respondents in this research will be free to exercise full autonomy in responding to the questionnaire and participating in interviews, no pressure will be exerted on them to provide specific response of the questions. In addition, the anonymity in the research is defined as the privacy of personal information provided by respondents. No personal information, such as name and other identifying data, will be requested from the respondents.

Beneficence and Justice – The individuals who have participated in the conduct of this research will in no way benefit from the results, although the organization selected can have a direct advantage if it decides to further the study by collaborating with the university. The insights gained from the research will also shed light on the particular innovation school of thought for the organization.

Since the proposal is exploratory in nature and the research is depending upon extrapolation of existing researches, the validity of any benefits and consequences can not be long-lasting. The outcomes of this research will be simplified to a great extent and any level of objectivity will be minimised to include a more subjective response from respondents as it is the research's main aim requirement.

8.3 Anticipated other *Risks or Concerns*

I am a Saudi Arabian citizen, it is my home country and primary place of residence. I am a regular traveller from and to Saudi Arabia, and have always travelled without risk or concern. In light of this, I do not foresee any risks or have any concerns about travelling to and remaining in Saudi Arabia. I have nevertheless completed and submitted the University's Travel Overseas and Risk Assessment to the University's Insurance Officer.

8.4 Medical Cover (if applicable)

N / A

9. Description of Research Method/ Protocol

Research Philosophy

The underlying philosophy for the research is interpretivism with an inductive approach. The data collected is qualitative because, although, according to Fraser (2014) there is a tendency for PhD researchers (outside Europe) into business and accounting to use quantitative methods (Fraser, 2014), as this appears to make publication easier – Fraser cites examples of quality research being turned down by American and Australian journals because the qualitative methods used ‘lack theory’ (Fraser, 2014, p. 51), the use of qualitative data can “bring us closer to the ‘truth.’” (Fraser, 2014, p. 49)

Method Research Approach

The study will employ a single case study, which will include semi structured interviews with a range of internal and external actors and stakeholders. This qualitative research will enable the search for in-depth data on the drivers and/or barriers to frugal innovation and reverse innovation. It will also permit investigation of the relationship between, and impacts of, the two types of innovation, together with evaluation of the impact of resource constrained innovation in the case study organisation. The research method has been selected to address the primary and secondary research objectives, and the data and analyses drawn will contribute to achieving the main research aim.

Case Study – Saudi Ceramic Company

- The products will be targeting resource-constrained customers in the home market and export to emerging and developed economies.
- Specific product range are water heaters.
- The relevant water heaters to the study are those targeting the resource-constrained consumers, and these are of different styles and capacities.

- Single-case study (of the Saudi Ceramic Company) is chosen for its advantage of allowing the researcher closer access to the research participants as it will allow for detailed data gathering.

Semi-structured Interviews

- This will be conducted with the senior managers, directors and academics that have contributed to the companies strategies. The reason for the choice of a semi-structured interview rather than the more conventional fully scripted one is simply to set a 'conversational' tone to the discussion, as this will ensure that the 'open-ended' nature of the questions increases the input from the interviewee and minimises that of the interviewer. Generally, the interviews will be conducted primarily in English because most of the interviewees, though native Arabs, are proficient in English language. However, occasionally, there would be a sentence, phrase or word given in Arabic where direct translation will not be possible or will make the nuance of the meaning be lost. The interviews will usually last for a period of forty, (40) minutes to an hour (60 minutes). The interview questions (see attached) contain no sensitive topic or any item that may be of special concern to the participants.

10. Compliance With Codes, Guidance, Policies and Procedures

This researcher will abide by all the guidance and policies stated by the university of Portsmouth data collection policies. In addition, because this research involves participants, the Declaration of Helsinki will be obtained and will strictly adhere to Concordat to support research integrity and to the University of Portsmouth ethics policy.

11. Recruitment of Participants

11.1 Who are the Research Population?
<p>The single case approach adopted means that the research population encompasses populations at three levels:-</p> <p>Macro: Saudi academics and Others with the requisite knowledge and experience AND who have contributed to the economic and business policy development of the Saudi Ceramics Company.</p> <p>Meso: Senior managers within Saudi Manufacturing in full time employment for at least 12 months AND are knowledgeable about the sector served by the Saudi Ceramics company.</p> <p>Micro: Managers within the Saudi Ceramics company and its local supply AND knowledgeable and experienced about innovation in this context.</p>
11.2 Inclusion/Exclusion Criteria
<p>Inclusion Criteria: General: Fluent in English Language</p> <p>Exclusion Criteria: General: Not fluent in English Language.</p> <p>Inclusion Criteria - Macro Level Participants: Senior academics and who made contributions to economic and business policy development with the company . Must be aged 18 or above, have read and understood research participant information and consented to participate in the research.</p> <p>Exclusion Criteria - Macro Level Participants: Not contributed to economic or business policy development..</p> <p>Inclusion Criteria - Meso Level Participants: Senior management of Saudi manufacturing that must be full time employee within company for at least 12 months, aged 18 or above, have read and understood research participant information, and consented to participate in the research.</p> <p>Exclusion Criteria - Meso Level Participants: Not part of senior management of Saudi Ceramics Company who employed within company for less than 12 months.</p>

Inclusion Criteria - Micro Level Participants: Legally employed, full-time employee of Saudi Ceramics, and/or a supplier or buyer in the company's local supply chain, aged 18 or above, have read and understood research participant information, consented to participate in the research.

Exclusion Criteria - Micro Level Participants: Not employed by Saudi Ceramics or a company within its local supply chain, and being employed by Saudi Ceramics or a company within its local supply chain for less than 12 months.

11.3 Number of participants (include rationale for sample size)

The research aims are multilevel and multidimensional. They all support, facilitate and encourage multilevel investigation. Within this the study uses a purposive sample approach, the number of participants indicative of the point at which data saturation within the qualitative methods employed, is likely to be reached.

Macro Level: 5 participants will be selected for this level. This sample size allows recruitment of participants from a variety of disciplines, knowledge areas, policy development expertise and experiences. In addition it is a manageable size for me to administer the discussions.

Meso Level: 5 participants will be selected for this level. The sample size for this stage is determined by the size of the Saudi manufacturing sector and wanting to make sure that participants represent companies that are/would be able to engage in reverse innovation.

Micro Level: 8 participants will be selected for this level which will measure leadership, organisational and business process drivers of frugal innovation and reverse innovation. The sample sizes for this level will enable the collection and analysis of qualitative data from the interviews for frugal and reverse innovation within Saudi Ceramics.

11.4 Recruitment Strategy (including details of any anticipated use of a gatekeeper in host organisation to arrange/distribute participant invitations)

Macro Level: Expert sampling will be used to recruit participants at this level. Expert sampling will be used to gather the perspectives, opinions and judgements of top management, academics who possess comparatively high levels of knowledge, experience and competence in the area under study (Gumani & Mudhovozi, 2013). Email to each individual containing a letter of invitation from

the researcher and an attached letter confirming that the research is supported by the Saudi Arabian government in body of email. Full details of the research, its anticipated benefits and what is required in participation will also be attached in the form of participation information sheet. The email invitation letter will also make clear that the researcher will be available to answer any questions or discuss any matters the prospective participants may have.

Meso Level: Expert sampling will be used to recruit participants at this level. The email will contain a letter of invitation from the researcher and an attached letter confirming that the research is supported by the Saudi Arabian government in body of email. Full details of the research, its anticipated benefits and what is required in participation will also be attached in the form of participation information sheet. The email invitation letter will also make clear that the researcher will be available to answer any questions or discuss any matters the prospective participants may have.

Micro Level: The human resource department of Saudi Ceramics Company will act as the gatekeeper disseminating the letter of invitation to managers, employees and individuals in the company's local supply chain. Stratified random sampling will be used to stratify/divide the research population for this level into different hierarchical, professional and occupational groups.

11.5 Payments, rewards, reimbursements or compensation to participants

All participation is based on voluntary basis and no payment to the participants will be provided.

11.6 What is the process for gaining *consent* from participants?

Formal consent request will be sent through emails to participants with study information sheet (please find attached). Participants will be given adequate time (about 15 working days) to give their consent. Participants will have an option to contact the researcher if they need any further information or have any questions via email or telephone. Moreover, prior to all interviews; researcher will remind individual participants of the study aims and seek verbal consent which will be recorded along with interviews. Consent forms will be stored in researcher's google drive.

11.7 Has or will consent be gained from other organisations involved (if applicable)?

Full informed consent for organisations' participation in the research will be sought by getting written consent from senior management most probably directors/owners of the firms. As part of the consent process, it will be clarified with the gatekeepers if they have the authority to sign the informed consent forms or if additional approval is required.

11.8 Arrangements for translation of any documentation into another language (if applicable)?

Interviews will be conducted in English and Arabic. If data is collected in Arabic where necessary, I will translate the information according to the academic standards.

11.9 Outline how participants can withdraw (if applicable), and how data collected up to this point will be handled. Also stop criteria for specific tests (if applicable)?

Participants can withdraw their participation at any time before the cut-off date of 31st January 2019. Participants' withdrawal will simply be verbally communicated to the researcher signifying their intention to withdraw their participation, and no reason need be given. Their withdrawal would be well recorded.

11.10 Outline details of re-consent or debrief (if applicable)?

N/A

12. Research Data Management

12.1 Description of data analysis

The analytic process involves: (1) analysing the field notes generated during the semi-structured interviews; (2) the data transcripts will be indexed to thematic categories using constant comparison of data and cases (Anderson et al., 2014). These early code structures will then be reviewed and revised until data saturation is reached. This will enable the code and themes to be refined, redefined, merged and retired until the final code and themes are reached; (3) the final data and themes will be grouped into categories (Ricks & Harrison, 2014). Therefore, significant time will be spent analysing and interpreting the data and a rigorous approach will be taken to ensure data credibility, reliability and replicability; (4) the final phase of the analysis will involve fitting the categories into the overall framework generated from this research.

12.2 Where and how will data be stored?

For this research project, all data will be kept in the researcher's password protected Google drive account and university N drive. Any hard copies of data will be kept in a secure locked cupboard in a private office. The data will be kept until the PhD project (including submission, publications and conference presentations) is completed. At which point, following the University of Portsmouth's Research Data Management Policy 2014, the data will be securely retained by the university for 10 years, from (whichever is the latest) the date of completion of the project, the publication date of any research findings from the data or the date upon which the data was requested from a third party. After such time, a review will take place to decide whether the data should be destroyed. Portsmouth Business School will be responsible for retaining the data, including after the principal researcher leaves the University.

12.3 Destruction, Retention and Reuse of Data

At the end of the research all data will be archived and retained. Retention will be in line with the University of Portsmouth Research Data Management Policy which requires that research must be retained for (10) years counting from whichever is the latest of:

- Completion of the research,
- Publication date of any findings emerging from the data,
- Date of last request of the research data by a third party.

At the end of whichever of the above is applicable, the retention of the data will be reviewed. The outcome of the review will determine if the data will continue to be retained and for how long, or if the data will be destroyed.

12.4 Personal Data – How will confidentiality be ensured (for instance will anonymisation be used)?

During transcription, all data will be anonymised to remove references to individuals and their job titles and this information will not appear in the thesis or any related academic publication. All individual participants will be given a specific code, which will be used in place of names, to identify transcripts. Copies of consent forms giving both codes and identifying data will be stored in separate files on the N drive from all other data to facilitate the security of individuals. Care will be taken to preserve the anonymity of individual respondents when reporting back to company gatekeepers by presenting only anonymised data (removing names and job titles). All printed copies

will be kept in a locked cabinet in room PO3.09 (PhD Researcher's Office) and will be digitised as soon as possible. After the digitising, the printed copies will immediately be destroyed using documents shredders on the 4th and 5th floor of Portsmouth Business School.

12.5 How will organizational data (publically unavailable data) be handled (if applicable)?

The organisations name will be kept anonymous to maintain data confidentiality. All companies and individual participants will be given specific codes, which will be used in place of names to specify transcripts. Copies of consent forms giving both codes and identifying data will be stored in separate files on the N drive from all other data to facilitate the security of companies. The raw data will be available only to researcher.

12.6 How will security sensitive data be handled (if applicable)?

Research will take place at the non-restricted, open to public area of the companies. Researcher will not have access to any restricted or commercially sensitive information.

13. Publication / Impact / Dissemination Plans

This research aims to further the progression of the present knowledge of reverse and frugal innovation within the framework of the selected industry. With this study, the KPIs of both reverse and frugal innovation, which have an essential influence in developing the core competence, will be thoroughly observed. The core focus of this research will be on the relationship between frugal and reverse innovation, which will be analysed systematically to determine any latent inferences. The influence of technology on frugal innovation will also be emphasised and this will allow this research to develop an understanding over the transitional processes of effective frugal products.

This research's focus is on the industry of Saudi Arabia, but to provide a more holistic review, current and international discussions on both frugal and reverse innovation will be vigilantly scrutinized. In lieu of these objectives, I will be further disseminating this study by publishing one or two articles in international publications.

14. References

- Andresen, M., Bergdolt, F., Margenfeld, J. & Dickmann, M. (2014) 'Addressing international mobility confusion – developing definitions and differentiations for self-initiated and assigned expatriates as well as migrants'. *International Journal of Human Resource Management*, 25(16), pp. 2295-2318.
- Anand, M. and Monin, P. (2009) *Innovation processes in emerging markets: Empirical evidence from the Indian Insurance Industry*, International Management, India
- Arasaratnam, Ajanthy and Humphreys, Gary (2013), *Emerging economies drive frugal innovation*, Bulletin of the World Health Organization, Canada
- Brian Leavy (2014) *India: MNC strategies for growth and innovation*, Strategy & Leadership, Ireland
- Cavusgil, T. S., Ghauri, P. N., & Akcal, A. A. (2013). *Doing business in emerging markets*. San Francisco: Sage Publication.
- Douglas, Tania S. (2013) *Contextual innovation and social engagement: From impact factor to impact*, South African Journal of Science, South Africa
- Fetters, M., Curry, L. & Creswell, J. (2013) 'Achieving integration in mixed methods designs – Principles and practices'. *HSR: Health Services Research*, December, 48(6), pp. 2134-2156.
- Govindarajan, V. (2012). *A reverse innovation playbook*. *Harvard Business Review*, 90(4), 120-124.
- Govindarajan, V., & Trimble, C. (2012). *Reverse innovation: create far from home, win everywhere*. Boston, MA: Harvard Business School Press.
- Govindarajan, V., & Ramamurti, R. (2011). *Reverse innovation, emerging markets, and global strategy*. *Global Strategy Journal*, 1(3-4), 191-205.
- Hang, C. C., Garnsey, E., & Ruan, Y. (2015). *Opportunities for disruption*. *Technovation*, 39-40, 83-93.
- Immelt, J., Govindarajan, V., & Trimble, C. (2009). *How GE is disrupting itself*. *Harvard Business Review Review*, 87(10), 56-65.
- Jaques Angot and Loic Ple (2015) *Serving poor people in rich countries: the bottom-of-the-pyramid business model solution*, *Journal of Business Strategy*, France
- Li, Z. (2013) 'Natural, practical and social contexts of e-learning: A critical realist account for learning and technology'. *Journal of Computer Assisted Learning*, June, 29(3), pp. 280-291.

- Lim Chaisung, Han Seokhee, Ito Hiroshi (2013) Capability building through innovation for unserved lower end mega markets. *Technovation*, South Korea & Japan
- Lipscomb, M. (2008) 'Mixed method nursing studies: A critical realist critique'. *Nursing Philosophy*, January, 9(1), pp. 32-45.
- Mani, G., & Danasekaran, K. A. (2014). Frugal innovations: The future of affordable health care. *Asian Journal of Pharmaceutical Research and Health care*, 6(2), 1-2.
- Mukerjee, K. (2012). Frugal innovation: the key to penetrating emerging markets. *Ivey Business Journal*, 76(4), 1-3.
- Nair Anil, Guldiken Orhun, Fainshmidt Stav, Pezeshkan Amir, (2015) Innovation in India: A review of past research and future directions, *Asia Pacific Journal of Management*, USA
- Paul van der Boor, Pedro Oliveira, and Francisco Veloso (2014) Users as innovators in developing countries: The global sources of innovation and diffusion in mobile banking services, *Research Policy*, USA and Portugal
- Prathap Gangan (2014) The myth of frugal innovation in India, *Current Science*, India
- Radjou, N., Prabhu, J., and Ahuja, S. (2012) *Jugaad Innovation*, Josey Bass, USA.
- Rao, Balkrishna C. (2013) How disruptive is frugal? *Technology in Society*, India
- Rao, Balkrishna C. (2014) Alleviating poverty in the twenty-first century through frugal innovations, *Challenge*, India
- Ricks, T. N. & Harrison, T. (2014) 'Disability and health: Exploring the disablement experience of young adult African Americans'. *Disability & Rehabilitation*, March, 36(6), pp. 479-486.
- Vinall Phil (2012) Frugal innovation: The future of cardiovascular medicine, MD Conference Express
- Zedtwitz, M. V., Corsi, S., Soberg, P. V., & Frega, R. (2015). A typology of reverse innovation. *Journal of Production of Innovation Management*, 32(1), 12-28.
- Zeschky B. Marco, Winterhalter Stephan, and Gassmann Oliver (2014) From cost to frugal and reverse innovation: Mapping the field and implications for global competitiveness, *Research Technology Management*, Switzerland
- Zeschky, M., Widenmayer, B., & Gassmann, O. (2011). Frugal innovation in emerging markets. *Research-Technology Management*, 54(4), 38-45.

15. Details of Appendices

Put N/A in version Number column if necessary		
Document	Date	Version No.
This Application Form	28 th April 2018	2.1
Participant Information Sheet(s) (list if necessary)	28 th April 2018	1.02
Consent Form(s) (list if necessary)	28 th April 2018	1.0
Supervisor Email Confirming Application	28 th April 2018	
Interview Questions / Topic List	28 th April 2018	1v1.01 2v1.01 3v1.01

16. Declaration by Principal Investigator and Supervisor (if applicable)

1. The information in this form is accurate to the best of my/our knowledge and belief and I/we take full responsibility for it.
2. I/we undertake to conduct the research in compliance with the University of Portsmouth Ethics Policy, UUK Concordat to Support Research Integrity, the UKRIO Code of Practice and any other guidance I/we have referred to in this application.
3. If the research is given a favourable opinion I/we undertake to adhere to the study protocol, the terms of the full application as approved and any conditions set out by the Ethics Committee in giving its favourable opinion.
4. I/we undertake to notify the Ethics Committee of substantial amendments to the protocol or the terms of the approved application, and to seek a favourable opinion before implementing the amendment.
5. I/we undertake to submit annual progress reports (if the study is of more than a year's duration) setting out the progress of the research, as required by the Ethics Committee.
6. I/we undertake to inform the Ethics Committee when the study is complete and provide a declaration accordingly.

7. I/we am/are aware of my/our responsibility to be up to date and comply with the requirements of the law and relevant guidelines relating to security and confidentiality of personal data, including the need to register, when necessary, with the appropriate Data Protection Officer. I/we understand that I/we am/are not permitted to disclose identifiable data to third parties unless the disclosure has the consent of the data subject.

8. I/we undertake to comply with the University of Portsmouth Research Data Management Policy.

9. I /we understand that research records/data may be subject to inspection by internal and external bodies for audit purposes if required.

10. I/we understand that any personal data in this application will be held by the Ethics Committee, its Administrator and its operational managers and that this will be managed according to the principles established in the Data Protection Act 1998.

11. I understand that the information contained in this application, any supporting documentation and all correspondence with the Ethics Committee and its Administrator relating to the application:

- Will be held by the Ethics Committee until at least 30 years after the end of the study
- Will be subject to the provisions of the Freedom of Information Acts and may be disclosed in response to requests made under the Acts except where statutory exemptions apply.
- May be sent by email or other electronic distribution to Ethics Committee members.

Principal Investigator: Awwad Alshammari

Date: 28 - 04 - 2018

DGPickemell

Supervisor (if applicable)..... ..

Date...30-04-2018

Appendices.

The following appendices have been included with this ethics application version 2.1

Appendix A- Research Participant Information Sheet.....	199
Appendix B- Letter of Consent	21
Appendix C- Interview Guide.....	23
Appendix A- Research Participant Information Sheet	



Research Participant Information

Title of Research Project: Uncovering the Relationship Between Frugal and Reverse Innovation: A Case Study of Saudi Ceramics Company

Researcher Name: Awwad Alshammari

Contact email: Awwad.Alshammari@myport.ac.uk

I am a post-graduate student at the University of Portsmouth. My PhD research in Frugal and Reverse Innovation involves a case study of Saudi Ceramics Company, concentrating on one product, an Electric Water Heater. In order to discover how Frugal and Reverse innovation has affected this product, I will be ascertaining the views of academics and higher managers involved in the economic and business policies of the Saudi Ceramics Company, as well as the views of the senior managers in the production department. In addition, the views of management and workers involved in the production of the electric water heater, including the companies in the national supply lines, will also be considered.

This will involve a series of short, semi-structured interviews with the directors, managers, academics, and workers in the company and its supply chain. These interviews will be completely voluntary and will not involve the disclosure of any confidential or sensitive information regarding the companies or individuals concerned.

I will like to invite you to take part in my research study. However, before you decide you need to understand why the research is being undertaken and what it will involve for you. Please take time to read the following information carefully. In case of any doubt you may have with any aspect of the study or with anything you read herein, please feel free to ask questions, clarification or further information. Take time to decide whether you wish to take part or not.

The purpose of the study, as outlined in the paragraph above, is to discover how the perceptions and opinions of those working with or for the Saudi Ceramics Company have been affected by Frugal and Reverse innovation. The study will also examine the effect of these innovations on the production of the electric water heater. This will enable a framework to be created in order that recommendations can be made that will, in the end, ensure that Saudi Ceramic Company remains both sustainable and competitive.

You have been chosen as a potential participant because you are working with the Saudi Ceramic Company or a company in its local supply chain. Therefore, you have directly experienced the

version 5 , 13th June 2018

19

impact and constraints or advantages of Frugal and Reverse innovation. Other potential participants have been identified in other companies in the supply chain of Saudi Ceramic Company who have also experienced this from other perspectives. All potential participants must have been employed for a minimum of 12 months and have either contributed to policy/design or to production of the electric water heater. In order to comply with UK data protection law all information will be securely stored on a google team drive associated with university of Portsmouth network account, accessible only by myself and my supervisors where access to the data will only be via individual logins, and using computers that are both password protected and use encryption compatible with university of Portsmouth protocols. Any data will be stored and destroyed in line with university of Portsmouth policy.

Some FAQs to consider

Why I Have Been Chosen?

You are chosen because of your professional relationship to the company and as this research is based on this company, therefore any information volunteered by you will go a long way in helping achieve the research objectives and an informed analysis.

What Precisely Will My Involvement Entail?

Your personal details will not be recorded, and your response will be anonymous, therefore the answers you give will only be used for research purposes.

Do I Have to Take Part?

No, you have complete freedom to refuse to participate and can also verbally withdraw at any given time without giving any reason.

Are There Any Risks or Rewards Associated with Participating?

The research findings will help the company improve its strategies, which will in turn help its employees grow. However, there are no personal, physical or emotional risks involved from participating in this research and there are also direct rewards as such.

Will My Participation Be Kept Confidential?

Yes. No private information will be gathered, recorded or shared at any time.

What Will Happen to The Research Results?

It will be used for research and academic purposes. If published, it will be with the permission of the Saudi Arabian government and the University of Portsmouth.

Who Is Organising and Funding The Research?

The University of Portsmouth is supervising this research while funding is from the Saudi Government.

Who Has Reviewed the Research?

University of Portsmouth supervisors and the University Ethics Committee.

What Happens If Something Goes Wrong or I Wish to Complain?

You can withdraw participation at any stage and you can contact the research supervisor on his email.

Where Can I Get More Information?

Feel free to contact the researcher directly on his email above.

I am Still Interested, what is the Next Step?

Please complete and sign the letter of consent.

Appendix B- Letter of Consent



Head of Department, Strategy, Enterprise & Innovation: Prof., Paul Trott

Supervisor: Prof., David Pickernell

Researcher: Awwad Alshammari

Research Participant Letter of Consent

Title: Uncovering the Relationship Between Frugal and Reverse Innovation: A Case Study of Saudi Ceramics Company

Contact information:

Position: _____

Name: _____

I have been advised of the purpose of this project, and that my participation will be confidential, and all replies and paperwork will be fully anonymized, and will not be traceable to any individual or setting.

I have also been advised of my right to withdraw from the research at any period in time during the research period until the cut-off date of 31st January 2019.

I have further been informed and advised that the data that will be generated from this research will be used in the application of frugal and reverse innovation not only the Saudi Ceramic Company but in other companies operating in an emerging economy like Saudi Arabia.

I hereby agree that, subject to the conditions noted above, I am prepared to participate in this research by taking part in interviews with the researcher.

In order to comply with UK data protection law all information will be securely stored on a google team drive associated with university of Portsmouth network account, accessible only by myself and my supervisors where access to the data will only be via individual logins, and using computers that are both password protected and use encryption compatible with university of Portsmouth protocols. Any data will be stored and destroyed in line with university of Portsmouth policy.

Signed:.....

Date:.....



Research Interview Guide Tier One

Title: Uncovering the Relationship Between Frugal and Reverse Innovation:
A Case Study of Saudi Ceramics Company

Contact information:

Question

1. Good morning/afternoon, thank you for agreeing to participate in this research project. Please tell me what experience you have of frugal innovation, the development of products specifically for resource-constrained customers, in the Saudi Arabian economy or elsewhere.
(prompts: read/studied? Introduced? Has it had any effect? Positive/negative? Product?)
2. Thank you, what strategies do you believe Saudi Ceramic Co. should follow with regard to frugal or reverse innovation, and why?
(Reverse innovation involves selling products produced for emerging markets at low cost in existing markets to gain new customers who are resource-restrained).
(Prompts: expand into other growing economies or into the west? Imitate or innovate?)

Interviewer Notes

1. _____

2. _____

Question

- 3. What are your views about the Saudi Ceramic Co. collaborating with a foreign multi-national company?
(Prompts: benefits, expand into foreign markets, competition)

- 4. Are there any difficulty/barriers to frugal or reverse innovation in the emerging markets at which Saudi Ceramics is aiming?
(Prompts: the chance of 'cannibalisation' (when a product aimed at resource-constrained customers sells instead of existing products instead of alongside them))

- 5. Finally, do you have any comments or anything you would like to add?

Thank you for your time and the information you have given me. Salaam Alaikum.

Interviewer Notes

3. _____

4. _____

5. _____

Although the interviews are recorded, these spaces are for notes about non-verbal communications etc. during the interview.



Research Interview Guide Tier Two

Title: Uncovering the Relationship Between Frugal and Reverse Innovation:
A Case Study of Saudi Ceramics Company

Contact information:

Question

1. Good morning/afternoon, thank you for agreeing to participate in this research project. What is your experience with frugal innovation and reverse innovation?
(Prompts: How Saudi Ceramics uses it, for product development, marketing, new customers, New products?)

2. What is your view of the experience of being a small to medium enterprise in a developing economy?
(Prompts: advantages, disadvantages, underselling European or US products? Expansion into 'their' markets? Cost? Overheads?)

Interviewer Notes

1. _____

2. _____

Question

- 3. What are the processes companies follow in developing new products? (Prompts: Frugal and reverse innovation for example water heater, similar products from China or India?)

- 4. Which of the current product range do you believe could be successfully exported to the resource-constrained parts of the European or US markets? (Prompts: heaters for drinking water? For washing?)

- 5. Have they been any issues in exporting strategy for cheap, basic product in markets that previously would have bought a more 'up-market' model? If no. Why not? If yes. How? (Prompts: marketing problems? Quality control? Market share?)

- 6. Finally, do you have any comments or anything you would like to add?

Thank you for your time and the information you have given me. Salaam Alaikum.

Interviewer Notes

3. _____

4. _____

5. _____

6. _____

Although the interviews are recorded, these spaces are for notes about non-verbal communications etc. during the interview.



Research Interview Guide Tier Three

Title: Uncovering the Relationship Between Frugal and Reverse Innovation:
A Case Study of Saudi Ceramics Company

Contact information:

Question

1. Good morning/afternoon, thank you for agreeing to participate in this research project. To what extent do you believe Saudi Ceramics uses frugal innovation, the development of products specifically for resource-constrained customers, and how has this affected turnover or demand for materials?
(Prompts: competition with Chinese/Indian products? Quality? Interest from new markets?)

2. Thank you. How do you think Saudi Ceramics co. wants to develop its activities (prompt: expand further?), and how do you think this will affect your department? (Prompts: Will Frugal and Reverse innovation help to make this possible and why?)

Interviewer Notes

1. _____

2. _____

Question

- 3. Do you believe that Saudi Ceramics should approach other small to medium companies for collaboration to create frugal or reverse innovations and to expand and how?
(Prompts: local small companies in Europe? Or India? Is 'made in the KSA' a selling point?)

- 4. How do you, or others in your department, actively try to find new, unexploited markets for the products?
(Prompts: when abroad on business/holiday? When watching news or documentary programmes? In resource-constrained parts of Saudi Arabia?)

- 5. Finally, do you have any comments or anything you would like to add?

Thank you for your time and the information you have given me. Salaam Alaikum.

Interviewer Notes

3. _____

4. _____

5. _____

Although the interviews are recorded, these spaces are for notes about non-verbal communications etc. during the interview.