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Performance analysis of Reverse and Frugal Innovations in Nigeria A Case Study of IVM automobile company

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Abstract. Nigeria which is considered as the 'giant' of Africa and is currently the largest economy in West Africa is also fast becoming the largest economy in the entire Africa. The country is in the process of developing a broader base for her economy which for many years has been reliant on oil and gas and non-renewable fossil fuels which are already saturated. However, the country has many other natural resources, and one of the major companies in the "non-oil" economy is the Innoson Vehicles and Motors (IVM) in Nigeria. In recent decades, many West African companies, including IVM, have begun to accept the need for innovation if they are to sell their products to a wider market and to increase exports. Noteworthy to companies in West Africa are Reverse Innovation and Frugal Innovation. This research observes the interaction these two forms of innovation adopts, innovation, and the ways in which they have been accepted by the IVM and their supply chain. There are three stages of management considered in this research (Macro; Directors and Educational Advisors Managers, members of this level precipitate policies that advance the economy and business inside the company. Meso; Senior Management at the production unit in the IVM, and Micro; The Organizational Supervisors of manufacturing and distribution). To achieve the purpose of this research, several personnel's at the three different levels of management were interviewed about their understanding of the terms and the application of Reverse and Frugal innovations in their experience. A total of 20 interviews (each lasting 15-20 minutes) were carried out, 8 at the Macro level, 5 Meso level and 7 at the Micro level. This led to a discovery that West African businesses found Reverse Innovation and Frugal very satisfactory, and inherent, should it be that the economic proliferation designed is continued. The study, by analyzing their opinions concerning the drivers and limitations of Reverse Innovation and Frugal Innovation, has successfully generated a framework for R&F innovations which establishments in other developing economies seeking to proliferate their exports back to the developed countries might find beneficial. Finally, sustainability is also seen as an underlying influencing factor throughout the research.

Keywords. Reverse Innovation, Frugal Innovation, Macro, Meso, Micro, IVM

1. Introduction

Innovation is relatively easy if a company has access to unlimited resources, as a product can be designed and developed to suit the needs of each customer. Real business never has unlimited resources and much of the innovation which does occur consists of adapting an existing product so that it meets the requirements of a more extensive run 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 Nigerian economy is oil-based, manufacturing and assembling of automobiles and the related business of IVM does not rely on oil, and, additionally, cannot use any existing income from oil to expand. Not being in a position where investment to develop and revolutionize is availed by the existing oil and gas business, hence its production is global, it is essential that IVM look forward to an efficient innovation, which comprises familiarizing present products to appeal varieties of customers in addition to innovative markets learning for products that are already present. Though, it is necessary that the distribution chain and other market competitors when trying to choose the best way to develop the business, and the drivers and barriers to innovation, some of which may be cultural needs to be observed by the study research.

Although, economies still evolving and expanding may not have profited from the extensive Foreign Direct Investment (FDI) which has transpired here previously over fifty years and may not have access to similar stages of internal investment availed to this nation. Nigeria is still categorized by the UN as a "developing economy" (UN, 2018), it is currently in an unusual place even though it is considered the business hub of West Africa, granting that the country is wealthy due to the oil and gas manufactured there. To permit the global competition of their businesses, the purpose of this research is to offer suitable and appropriate information for the economies where innovation, sustainability, and growth are required. Therefore, this study reflects the main idea, and makes effort to show why rather than just the aims, purpose, and questions shown below, in some ways, in the Twenty-First Century an essential element of modern sustainable industry is revolution. Fairly, this as well, is the reason why the research medium was a single case study; considering how efficacious the firm is, IVM may be used as an illustration. During the highest oil demand era, this firm has expanded into a system which other geographic firms could not, when lots of firms in Africa depended massively on products imported, in the trades of construction and building as well, such that some firms followed customarily razed into inflation and shutdown (Held and McGrew, 2003). As stated by a famous observer of the region, the forlorn outcome of oil in substantial sectors are due to a rise in "orientalism" (Said, 1979), furthermore some cases are a mislaying of identity as Western civilization has taken possession (Said, 1994). Even though both of these are not close to contemporary studies, the West African case is still based on them. A framework that is subtle conceptually as well as delineates the drivers and difficulties to innovation, indicate ways to control the difficulties, and specify the use of the drivers, would be designed during this study. Perhaps, there is a reaction in opposition at this moment the world has arrived "The End of Oil" (Roberts, 2004), a useful idea generally is a framework that could enable real firms survive with a transformation to a non-oil economy.

Developing a framework of drivers of Reverse Innovation and Frugal Innovation in the environment of the evolving economy, which is subtle conceptually with the aim that it may be functional within states having a rigid pyramid is the basic purpose of this study. Economies emerging that have been monopolized previously by one product (in the Nigerian case, Oil for instance), or have been conditioned heavily on products imported will find this framework of particularly interesting.

1.1 Research objective

The research is motivated by the desire to see West African'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 from a progression of interviews at three levels of the business

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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.
The research objectives includes;

1. To analyze the macro/ meso/ micro drivers and/or limitations to Reverse Innovation and Frugal Innovation and the Frugal innovation and the extent to which these are applicable to developing economies like Nigeria Economies like Nigeria still emerging.
2. For the nature of the relationship to be analyzed, if any, between Reverse Innovation and Frugal Innovation in IVM company.
3. To identify ways through which companies in developing economies could manage successful Reverse and Frugal Innovations.

When successfully reached, these objectives allow the management of any company in a similar position to IVM 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 IVM to see any links or crossover between the two innovation types within their own organization to reduce any duplication which may be present. Finally, they will enable company management empower other emerging economies to manage their firms to grasp the importance of applying the framework and of making use of these innovation concepts.

1.2 Research contributions

1. This research will be a great addition to knowledge about Reverse Innovation and Frugal Innovation in the management within Nigeria and Africa at large, and will demonstrate some ways in which that knowledge can be put into practice both within the country and throughout the African region.
2. By creating a suitable framework, the research will provide other companies in a similar position to IVM with a suitable tool to ensure that sustainable growth is achieved through using these two innovation types.

2 Related works

2.1 Overview of Innovation

Innovation has always been integral to the efficient development and operation of nations, organizations and firms (Markatou, 2011). It is widely believed that innovation is a crucial source of gaining an upper hand 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. Although, the scope of this research is clarified, in the subsequent paragraphs, the discussion ranges from the definition of 'innovation' through to the debate over the 'originality' ideology. It is totally an enormous duty trying to prove it considering the various categories of literature available. There are in existence numerous innovation categories, therefore, different categories of research are concentrated on the particular categories of innovation.
The concentration of this Chapter is basically on the two categories of asset compelled Innovation; since the purposes of the present study is focused on designing a framework for as well as applying within a developing market Frugal Innovation and Reverse Innovation. An effort to design innovations of standard by means of inadequate assets for resource-inhibited customers is a functional explanation for Frugal Innovation, this approach is given below. The ideas of Frugal Innovation and Reverse Innovation, in the years contemporary have gained substantial consideration in literature both scholarly and administrational. Reverse Innovation

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refers to an innovation originated in a country emerging economically which as well can be transferred to an advanced economy to secure different resource-inhibited customers as a different market region totally.

Notwithstanding the category and magnitude of a business, the core of successful innovation to business and establishment performance remains unchanged. The fact that Frugal Innovation and Reverse Innovation are considered all important to businesses determined to uphold their attractiveness in the fast-moving modern international economy clarifies the improved 10 scholarly and professional reflections. To address this point, Hossain (2017) stated that Frugal Innovation is of great importance for the various categories of institutions, together with government and national institutions, international businesses and small and medium-sized enterprises (SMEs). The surge of developing markets such as China and India brought about rise in competitiveness among initiatives determined to gain from the development and middle-class consumer spending in countries emerging economically (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, like China and India, is significantly lower than those in economically developed nations like 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 Frugal Innovation concept 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 develop 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. One of the core objective of this chapter is to examine the conceptualizations, descriptions, typologies and definitions of innovation, specifically, those relating to resource constrained innovations, Frugal Innovation and Reverse Innovation.

These conceptualizations begin with the basic process-outcome characterization, 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 to the broadness of the innovation subject area. To provide discipline, direction and emphasis on the conceptualizations, 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 particularized 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).

Most literatures reviewed in this section describes the way diverse categories of limited resources supports this scheme, like base of the pyramid innovation, cost innovation as well as Frugal and Reverse Innovation. The ensuing section concentrates on the hypothesizing of Frugal Innovation and Reverse Innovation after analyzing the breadth of resource-limited categories of innovation. The illustrations, meanings and hypothesizing of Frugal Innovation and Reverse Innovation occupy a balance having a modest and direct vitality at one extreme and multifaceted, interconnected vitality at the other as the case is generally with innovation. Frugal Innovation and Reverse Innovation haven been analyzed theoretically, the following observes literature on how to implement the two kinds of resource-limited innovation within establishments. On how it impacts implementation performance and cost savings is where emphasis is laid. Thoughtfulness is given precisely to the problems to functioning in markets where socioeconomic environments and environments (AlOmar, Parslow, and Law, 2018) are massively contradictory and to the business's method to finding ideal resolutions that monitors demanding trade and cultural situations. How the two categories of innovation are spread is reflected on in the subsequent section, the Chapter takes a course that is clear haven observed literature on how industries device Frugal Innovation and Reverse Innovation.

As in the sections preceding this, the distribution of innovation generally, and precisely Frugal Innovation and Reverse Innovation, has manifold approaches and features differing based on the intricacy and location of origin and destination. In the following Chapter, which provides the organization, course, hypothetical support an empirical study of this research, the acceptance of the area of innovation approach which is intricate and divers as are the aspects of two multidimensional multilevel cooperation in Frugal Innovation and Reverse Innovation so as to complete and proceed with the theoretical framework. Concluding this Chapter, there is an examination on the Western alignment of many of the literature on limited-resource innovation. While accounting concurrently for the numerous and interrelating movements of innovation, the framework theoretically following this Chapter tries to simplify the complexity of innovation ideas with limited resources. Moreover, the objectives of this study are entrenched in the perception of the economic emirate and its noticeable looking concentration, this is reflected in the theoretical framework.

2.1.1 Innovation Conceptualizations: Descriptions, Types and Definitions

The terminology innovation is defined and understood in various ways with its application in lots of backgrounds that are reliant on or influenced by physical site and managerial sector, even if public or private, service or production, Multinational Corporation (MNC) or Small to Medium Enterprise (SME). Joseph Schumpeter, in the 1920s created the first meaning of innovation, innovation – being able to do things otherwise (Crossan and Apaydin, 2009). Over time, conversely other researchers and philosophers realized this as a rather inadequate meaning and presented manifold features and variations of innovation. These included definitions highlighting its beneficial nature (Camisón-Zornoza, et al., 2004), successful implementation, (Hobday, 2005), and intentionality (Lansisalmi, et al., 2006). Nevertheless, not all innovations are the same. They may differ based on the height of innovation novelty or the sphere of its application.

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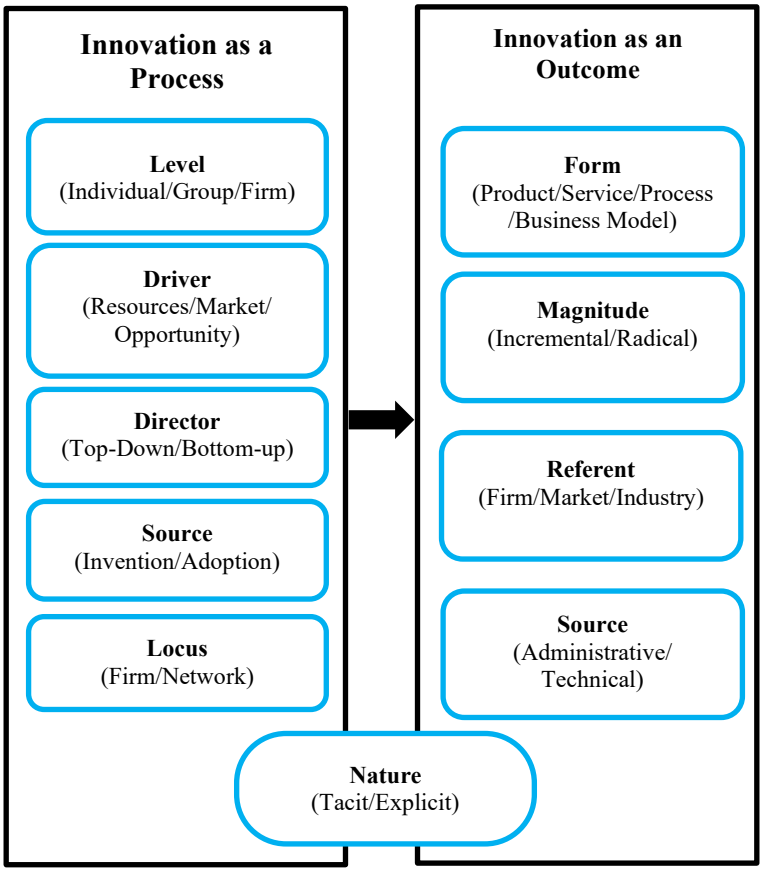

Figure 1: Dimensions of Innovation

Consequently, is what types of innovation may be differentiated. According to Coccia (2006), the most fundamental classification is based on whether the innovation is considered a procedure 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 procedure, 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 procedure 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 in the framework of the organization, firm, location and/or sector. Konovalova and Jatuliaviaiene, (2015) present what they represent as a scientific classification of innovation that borrows from and builds on Schumpeter's original definition. The seven-criterion classification comprises: newness, scale, cyclicality, 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.

Reverse 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 categorizing 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.

2.2 Conceptualizing Frugal Innovation and Reverse Innovation

Because of the lack of any standardized 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.

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 organizations (NGOs), aims to provide more opportunities to 24 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)).*

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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 characterizing 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 localized 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 organization is a principal difference, as market-based innovations are usually organized 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 realized with the help of voluntary labor 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 organization (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).

2.2.2 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 globalization. In general terms, globalization 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 minimize costs at a global scale and maximize market share by adapting products to local markets (Hadengue, Marcellis-Warin, and Warin, 2015). However, with the rise of emerging markets, globalization is no longer the most efficient option for global business. Immelt, Govindarajan, and Trimble, (2009) view localization 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.*,

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(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, *el at.*, (2015) also draw attention to the fact that various flows of global Reverse Innovation exist. Von Zedtwitz, *el 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).

2.3 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 terms of medical equipment and proposes the framework in Figure 2.

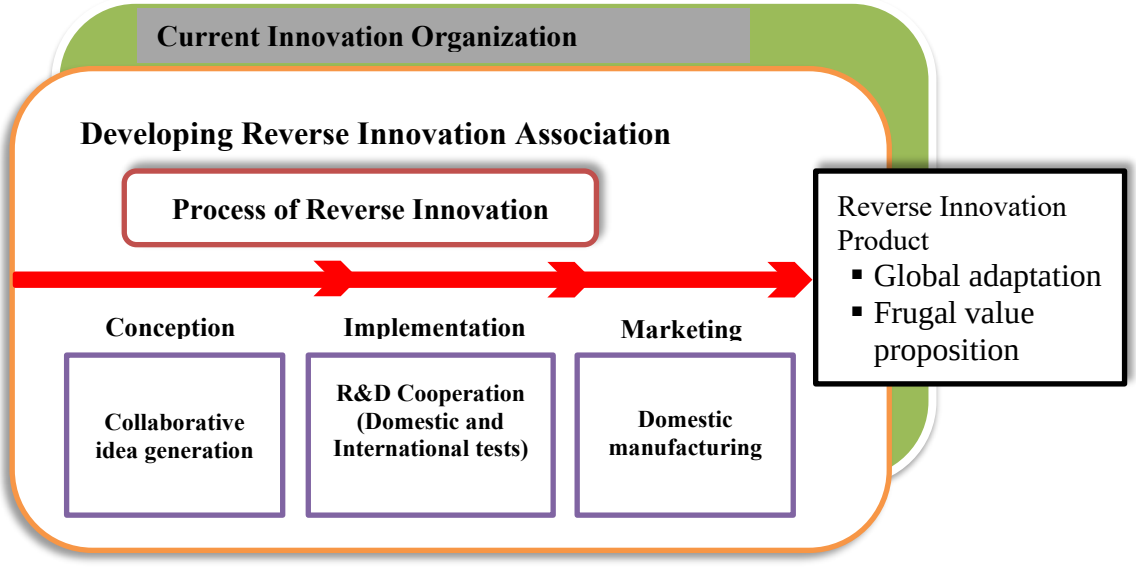

Figure 2: Dellermann's suggested framework

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This framework is a clear indication that Reverse Innovation has no connection with Reverse Engineering, 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. One of the few scholars who proposed openly that limited resource innovations are a technique for expanding into MNCs, as the goal of this study is Dellermann (2017).

2.4 Reverse Innovation and Frugal Innovation; Governance, Sustainability, and the Environment.

In emerging and advanced economies, businesses which are efficacious increase in size. As already recommended by Peng, et al., (2018), development can happen using three main techniques; organic, network-based, and acquisitive. Typically, the first of these is perceived as the utmost sustainable in general, also, in economy still emerging, organic development needs Frugal Innovation commonly. As displayed in Figure 3, their idea of this, is appropriate inside and outside an emerging economy.

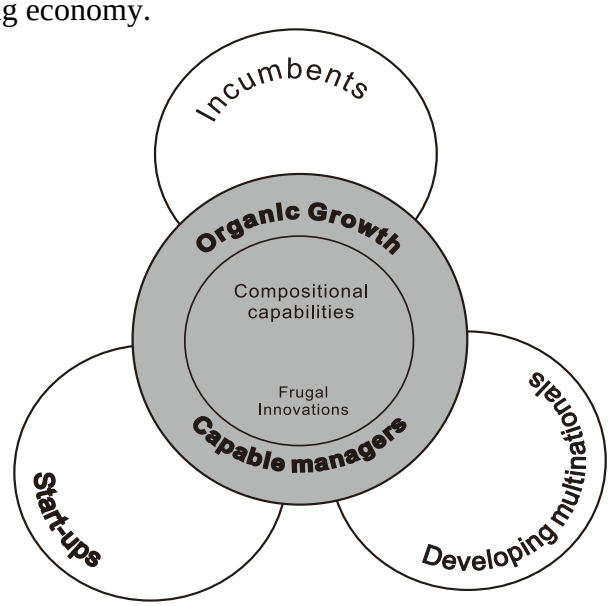

Figure 3: Organic Growth in an Emerging Economy

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 endeavor unsustainable. In the aforementioned sub-section, this is mirrored previous sub-section relating to the diffusion of innovation, unless the innovation is (1.) sustainable (Albert, 2019), and (2.) 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 globalization 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 when the factual prominence of their innovation has not been seized by them. Importantly, environmental guidelines and authority should be contemplated on for deliberation on sustainability. For sustainability to have any actual definition, authority and guidelines on the other hand must deliberate on the need for Frugal Innovations. Ramzy and Zaki (2018), for instance decided 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). More rapidly, environmental authorities will be required, which will kindle the Frugal Innovation required for sustainable development on the other hand to impose the guidelines of the environment which have been made to be more rigorous. For example, a study of the detoxification of seawater in the Arabian Gulf carried out by Barau and Al Hosani (2015), which proposes 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 IVM operate.

3 Research Theoretical Framework

The theoretical framework is supposed to help explain, create and guide practical research process. It either comes as an inscribed report and/or a design that is graphical through which the writer(s) explain the main content, key factors, concepts or variables, and supposed interrelationships to be studied in the form of graphics or narratives. ". They "(Miles and Huberman, 1994, p. 18). As well as the assessment of the research project, the theoretical framework in addition can be used as well to update and help the understanding and examination of research information. This implies that, the theoretical framework can be of serious importance. A theoretical framework that is flawless can guide and direct study, and it can advance with the development of the study and the improvement of the researcher's understanding and clarity of research topics.

Green (2014) states that the theoretical 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, unpredictability and styles precisely in the literature on Frugal Innovation and Reverse Innovation and on limited resource Innovation more generally.

Resource limited innovations, containing Frugal Innovation and Reverse Innovation, are influenced by their physical, technological, social, and geographical locations as pointed by the literature. In addition, they are multi-level structures which implies broader social factors (such as tradition), administrative factors (such as management, construction, resourcing, tradition, education, and company procedures) combined, regulating or, at minimum, impact innovation procedures, results and courses.

As maintained by Hunt and Madhavaram (2012) idea, frameworks that are supported by hypothetical foundations potentially are more valuable 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 theoretical framework's used in defining and/or clarifying the research purpose and focus and in light of the present study's related 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 organization (Crisp, 2014), organizational learning (Harris, et al., 2015; 2016), organizational structure (Hofstede, 1981), organizational 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 theoretical framework in an abstracted and hypothetical 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 at the industry level - which can be summarized 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 organizational drivers of innovation, such as, leadership, organization structure, resourcing, learning organization, organization culture and business processes (see Figure 4).

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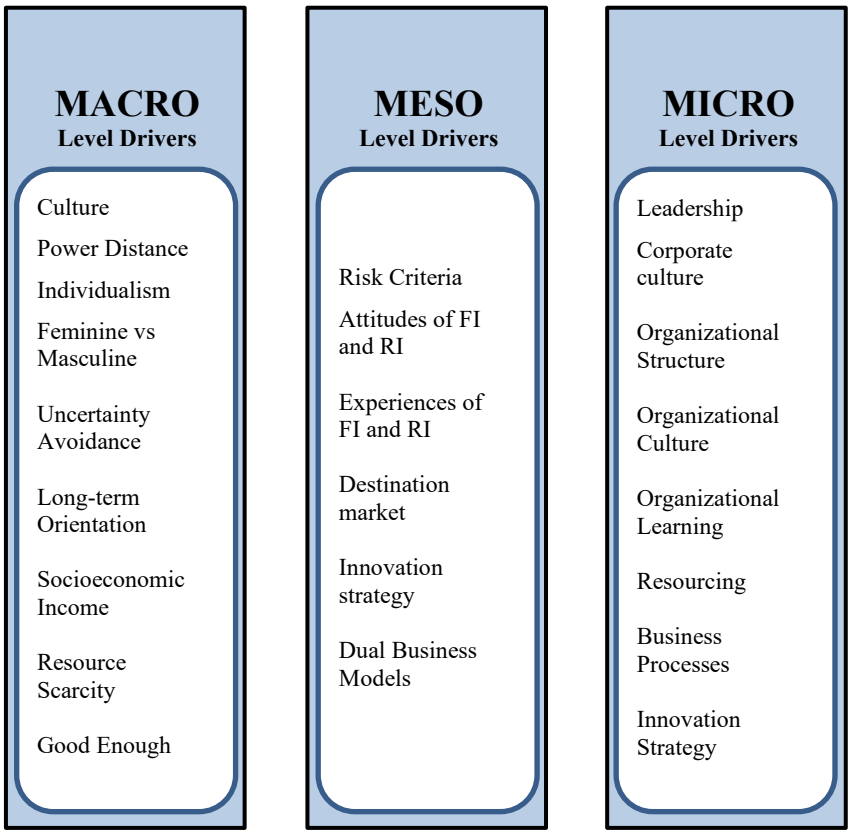

Figure 4: Theoretical Framework for investigating the Drivers of Reverse and Frugal Innovations in an emerging economy.

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 analyzing data on impacts of state culture on innovation within an economically developing country, such as Nigeria. 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. 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 as is the situation of the present study includes manufacturing, ceramic tiles, sanitary ware, water-heaters, and related sectors in Nigeria - 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 not as much expected to achieve the potential benefits available through Frugal Innovation and Reverse Innovation, then those who view such constraints as opportunities to create competitive advantage. Exploring the attitudes and experiences of decision makers within the West African manufacturing sector towards Frugal Innovation and Reverse Innovation, particularly how they view the potential risks and rewards (their companies' risk criteria), of

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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 Nigeria, a country with a dearth of literature on resource constrained innovation, undertaking a qualitative survey of West African manufacturing businesses regarding resource constrained innovation, and investigating attitudes and experiences towards managing two business models for costlier and good enough products.

In addition, informed by Simula, Hossain, and Halme's (2015) theoretical model for Reverse Innovation and Frugal, Innovations (Figure 5), this study's theoretical framework includes two additional meso level drivers of resource constrained innovation to be measured.

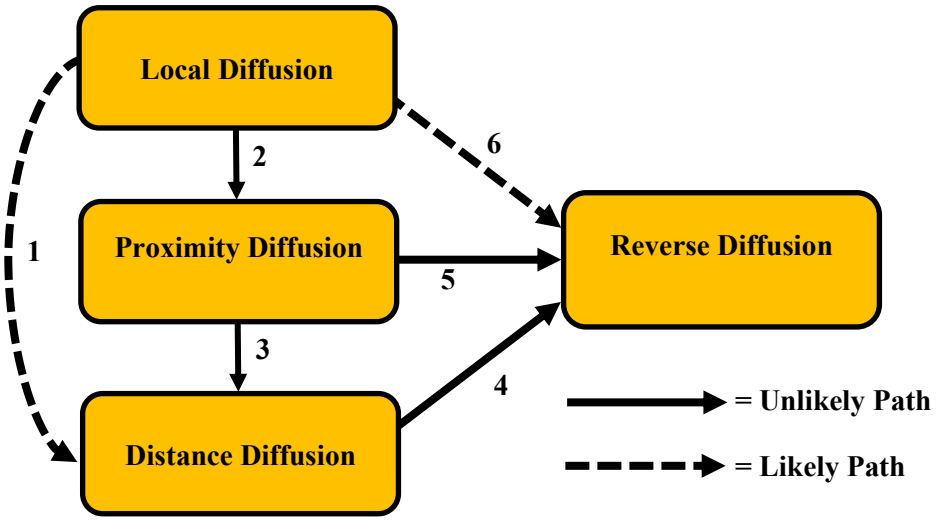

Figure 5: Pathways for Diffusion

- First, the attitudes of the emerging market's industry, in this case the Nigerian 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 organizational drivers of Frugal Innovation and Reverse Innovation.

Crossan and Apaydin's (2009) multidimensional administrative innovation framework has three main determinants of innovation: leadership (at individual and group level); managerial (at organizational level); and business processes (at process level), together with two dimensions of innovation: as process and as an outcome. This organizational 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.

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Existing theories of leadership and innovation, organizational structure and innovation, organizational learning and innovation, and organizational culture and innovation information and provide the theoretical foundation for this level of the conceptual framework.

4 Research methodology

In this section, the procedural background and concepts behind this research project is established, 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 Research Methodological Philosophy and Approach

The onion framework as proposed by Saunders, Lewis, and Thornhill's (2012) is considered as a useful analogy for the research process. This framework clearly indicates the relationship between the different possible choices at each level.

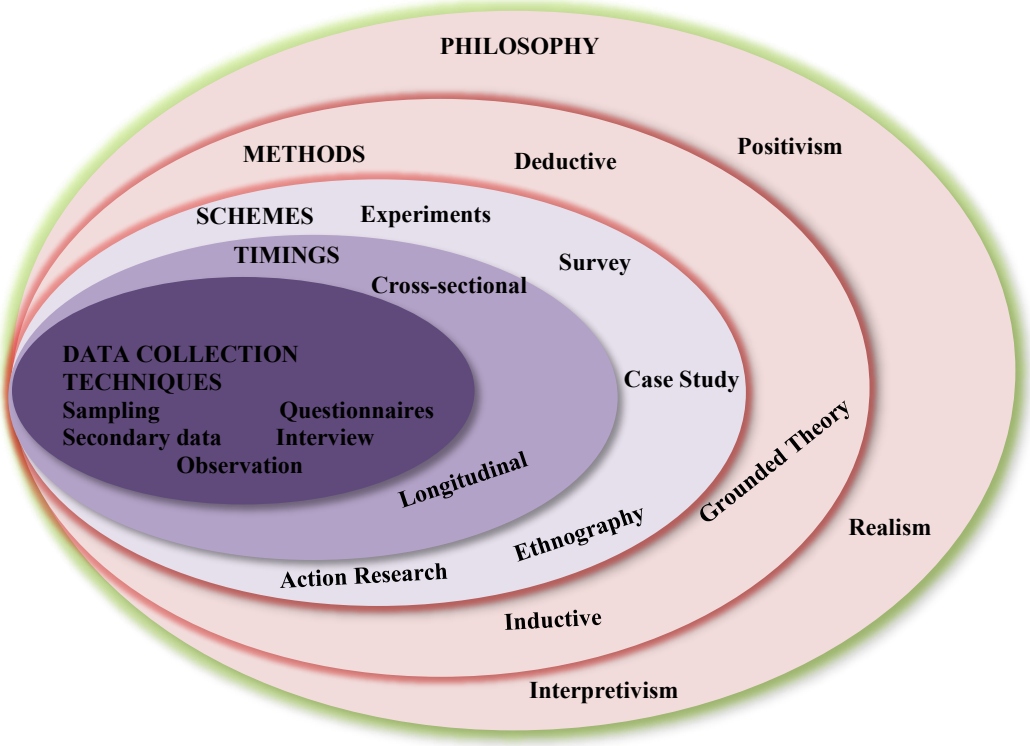

Figure 6: The research 'Onion'

Showing these relationships in this way also strengthens the rationalization 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 this research examined as part of this study, with a comparison of the possibilities which shows clearly why one was chosen in preference to another.

The final choices added together forms the overall methodology for the research, but this section gives the limitations of the choices alongside the rationale, and this also adds to the validity and repeatability of the research program. 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.

On the other hand, research philosophy helps in dealing with nature, development and source of knowledge (Bajpai, 2011). Simply, the philosophy of a study is defined as a belief regarding the way with which data regarding a phenomenon can be collected, analyzed and utilized. 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: interpretivism, realism, and positivism. 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 utilized by the researchers.

A number of variations explains the equality of positivism 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 opinion of the empiricist that the knowledge stems from the experiences of humans. It possesses an atomistic opinion 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 philosophy of study which 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 attain a good picture of the phenomenon. Since the epistemology perception, 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).

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).

Innoson Vehicles and Motors is an instance and examines the impact of Reverse Innovation and Frugal Innovation on their products and local supply chain. Because of the wide-ranging impact of Frugal Innovation and Reverse Innovation, the case study examines three distinct areas of the organization. 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 research, they are important specifically because of the strict hierarchical structure of Nigeria and the power-distance (Lukes, 2005) inherent in Nigerian companies. The first, denoted as the macro level, involves the Innoson Vehicles and Motors companies and the Innoson Vehicles and Motors managers who add to the Companies' development of economic and trade policy.
The meso level which is the succeeding section discussed includes senior level directors of the manufacturing division inside the Innoson Vehicles and Motors. Finally, the third area, discussed as micro level, is the organizational manufacturing and distribution administrational directors, beside the local distribution chain.

4.2 The Case Study

The research study sample is the Innoson Vehicles and Motors, a well-established indigenous company in Nigeria (West Africa) which produces and assembles automobiles and auto-spare parts both for the domestic market and for international export. The specific product range that has been studied in this research is the automobiles (Cars and Motorcycles) and Auto spare parts produced by Innoson Vehicles and Motors.
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 generalization but to include additional companies.
The alternative, the multiple-case study, is also a useful tool (Gustafsson, 2017), but in the West African context, a single-case of a Nigerian company trying to expand into export markets to boost the economy of the nation seems particularly opposite it emphasizes 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 research (Gustafsson, 2017).

4.3 Data collection

A semi-structured dialogue in sequence of senior managers, directors, and academic works who have contributed to the company's strategies are analyzed qualitatively. These were conducted primarily in English, but the occasional sentence, phrase, or word was given in Africana - often in places where a direct translation would perhaps lose its meaning. This is a challenge when collecting data multilingual (Andrews, 2013), because the meaning is the most important aspect of data collected in this way. These interviews were displayed as in Table 1, in the levels described above. This should provide a reasonable cross-section of the management structure of the Innoson Vehicles and Motors (IVM).
Any additional data analyzed and discussed in this study has come from observation (Barker, 1980) - although "observation" was not used as a data collection method, this was observation

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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.

Table 1: Data collection for the Interviews

Level	*Comprising of*	*Number*
Macro	Managers, Educational consultants to Managers, Senior Administration	8
Meso	Regional Managers, Policy makers	5
Micro	Assembly Managers, Dealers, Sub-contract managers	7
	Total Interviews	**20**

4.4 Company background

The company is based in an economy still emerging- Nigeria which is rated as one of the world's largest known oil and gas producing country (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 Nigerian case needs to be considered as unique; any sense of 'copying' or 'following' other specific industries or companies from abroad should be circumvented. Although the situation should be considered as unique, expansion and diversification of manufacturing, as part of a 'new economy' will, perforce, use methods that in some other place is in application. The research is looking for evidence that the Nigerian Vehicle Production company has made adaptations to those methods - have Reverse Innovation and Frugal Innovation developed differently here to the Indian model described by Agarwal and Brem (2012), and if so, to describe how it is different. These differences, if any, can then be considered based on their efficacy and overall impact on the expansion into new marketplaces.

5 Results and Analysis

The data for this research was gathered in three sets of interviews in the Macro, Meso, and Micro levels of the company structure (see section 4) and the examination of the discussion transcripts with the assistance of NVivo 11 software was carried out. 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. Additionally, coupled with the data gathered from interviews, there is secondary data regarding the markets and operational areas of IVM which gives an insight into the relative importance of the marketplaces and therefore of the policies of R&F innovation. The sales figures for IVM have followed a style descending 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 (IVM, 2016) to 12.11% of revenue in 2017 (IVM, 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 internal market policy 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 as products being exported at a lower value than their "normal value" their "normal value" and has always been strongly discouraged by the World Trade Organization 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 IVM, 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 (IVM, 2017a). This, unlike dumping, has not impacted on the Nigerian domestic market, where IVM 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 IVM are discussed based on the company's annual reports from 2016 and 2017. 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 analyzed. Second part of the section is dedicated to presenting the findings and drawing some initial conclusions.

Across the Nigerian marketplace, there have been increases in revenue in Riyadh, Makkah, Medina, and Taif (IVM, 2016; 2017a) despite the decrease in the country's other part country. Since these are the regions which have seen increased investment in infrastructure this is a logical extension of the "Vision 2020" (Federal Government of Nigeria 2017) strategy, and has been, at least in part, due to the increase in the product range of vehicle assembling as well as to the innovations of the vehicle production (IVM, 2017a). Increasing export sales is also expected to expand the economy in general, allowing home market sales to during the coming five years.

The company remains a large company, by a surpassing income of a 1.1bn Naira, 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.

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 discrete "pair" of interviews.

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5.1 Clustering and Grouping Data

Figure 8: A single Interview Unpaired. Sources Clustered by Word Similarity. Three sets of data interviews. Data analyzed using NVivo Software

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 measured 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

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appeared to be paired after sub-division. The final tests before the detailed analysis began was to find words the words most frequently applied in the response to the questions.

5.3 Data Structure

Figure 9 illustrates how the collected data was organized during the analysis from the idea of Macro, Meso, and Micro drivers to theoretical drivers, and finally to vital items.

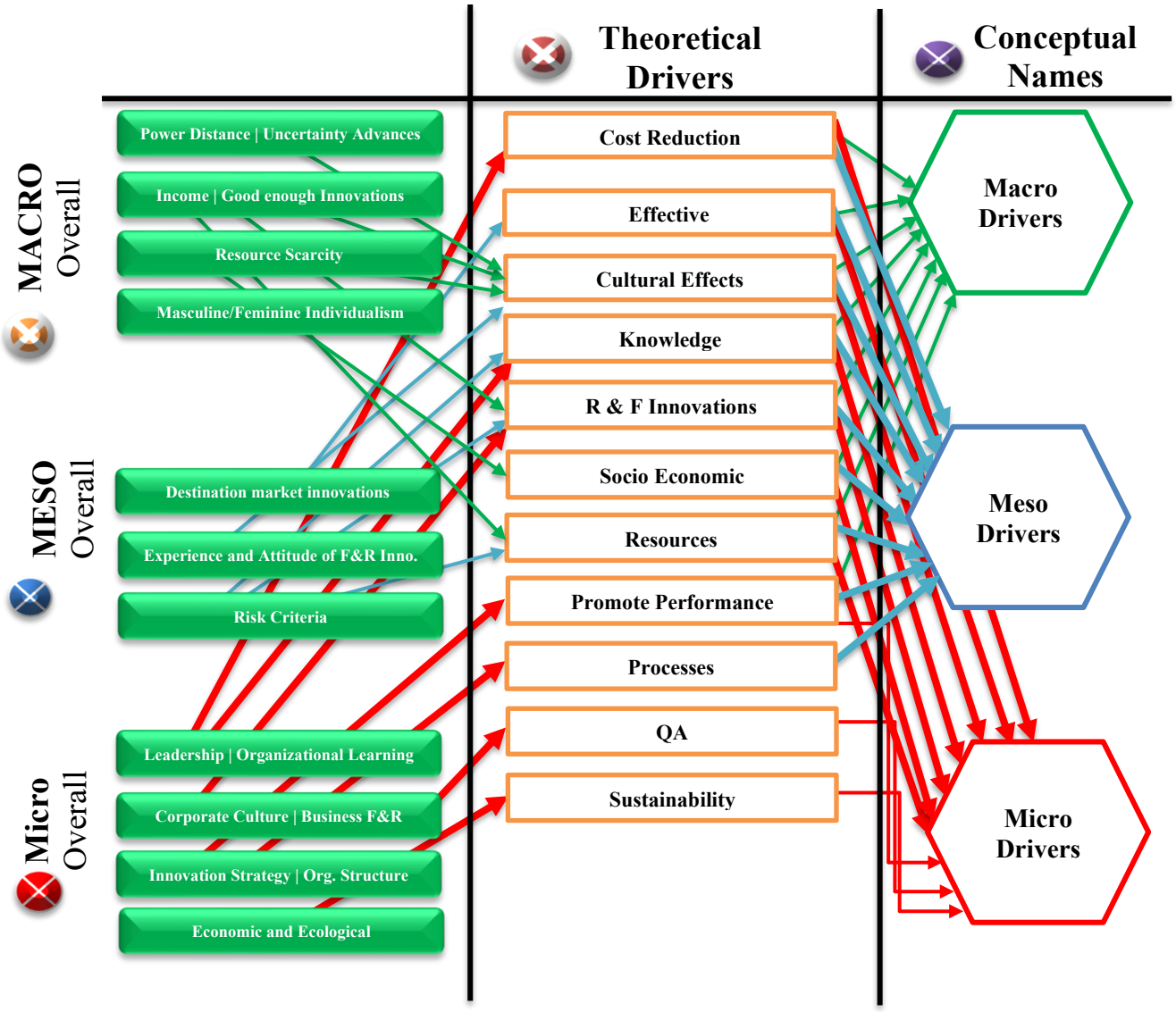

Figure 9: Simplified Links of Data structure: Conceptual to Theoretical to Essential

5.4 Data Analyzing

The deeper discussion to be studied 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 the next section, and from that to the conclusions and recommendations. The findings begin with the

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definition of Reverse Innovation and Frugal Innovation from the data, and a comparison of that with the working definitions given in Section 2. The findings are then discussed level by level and item by item leading to the initial conclusions which are discussed and developed in the next section.

5.5 Results and Findings

The initial findings has three types of levels (Macro, Meso, and Micro), and within those divisions into sub-divisions such as "Socioeconomic Factors". These factors for each level shown are in Figure 10 and the associated Table (Table 2). 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.

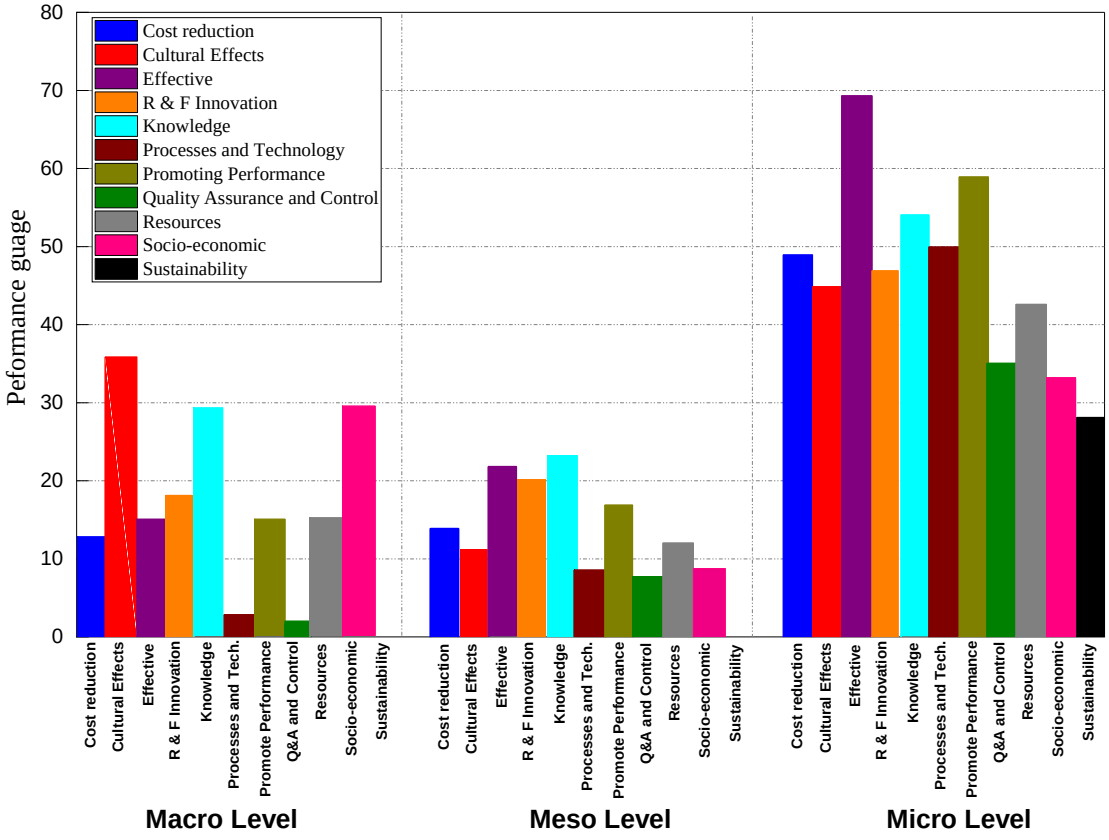

Figure 10: Code Matrix illustration

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Table 2: Analysis of Code Matrix

Level	Cost reduction	Cultural Effects	Effective	R&F Innovation	Knowledge	Processes and Technology	Promoting performance	Quality Assurance and	Resources	Socio-Economic	Sustainability
Macro	12(6)	36(2)	15(3)	17(5)	29(3)	3(3)	15(3)	2(2)	15(2)	30(2)	0
Meso	14(4)	11(5)	22(3)	20(3)	23(2)	8(8)	16(4)	7(7)	12(4)	8(9)	0
Micro	48(5)	35(6)	69(1)	46(6)	54(3)	50(5)	59(7)	35(5)	43(8)	33(10)	28(11)

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. In similar vein, the convergence of the Micro and Meso level views may be a positive indicator of organizational change creeping up through the organization.
Although change in Nigeria (West Africa) usually needs to be "top down", there have been indications that, as the workforce becomes "Nigerialized" the traditional power distances are becoming less apparent, and that some changes are occurring from the "bottom up".

5.5.1 Reverse Innovation and Frugal Innovation defined by the Interviewees

During the interview process the participants were asked questions designed to ensure that Reverse and Frugal Innovation comprehension was in general agreement with the accepted definitions of the terms. So of the meanings of the terminologies as the contributors mentioned, nonetheless, they majorly were perfect and succinct alongside being correct, even if it seemed initially as though there may have been some misunderstanding at the Macro level between the terms "Reverse Engineering" and "Reverse Innovation". The complete answers to the questions at this stage (see Section 5.5.2), auspiciously exposed that these managers were well-aware in fact of the difference. The operational meanings for these two terminologies founded on the outcome of this data are as follows below.

5.5.2 Analysis of the findings at the Macro Level

In Table 3, a short summary of the Macro level findings is presented. A tabular analysis is presented to illustrate respective examination, the three discussion levels were examined individually.

Table 3: Analysis of Macro level findings

Macro Level factors	Findings
Socio-Economic factors	• Recognized by senior management as one of the driving factors in Nigeria • High power-distance results in resistance to innovation • Need to sell to resource constrained customer which in turn is a good driver of innovation
Resource	The impact of resources is observed in;

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	• Profitability • Quality • Cost-reduction But not sustainability.
Promoting Performance	Observed as an important (company culture) which results in uninterrupted expansion.
Knowledge	Customer knowledge is a good driver to innovation
Reverse Innovation	• RI is an innovation that does not distraught existing state of affairs. • It is also referred as "Innovation through the back door"
Effective	Corresponding to both productivity and business development which makes innovation satisfactory
Cultural Effects	Always "top-down" not "bottom-up" which results in innovation reduction.
Cost reduction	Only acceptable through improved productivity

5.5.3 Analysis of the findings at the Meso Level

Haven finished the performance and appraisal of the obtained information from the Macro levels of administration at IVM, the discussion will now be moved to the "middle management" of the business at the Meso Stage. Two new factors were deliberated on at this level; "Quality Assurance and Control" and "Processes and Technology". Further down, the purpose for the overview of these new factors is dialoged. The factors are presented in Reverse alphabetical order as above. 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 4: Analysis of Meso level findings

Macro Level factors	**Findings**
Socio-Economic factors	Considered as a factor in outside markets but not in the domestic market.
Resource	Keeps processes running efficiently
Quality Assurance and Control	Innovation must not affect quality
Promoting Performance	Reverse and Frugal Innovations at IVM promotes sales and employee performance
Processes and Technology	A key driver of innovation that affects profits.
Knowledge	Customer knowledge is very significant to innovation. There is no business without customer awareness, thus no innovation.
Reverse and Frugal Innovation	Essential for Nigeria business to always stay ahead and not behind their global counterparts.
Effective	In business, profit is loss unless innovation is effective
Cultural Effects	There is more social mobility at the level of innovation
Cost reduction	Innovation brings about cost reduction while quality is maintained.

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5.5.4 Analysis of the findings at the Micro Level

The last collection of interviews were with the micro level of management - those involved directly in the production, promotion, sale and development of the products of IVM. 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. Considerably, 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 Nigerian 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.

A reassuring mark that this approach will infiltrate aloft as they are endorsed to the subsequent stage is because this level of administration comprises the younger members of executive.

Table 5: Analysis of Micro level findings

Macro Level factors	**Findings**
Socio-Economic factors	Reverse Innovation results in a resource constrained customers
Resource	Resources are needful for sustainability and innovation
Quality Assurance and Control	Q&A is a very important factor of innovation.
Promoting Performance	Helps acquire the best not the most from employees
Processes and Technology	Connected to profitability and performance which are propelled by innovation.
Knowledge	Knowledge propels quality while quality propels innovation
Reverse and Frugal Innovation	These two innovations minimizes costs of production and they are easy to introduce at this level
Effective	The effectiveness of an innovation will result in quality, knowledge and profitability.
Cultural Effects	This level records the highest social mobility and is a good propeller of innovation
Cost reduction	Propelled by Innovation
Sustainability	Sustainability is very essential for both the society and innovation.

5.6 Assumptions from the data

A framework of drivers and limitations to Reverse Innovation and Frugal Innovation has being designed by the study. Firstly, the hints were that the obtained and examined data is enough to satisfy this purpose, with the impartially cleat demarcations between the patterns of the managerial phases. This in a better depth is deliberated on although the previous deductions are that the drivers and limitations to Reverse and Frugal Innovation have been explained clearly at every level of management, making designing an appropriate framework conceivable.

Also, the three management strata's similarities and differences also have been debated, and the variations possibly playing out have been added into framework. Hypothetically, the similarities

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and differences are significant as they may be a mark of methods by which Nigeria and other African nations may emerge and or and modify the era.

The method of selling their products back to other African countries was detailed, although the bottom section of Figure 11 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 by the international standard organization (ISO) to ensure that it still met the International standards of the original product made with European and American technology.

The major driver initially was the export sales to African countries and the middle-east countries, but once this market was established the company concentrated on expanding its sales area to to other parts of the world. 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 information permitted the study purpose to be achieved as well.

This in depth is further deliberated on in succeeding section, while the three study aims preliminary summaries follow – each aim is repeated in the initial paragraph of the subsection which recounts to it. The study questions about the Drivers and Limitations to Innovation are themselves examined and answered.

The drivers and limitations to Reverse and Frugal Innovation at the three administrative levels are the foremost purpose. The information has availed with appropriate alterations, the drivers and Limitations for every administrative level. With this the attainment of the first purpose is allowed. At the Macro level, the drivers and barriers were cultural majorly, and the shape of Nigerian society is reflected in the presented notions by this level of administration.

Also, the drivers and limitations recognized at the Meso level were chiefly linked to threat and company aims, as change is gripped and welcomed in this level of administration. Lastly, a distinctive sensation of change that existed at the Micro level of administration that change should not be accepted, and the toughest emphasis was on sustainability. Due of this, control is inclusive in the drivers, and the limitations consisted cultural discernments of innovations.

Table 7: Analysis of both drivers and limitations of R&F Innovation at the three management levels

Management Level	Drivers	Limitations
Macro	1. Culture – Power Distance 2. Culture – Individualism 3. Culture – Masculine & Feminine 4. Culture – Long-term Coordination 5. Culture – Ambiguity circumvention 6. Socio-economic – Income 7. Insufficiency of resource 8. Good enough Innovation	a. Tradition – same yesterday, same today, same tomorrow b. Fear of displeasing the government c. Need for certainty d. Product affordability e. Idea misinterpretation f. Commitment of management
Meso	1. Risk criteria	a. Idea misinterpretation b. Size of market

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	2. R&F innovation attitudes 3. R&F innovation experiences 4. Innovation approach of destination market 5. Twofold Business Models	c. Demand of Customers d. Commitment of management
Micro	1. Strategy of Innovation 2. Sustainability 3. Business resources and processes 4. Organizational culture and structure 5. Organizational learning 6. Leadership 7. Corporate culture	a. Cultural perception of innovations b. Application of resources and power c. Economics d. Cultural understanding of business processes and resources e. Commitment of management

5.5.5 The Relationship between Frugal Innovation and Reverse Innovation at IVM

Examining the nature of the relationship, if any, between Frugal and Reverse Innovation in Innoson Vehicle and Motors is the second aim. Variations of innovation has seldom been acknowledged by companies, which for the motives of culture, usually have been tremendously unadventurous in their perspectives.

Contemporary economy has been founded on oil, even though there is a stretched history of trade and business. Even if "its role in the development and coordination of the market is inalienable" (Tohidi and Jabbari, 2012, p. 535), it has been expressed a long time that innovation is important to the development of market (Drucker, 2015).

Businesses in Nigeria are just starting to embrace innovation regardless of this. Except it is displayed that it does not "go against tradition," the collected information recommends unwillingness to take in innovation. In Nigeria, Frugal and Reverse Innovation are connected since to a bigger or smaller degree they meet this standard degree and are therefore becoming acceptable to companies in the KSA. In one sense, IVM is at a disadvantage for the application of innovation because it is a large company.

More possibly, SMEs are to have the required suppleness to invent than enormous businesses, says Petkovska (2015). Contrastingly, the water-heater section is to continue as if it were a business that is insignificant and different, while the equipment adopted in all the water-heaters was from European firstly (like Bosch), hence, reception of Frugal and Reverse Innovation, once at the Macro level received has been a functional equipment for growth.

Figure 11 below displays the recognized interaction concerning Reverse and Frugal Innovation. The association collected from information is vivid – Frugal Innovation into economies comparable but with a GDP somewhat improved, the data in Figure 11 is abridged at the bottom in the timeline, then Reverse innovation focusing on those having the least GDP to sell back to the selfsame divergent African economies. As formerly acknowledged, this model example of Reverse Innovation is precisely what IVM automobile manufacturing has done.

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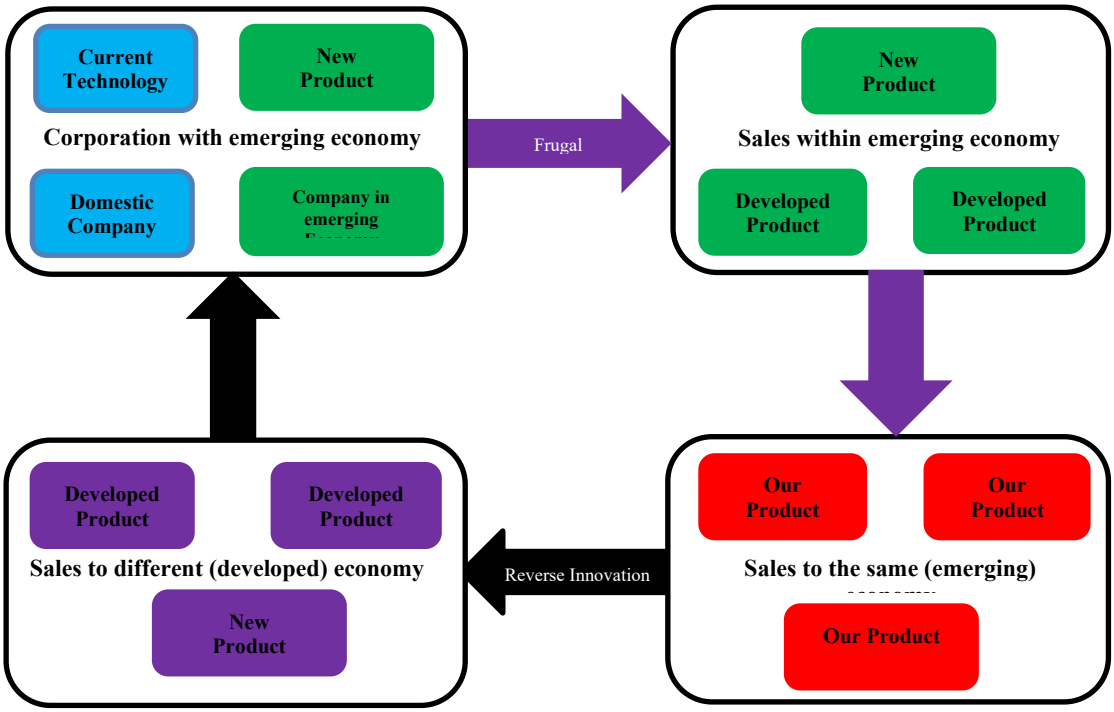

Figure 11: The recognized nexus between Reverse and Frugal Innovation

Sales progress, especially in West Africa, and the businesses not reliant on extra input from its partners anymore clearly are signs of Reverse and Frugal Innovation is successfully being functional within the IVM, and the culturally subtle framework and meanings allow this achievement to be followed in other African countries.

6 Discussions

Both the study questions in view of the conclusions and analysis together with the connections between the study questions and literature review are observed in this section. The discussions also considers the different views or approach of each of the defined levels of management within IVM 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 research the goals and purposes, as it is also essential that these have been met, and to explain how they have been met.

6.1. Research Aim revisited

Establishing a framework for Reverse and Frugal Innovation is the major goal of this study considering the 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.

6.1.2 Research Objectives reflection

1. To analyze the macro/ meso/ micro drivers and/or barriers to Frugal Innovation and Reverse Innovation and the extent to which these are applicable to economies such as Nigeria that are still emerging
    i. This objective was met in the macro level interviews, where the drivers

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identified are mainly cultural, and it was made clear that in a rigidly hierarchical context such as Nigeria, Frugal Innovation and Reverse Innovation may be the only acceptable innovation available.

ii. 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.

iii. Finally, it was also met at the micro level management, where once more drivers seemed centered 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.

2. To analyze relationship the association type, if any, between Frugal Innovation and Reverse Innovation among in the Innoson Vehicle and Motors Company.
   i. There was found to be a clear relationship between these types of innovation at IVM - 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.
   ii. All administrative levels recognized the Frugal and Reverse techniques as matching.
3. Classifying the techniques through which emerging economies businesses possibly will achieve successful Frugal Innovation and profitable Reverse Innovation
   i. Following the instances made by IVM – haven ensured the appropriateness of these methods, businesses in other emerging economies might profitably apply these techniques, predominantly for developing into a limited resource market place.

6.2 Answers to Research Questions

1. *How does the improvement of product and related Innovation in Frugal and Reverse Innovation affect the want to upsurge the competitiveness of product?*

The information clearly responded to this question, came after more than a few of the questions during each interview level, even though not directly asked as declining the marketing price effects of product on profitability, sales capacity, observation of the product by customers, assurance of the product superiority, distributors choice, and raw resource choice. Each of these areas was discussed at every management level, and the views were broadly similar.

2. *What is the efficacy of resource controlled innovation in stimulating 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 relations to R and D. The views of each level of management had both similarities and differences, as the sub-sections 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 the time of research and development, and therefore cost.

6.4 Research Contributions

The following contributions are a summary of what the research has added through answering the research questions, and from meeting the objectives goals mapped out in the first section.

From a Nigerian 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 Nigerian framework, and provided a culturally sensitive definition which should be of use to other parts of Nigerian 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 Reverse Innovation and Frugal Innovation - the management at IVM are among the first in the kingdom to utilize these methods, and since the introduction of Reverse Innovation and Frugal Innovation, the water-heater division has grown strongly.

IVM is not a small, struggling company in an economy emerging - although sales in its traditional arm have dropped, the company revenue is still around 2,560,000,000 Naira - 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 niche design a niche for a new market. Nevertheless, despite its industrial role in general and particularly in the Africa, 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 IVM as being too confidential for publication. Thus, it is believed that other companies in developing economies (Africa 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 IVM being to accept the technological help from the developed economies, apply some Reverse, but mainly Frugal Innovation to sell the products in the internal market and the local export markets where the company name and logo are known, and accepted as a symbol of value.

After establishing a market, the phase that follows is to apply more Reverse Innovation to design a product type that is attractive in the countries from which the expertise initially was taken from.

6.4.1 Direct Contributions

It should be recollected that IVM will profit immediately from the study, even if there may be boundaries to the capacity to take a broad view from this research, the framework of drivers for Frugal and Reverse Innovation would aid any business that discovers itself in position comparable to IVM, and as the economy of Nigeria develops and stabilizes, the number could be bulky.

As already established, possibly the framework of this research is the largest direct contribution as it does not in a way recommend undertaking business but avails an underpinning basic for developing business in an emerging economy. The framework is a wobbly gathering of notions that about the function of Frugal Innovation and Reverse Innovation that allows these perceptions to be applied even with some kinds of disagreement that is indigenous. Sustainability is the keyword in the twenty-first century. Procedures whose sustainability is indeterminate must be transformed. It is probably more sustainable so long as it can be

transformed using Frugal and Reverse Innovation, the effort hence could also donate towards sustainability in recent companies, that is based on how close enough this part is followed.

6.5 Summary

This section has discussed in depth the data gathered regarding the car production sector of IVM. The research began by revisiting the aims, objectives and research questions, and then giving clear responses to the study 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 section has refined and reorganized the proposed framework of drivers for Reverse Innovation and Frugal Innovation in a developing economy. This updated framework has emphasized some of the difficulties facing management in Nigerian companies, as well as some of the essential changes that may be necessary before any kind of innovation becomes truly acceptable to industry in Nigeria, in part because of the structure of the Nigerian culture in Hofstede's (1981) five dimensions. The recommendations for applying the framework and the identified drivers.

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